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Review Article

FIVE SUNNAH THAT LATER PROVED BY SCIENCE

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ABSTRACT

The Sunnah refers to the sayings and practices of the Prophet Muhammad (SAW) and is the second source of knowledge for Muslims. Sunnah encompasses the beloved Prophet's character, manners, habits, and legislative rites to bring a worshipper closer to Allah Almighty. Although following the Sunnah is not obligatory, it is considered mandatory for enthusiastic adherents due to its spiritual and scientific benefits. Those who wish to learn, Allah has sent a messenger who embodies vitality in his personality for the benefit of his Ummah. This study is a narrative review to highlight sunnah of Prophet Muhammad (SAW) that proven scientifically. A sunnah of Prophet Muhammad (SAW) is early raising that can improve cognitive function, enhanced organizing skills, stay stress-free and enjoy quality sleep. Eating less and mindful eating prevent chronic diseases & health problems (e.g., obese). Furthermore, practicing sunnah when drinking water can prevent many diseases such as gastrointestinal tract (GIT) damage, kidney damage and arthritis. It also prevents choking of esophagus and 'acidosis'. Another sunnah fasting also help people to lose weight, develop a healthy brain and heart, increase growth hormone and acts as anti-inflammation. Finally, staying active for example swimming and horse riding are also sunnah of Prophet Muhammad (SAW) that can lead to good mental health, improve body coordination, and muscle strength and cardiovascular fitness. Staying active, early rising, fasting, drinking water and mindful eating are closely related to five components of the healthy lifestyle. These practices now proved to prevent occurring of non-communicable disease which are the main burden of developed and developing countries including Malaysia.

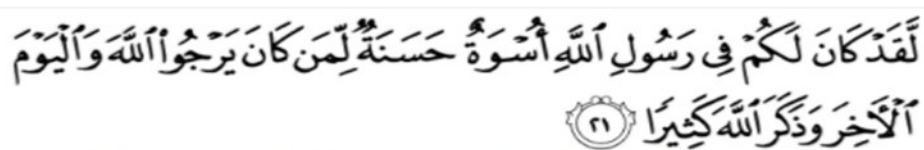
INTRODUCTION

Like all religions, Islam requires a specific code of conduct for its adherents. However, few religious traditions were quite as strict with the standards as Islam. Much of this is due to the fact that the first Muslims made a point of recording as much as they could about the life of Islam's prophet, Muhammad, in order to utilise it as a guide for their own lives.

Prophet Muhammad (SAW) is Allah Almighty's last Prophet. Allah (SWT) has sent two types of revelation to His Messenger (PBUH): the Quran and the

Sunnah. Everything the Prophet (SAW) says, does, or admits is referred to as the Sunnah. The real affection of Muslims is for Prophet Muhammad (SAW), whose entire life is encapsulated in his Sunnah. Following Prophet Muhammad (SAW) is the proper way that leads to ultimate happiness since he is the walking Quran. It is critical that we learn about the Prophet's Sunnah and then attempt to follow His (SAW) path in order to be successful in both realms. Allah says in the Al-Quran (Figure 1).

Our Holy Prophet Mohammad's (SAW) personality, etiquettes, customs, and legislative responsibilities



“There has certainly been for you in the Messenger of Allah an excellent pattern for anyone whose hope is in Allah and the Last Day and [who] remembers Allah often.” [Quran 33:21]

Figure 1: Verse al-Quran 33:21

were fulfilled to keep Muslim believers closer to Allah (SWT). Prophet Muhammad (SAW) constantly put what Allah (SWT) revealed to him in the form of Divine revelation, the Quran, into reality throughout his life. He fulfilled all of Islam's principles in order to become a role model for Muslims who want to live a virtuous life. There are several physical and spiritual advantages for every Sunnah that a Muslim practices [1].

EARLY RISING

Every day, Prophet Muhammad went to bed early and awoke to the Adhan of Fajr. Being an early riser has been proven linked to increased productivity and better mental health in general. So, while waking up early may be difficult, you may begin to improve your quality of life by taking little steps, even if it's only waking up 15 minutes earlier to begin with.

Our beloved Prophet Muhammad (SAW) said: "O Allah, bless my nation in their early mornings" (Sunan Ibn Majah). But why is it so tough for us to follow through with the time we have in the morning? It may be the only time we have to spend on ourselves, so why is it so difficult for us to do so? Islam emphasises the need of cleansing our intentions on a regular basis [2]. We should sit down and read the Qur'an and pondering on the verses in the early mornings to help us achieve calm within our souls. Getting up early in the morning to do the Tahajjud prayer before Fajr would make us feel complete and prevent us from feeling lost [3].

Getting up early to study about our beloved Prophet Muhammad (SAW) would allow us to understand why we follow the Sunnah and to truly comprehend what he was like in order to try to be like him. Early risers are more likely to fall asleep quickly. To sleep, you don't need to count sheep. When you get up early, your body becomes sleepy quickly, allowing you to have a good night's sleep as soon as you go into bed. You become used to the natural circadian cycle, which causes you to go to bed and rise early [4].

Longer awake hours result in enough adenosine buildup. Adenosine is a neurotransmitter that inhibits neuron activity, causing drowsiness. Getting up earlier causes adenosine to accumulate faster, making you drowsy later in the day. Going to bed early increases your chances of completing all four phases of sleep over the course of four to six sleep cycles, resulting in a more relaxed and rejuvenated feeling [5]. Because they are more likely to complete all phases of the needed sleep cycles, early birds have greater sleep quality than night owls. They have greater vitality in the morning than night owls, who don't have enough time to complete all phases of sleep. Passing sleep phases and cycles is beneficial to one's physical and mental health. During the deeper stages of sleep, growth hormones are produced, which cause tissue repair and regeneration [6].

You get the advantages of numerous excellent habits when you get up early, resulting to an energetic, well-rested, stress-free, punctual, and healthy you. You gain a feeling of order in your life, which makes you

feel better. In fact, a 2012 National Library of Medicine research found that healthy individuals who got up early had a better mood than night owls [7].

EATING LESS AND MINDFULL EATING

Habit is something that is usually or regularly done. It is genuinely important for everyone to develop good habits in life especially for Muslims. Islam's comprehensive approach to life and thus health offers us the ability to remain robust and healthy. Our prophet Muhammad S.A.W has taught us since 1400 years ago with a lots of good habits to be practiced in daily life. Science later proved that by learning, adopting and maintaining habits derived from the Prophet, can help us reach our full potential, both in our spiritual and worldly lives. One of the habits of prophet Muhammad that science later proved is eating less and mindful eating. Eating less means the quantity of food should be kept at a moderate level. In Islamic practice of eating, the proportion is $\frac{1}{3}$ of food, $\frac{1}{3}$ liquid, and $\frac{1}{3}$ breath [8]. As in one of Hadith Prophet Muhammad S.A.W said: Nothing is worse than a person who fills his stomach. It should be enough for the son of Adam to have a few bites to satisfy his hunger. If he wishes more, it should be: One-third for his food, one-third for his liquids, and one-third for his breath" (narrated by Tirmidhi & Ibn Majah). This eating practice seems to be the guardian of self-improvement.

Prophet Muhammad often reminds his ummah to control appetite and drink as it will affect one's health. Based on The National Health and Morbidity Survey (NHMS) 2019 finding, it is showed that half of adults in Malaysia were either overweight or obese [9]. By controlling our daily food intake, many benefits can be obtained for example prevent disease and health problem like obesity and heart attack, reduce binge eating, lose weight and slow aging. Another point is mindful eating. The term "mindfulness" was defined by Jon Kabat-Zinn as "paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally" [10]. Kabat-Zinn was the original developer and leader of the Mindfulness-Based Stress Reduction program at the University of Massachusetts Medical School. He wrote the book Full Catastrophe Living in 1990 to offer guidance on living mindfully based on his experiences with this program since 1979 [11].

Mindful eating is a way of eating that focuses on people's sensuous awareness of food and the way they taste, feel and experience the food [12]. Imam Ali (a) stated "Remember Allah when eating and refrain from useless talking, as food is a blessing and sustenance from God and you should remember Him and be thankful as you eat". Increasing number of people to believe that mindful eating can help individuals to loss weight. However, it is worth to note that the researchers were unable to find the correlation between mindful eating and weight lose incurred even though 13 out of 19 studies found weight loss in approach of mindful eating [13]. They favored for further research to

find a specific relationship between these two. It is believed that the main goal of mindful eating is to encourage people to fully engage in the eating experience by helping them relish the food and the moment of eating.

Malaysian government has implemented KOSPEN (Komuniti Sihat Perkasa Negara) which gives emphasis on healthy eating as one of the scope to prevent Non-Communicable disease.

THE WAY OF DRINKING WATER ACCORDING TO PROPHET MUHAMMAD SAW SUNNAH

Islam teaches the Ummah to live life in the best manner. There are Al-Quran and the Sunnah of the Prophet Muhammad SAW that we should adhere as an obedient Muslim. The Prophet guided us and left us with his Sunnah for us to follow to lead a hassle-free life. As Islam believers, we must take a good care of our spiritual, mental, emotional and physical health. Diet and nutrition play a big part in maintaining the best possible health [14].

Water is very important in one's life. Even though it is just water but there are certain ways to drink water to get the most benefits out of it. The Prophet Muhammad SAW has already taught us on how to drink water in the most appropriate manner. The ways of drinking which are taught by the Prophet Muhammad SAW has now been approved by science after conducting experiments and researches. There are several ways to drink water which were taught by the Prophet Muhammad SAW. They are do not drink water in a short period of time, drink water while sitting down, drink water while taking three breathing pauses, do not exhale in a drinking water [15].

There's an experiment conducted by the royal society of chemistry on carbon dioxide and water reactions. Own exhaled breath was used to see the water and carbon dioxide reactions. There was formation of weak acid which produce the result by changing the color of indicator (acid-base) [16]. Carbon dioxide reacting with water causes the formation of carbonic acid. We know that when carbonic acid in dissociated it forms hydrogen ions and bicarbonate ions. Hydrogen ions increase the acidity of the solution [17]. These statements from the experiment and research show the negative effects of drinking the water that we had exhaled. Exhaled air contains high level of carbon dioxide. When we exhale into the water we are drinking, the carbon dioxide will react with the water and forms carbonic acid. When carbonic acid goes into the body, it will lower the blood pH as there are hydrogen ions (H⁺) in carbonic acid (H₂CO₃). Lower blood pH causes acidosis which may lead to kidney failure [18]. In KOSPEN (Komuniti Sihat Perkasa Negara) Malaysian government stressed on drinking more plain water rather than sweetened water and made a requirement for any feast festivals or occasions.

The sunnah of Prophet Muhammad SAW is not only for the Muslims to follow but they are for everyone.

Prophet Muhammad SAW is the best living example that we should look up to.

STAYING ACTIVE

Several studies show the benefit of staying active by doing the physical activity plays role in prevention of chronic disease and premature death in any country. Effectiveness of regular physical activity is very much important in the prevention of primary and secondary chronic diseases such as hypertension, diabetes, cancer, obesity, depression osteoporosis, cardiovascular disease and premature death [19]. Rasulullah SAW showed 1400 years ago the importance of activity and doing exercise.

According to hadith, the prophet Muhammad encourages us to staying active by doing some physical activity such as swimming, archery, wrestling and horseback riding. This kind of activity was practice by the people from thousand years ago. We could say that by doing those activity gave the human a benefit without them realizing it [20].

At first swimming is such an activity by which our whole body movement occurs which causes our heart rate to go up and reduce stress in the body. Swimming increases body and muscle strength, stabilize cardiovascular activities. In the water, it was difficult to breath, so it will increase heart rate as the heart need to pump blood to keep oxygenated blood sufficient for our body [21]. Swimming also helps in maintaining a healthy weight as the calorie burn during swimming is really high, we also keep lung healthy by increase the functional residual capacity. The body movement during swimming tone the muscles and builds strength of the body. Lastly, swimming causes total body workout because we use all our muscles during swimming [22].

Riding horse is a common activity in religious school. By riding the horse, we can get a mental health benefits. Many rich people reduces their stress by this activity. During riding on the horse, we can get the feelings of relaxation [23]. By trying to stabilize our body on horse, we can improves our core strength and balance with coordination, as to take control of the horse we need to improve that criteria. Riding horse also can increases muscle tone and strength as we need to hole the rope to stop the horse movement that required big forces. Lastly, we can improves circulation and flexibility of our body, as during horse running, the body condition was upside down, that situation give benefit to the circulation because the blood go all over body, and make our body follow the horse body direction [24].

Archery is good physical activity. The archer usually have good heart health because by archering. To pull the string of the bow, it need a good heart because when the archer pull, they need to hold breath during holding a big forces at their hand. By doing those, the muscle will strengthening, because archer keep giving heir biceps forces. We also can relief our stress as when we let the forces that we hold, it feel like we let got the big stress. Beside that by playing archery we can increase Hand-Eye

Coordination and depth of focus as we need to target the highest score at the archery board [25].

Wrestling is actually not a bad thing as long as it was done in appropriate way. By wrestling we can get benefits from the mental aspect as during the match, we need to keep our mental strong as we can be beaten of our opponent anytime and we need to bear with it. Next, by wrestling we need to do the full-body workout [26]. This is because, the body of wrestler need to be fit, as we need to be mobile, the wrestler with fat body, will easily beaten up because their movement will be slow. From the cardio aspect, we can see that wrestling is a high intensity game, so the wrestler need to keep a good stamina by doing cardio workout such as jogging [27]. By wrestling we can increased our strength and endurance, because we need to suit our self in the high intensity condition, we need to focus 100%, and other aspect. From that we will keep reacting fast to suit our self in any the condition. The calorie burn, during wrestling is promisingly high, because we need to move our body fin high speed, and doing cardio. This will give our body good condition [28].

BENEFIT OF FASTING

There are few terms used in fasting known as Intermittent fasting (IF), Alternate day fasting (ADF) and traditional calorie restriction (CR). IF is the practice of energy restrictions 1 to 3 days per week. Whereas ADF means fast and feed in an alternate day. ADF is a subclass of IF. CR is a traditional way of restriction of calories. Nowadays IF gained more practice for Malaysians [29]. IF and ADF helps in losing the weight and protect the heart as it is as effective as CR [30].

Fasting reduces blood insulin levels which helps in reduction of fat. Fasting also increases growth hormone (GH) which helps in fat burning and muscular gain. Not only that fasting improve cellular repair and gene expression [31]. Fasting causes decrease in insulin levels, increased growth hormone, and high norepinephrine level which facilitate body fat reduction by breaking down of fat, and causes high energy expenditure. The experiment showed that short-term fasting increases metabolic rate which ultimate burn more calories. IF utilizes the concept of balance of calories. It induces increases calories out (induces metabolic rate) and reduces the calories in (reduction of food consumption. As reviewed by scientific papers, intermittent fasting can cause weight loss of 3–8% over 3–24 weeks, which is a very important [32].

Oxidative stress is the main source of origin for many chronic diseases. Oxidative stress produces free radicals known as reactive oxygen species (ROS). It damages the cells and important cellular organelles specially DNA. Several studies show that intermittent fasting increases the body's resistance towards oxidative stress and free radicals. Additionally, many studies show that intermittent fasting helps to fight against inflammation which is another major source of common diseases [33].

Heart disease is the world's major killer as of today. It's known that different heath markers also know as risk factors can increase or decrease the risk of heart diseases. Various studies how that Intermittent fasting improve numerous different risk factors which include total and LDL (bad) cholesterol, blood triglycerides, blood pressure, blood sugar levels and inflammatory markers. However much of these studies based on animal model [34].

It's also thought that fasting can improve the way your body metabolizes sugar. This can reduce your risk of gaining weight and developing diabetes, which are both risk factors for heart disease [35]. However, there are concerns about the potential side effects of regular fasting for certain people or in specific circumstances. Fasting is not recommended for people with eating disorders and those who are underweight, women who are pregnant or breastfeeding People taking diabetes medications, people with end-stage liver disease [36]. The effects of fasting on heart health look promising, but more study is needed to determine whether regular fasting can reduce your risk of heart disease. If you are considering regular fasting, talk to your doctor about the pros and cons. Keep in mind that a heart-healthy diet and exercising regularly also can improve your heart health [37].

When we fast, the body tissues causes a “waste removal” process known as autophagy. “Autophagy is the body's way of cleaning out damaged cells, in order to regenerate newer, healthier cells”, according to Priya Khorana, PhD, in nutrition education from Columbia University. “Auto” means self and “phagy” means eat. So the literal meaning of autophagy is “self-eating.” The process of autophagy causes the cells breaking down and metabolizing broken and dysfunctional proteins that build up inside cells for long time. Increased autophagy initiates protection against several diseases, including cancer and neurodegenerative diseases such as Alzheimer's disease [38].

Intermittent fasting and caloric restriction have been shown to extend life expectancy and reduce inflammation and cancer protection in animal models [39]. Intermittent fasting improves metabolic reactions which help for healthy brain. Intermittent fasting reduces: blood sugar levels, inflammation, insulin resistance and oxidative stress. Several studies in mice and rats have shown that intermittent fasting increase the growth of nerve synapse and nerve cells, which believed to have important beneficial brain function. Fasting also increases levels of a brain hormone called brain-derived neurotrophic factor (BDNF). A BDNF deficiency has been implicated in depression and various other brain problems. Animal studies have also shown that intermittent fasting protects against brain damage due to strokes [40].

CONCLUSION

“You have a good model in the Messenger of Allah for one who hopes for Allah and the Last Day” [Qur'an 33:21]. A role model is someone you

would admire and would follow his actions, habits, and way of thinking. In this modern age, so many of us would refer to successful businessmen, scientists or even celebrities as our role models, but the real role model recommended by Allah is none other than our beloved Prophet (SAW).

Five sunnah have proved scientifically beneficial for our healthy life. One of them is early rising. Starting the day early also improves your concentration which means we can achieve those goals and tasks that we set out the night before. It means when we get to our work we stay fully awake and properly disciplined to the day and become more dynamic. Another sunnah of Rasulullah (SAW) is eating less and mindful eating. By eating less and mindful eating we get a lot of benefits such as weight loss, stress reduction, increased satisfaction, better digestion, reduced overeating or binge eating and so on. Third sunnah that was discussed drinking water according to sunnah. By sitting and drinking, our muscles and nervous system is much more relaxed and helps the nerves to digest food and other fluids easily. Our kidneys also pace the filtration process while sitting and drinking. Staying active by doing some exercises were practiced by Rasulullah (SAW). By staying active we can reduce our risk of heart diseases, manage weight better, lower blood cholesterol level, lower risk of type 2 diabetes and some cancers, lower blood pressure and many benefits. The fifth sunnah was fasting. Fasting has enormous beneficial effects on health. Examples are; fasting improves blood sugar control, fights inflammation, boost heart health by reducing blood pressure and cholesterol level, prevent neurodegenerative disorders, improves metabolism system, stimulates growth hormone secretion, delay ageing and alleviate cancer prevention, etc. By following Prophet Muhammad's Sunnah (SAW) people will get blessings of good health from Allah SWT. Science also proven benefits or practicing sunnah. We should practice these sunnah and explore more by doing research on the other habits Rasulullah (SAW)

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Original Article

THE ADULTS' MENTAL HEALTH STATUS DURING COVID-19 LOCKDOWN

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ABSTRACT

This study is to determine the level of stress, anxiety and depression among Malaysian adults during COVID-19 lockdown. It is also to study the mental health distress that affect people based on few different measures and it is based on their mental health status during Covid-19 lockdown. The findings revealed that 67.1% of people have normal level of stress, 5.2% have a severe level of stress and 1.7% have a very severe level of stress. Meanwhile, 40.8% of people have a normal level of anxiety while 8.9% have a severe level of anxiety and 12.9% have a very severe level of anxiety. Moreover, 57.7% of people have a normal level of depression, 9.4% have a severe level of depression while 2.5% have a very severe level of depression. These findings showed that most Malaysian adults are experiencing serious mental health distress as a result of COVID-19 lockdown and measures should be taken to help them overcome this. Therefore, in general, Malaysian adults have poor mental health status during COVID-19 lockdown and authorities as well as government should play an important role to lend a helping hand.

INTRODUCTION

When pandemic first strike, people mostly do not have the full knowledge on COVID-19 and they also do not know how to handle the pandemic. It is not just a problem with virus but other health related problems during pandemic that scared the people worldwide. No enough information is known during that point of time, thus, it is understandable what fear and distress the general public especially people with anxiety issues. Some with mental health conditions usually cannot decipher their own problems and they need professional help. Mental health includes social well-being, psychological as well as emotional aspect. Therefore, it will affects how people feel, think and act accordingly. Nevertheless, how people make choices, handle stress and relate to others are also determined by their mental health. Thus, it is important at all stage of life from childhood, getting through adolescent and also adulthood.

Despite the rising need, COVID-19 epidemic has interfered or ceased key mental health services in 93% of nations globally according to WHO recent assessment. A study has highlights the urgent need for more funding as it is done on 130 nations and

provides the first global evidence of COVID-19 dreadful impact on mental health care access. Before this, global were spending less than 2% of their national funds on mental health which do not satisfy their populations' requirements.

Furthermore, the driving demand for mental health care is driven by epidemic. Mourning, income loss, fear and aloneness can set off mental health problems. Most people tend to have anxiety, sleeplessness as well as increased drug and alcohol usage.

Meanwhile, COVID-19 can trigger mental and neural problems such as agitation, psychosis and also stroke. There's higher chance of severe consequences or even death to people with pre-existing neural, mental or substance-abusing sickness as they are more sensitive to SARS-CoV-2 infection.

Pandemic COVID-19 around the world

The COVID-19 outbreak is labelled as pandemic on March 11, 2020 by WHO as the virus sweep over

the world. to prevent the transmission mission, governments around the world have used various measurements such as lockdowns, social distancing and voluntary self-isolation [1-4]. However, these measures cost people their lives, jobs off, health and wellbeing effects. It is revealed that levels of depressed, anxious symptoms, as well as poor sleep quality are particularly rising in young people. Predictors for containment-related distress may differ according to country.

Internet-based media, digital technology as well as applications like Zoom, Skype, WhatsApp and FaceTime could allow for the maintenance of social contacts and bridge social distance [5,6]. This factor can be stress-relieving. Drug consumption is expected to be boosted by the COVID-19 pandemic. The public health implications of long-term isolation on alcohol use remain unknown, although stress is a significant risk factor for the initiation and maintenance of alcohol abuse [7]. The main goal is to assess public health measures associated with its containment, psychological distress associated with the COVID-19 issue as well as to develop mental health intervention programmes to deal with this problem. Lockdown has greatly influence the young people [1]. Due to proximity to contamination, anxiety is increased in young people, and there is a high intolerance of ambiguity as well as an overload of contact through social networks. Half of the current young sample group is made of students who are consumed by major uncertainties about their future and educational possibilities. They mostly can develop inventive solutions and new skills to deal with the pandemic even though young people are the most mentally distressed. Face-to-face contact cannot be exchanged with contact via digital media and this somehow causes people to worry. Psychological assistance through virtual consultation is available but least likely to be pursued by young individuals [8,9].

Likewise, their anxiety and stress levels can be intensified by exams and distance education as they are involved in new style of teaching and assessment modalities that they are not familiar with, or because of distance supervision, insufficient communication and teachers' monitoring. In order to assist them in communicating with students, it is necessary to propose clear rules for teachers, to provide access to infrastructure that will benefit their well-being like free psychological consultations as well as promotion of access to cultural organizations and also sports [8]. To provide college students with high-quality, timely crisis-oriented psychological treatment, the government and institutions should work together. Hence, to inform student-centered support services and prevent long-term negative consequences whether for working or unemployed youth, a new in-depth study has to be conducted [10,11].

The discoveries disclosed that no work and the free time has lead to anxiety due to a sudden break in people's work routine has resulted in boredom during lockdown. Moreover, financial loss due to loss of job, fear of job loss and salary cuts are among the concerns shared by the employees for their future.

During lockdown, inciting articles, doubtful imagery, false rumours and unconfirmed blog postings circulated by various kinds of media has aggravated the mental health. Public health issue that must not be ignored are coronavirus's psychological effects. It is important for government and policymakers to develop and implement behavioural as well as community-based measures to support toughness. In developing measures to reduce stress and anxiety caused by the COVID-19 lockdown, the findings of this study is expected to assist the government and related bodies, policymakers and healthcare departments [12].

People's sense of self-identity, independence, power and control is provided by work. Lockdown has resulted in no work and free time, which has led to boredom and worry therefore it is an unexpected disruption in their daily pattern. According to some survey, people have started to drink and smoke more out of boredom. According to WHO, this must be stopped immediately or else it will have a negative impact on immune and mental health but for people under COVID-19 pandemic confinement, they believe that drinking alcohol is a beneficial method for coping with anxiety and stress. Financial loss as a result of the COVID-19 lockout is the second most prevalent issue causing anxiety and tension among people [12].

The media such as television, newspaper, radio, internet and social media has kept its readers and viewers up to date on the disease since the outbreak of COVID-19. It has helped encourage people to adopt healthy behaviours and slowing disease spread by providing information on the virus, its mode of transmission, infection risks, precautions and other such advice as it is disseminated through the media and reaches its audience promptly and on time. Nevertheless, people is still confused, fearful, conflicted and anxious leading to stress as there is some biased, deceptive and misleading media coverage of the COVID-19 pandemic. Therefore, it is revealed that a moderating impact between the lockdown and anxiety level is by using the media. To learn more about COVID-19 and its current state, lockdown people are monitoring the news and accessing the internet. In order to cause needless worry and enhance damage perceptions, information about pandemics should not be modified, nor should it be toned down in order to reduce responsibility and encourage carelessness but rather should be kept updated and aware [12].

METHODOLOGY

This is a prospective descriptive, cross-sectional and analytical study. For inclusion, the study have included respondents from all around Malaysia aged 18 years old and above. Study also have excluded respondents who are non-Malaysians and Malaysian aged below 18 years old, indigenous as well as homeless people. Questionnaires are developed with the help of an expert in Psychiatry and used Cronbach's Alpha (.942) to test for reliability and validity of the questions used. The

questionnaire has been randomly spread nationwide and each respondents will remain anonymous. The data mostly focused on their age group, gender, education level, monthly income, living area and internet accessibility. The sample size has been calculated by using formulas and Raosoft® sample size calculator. The calculated sample size is 385 while the actual sample size is 404. The responses that have been recorded are divided into groups for further analyses.

RESULTS

Based on the collected data, analyses has been performed by using IBM SPSS V27. The frequencies of each variable has been noted like socio-demographic characteristics (respondent's gender, age group, education level, monthly income, living area and internet accessibility). Findings have revealed that there is significant relationship between gender and general knowledge of mental health (2, N = 404) = 11.928, $p = .003$. This shows female participants are more likely to have good knowledge of mental health as compared to male. Next, there is significant relationship between education and general knowledge of mental health (8, N = 404) = 145.526, $p = .000$. Bachelor students are more likely to have good knowledge compared to other types of education in regards to mental health. Moreover, there is significant relationship between education and stress level (16, N = 404) = 37.018, $p = .002$. This is because Bachelor students are more likely to have abnormal stress level compared to others. For depression, there is significant relationship between education and depression level (16, N = 404) = 32.328, $p = .009$. For this, Bachelor students are more likely to have abnormal depression level in contrast to others. Lastly, there is significant relationship between income and depression level (12, N = 404) = 27.310, $p = .007$. People with low income are more likely to have abnormal depression as compared to other income group.

DISCUSSIONS

There are a number of preventative measures that can be taken, such as maintaining excellent physical and mental health, learning and putting relaxing techniques into practice, and maintaining good relationships with other people.

Maintaining excellent physical and mental health is crucial in this new era. Exercise not only improves physical health but also acts as a potent stress reliever. Set realistic goals for ourselves and think about non-competitive aerobic activity, weightlifting, or movement practices like yoga or Tai Chi. Endorphins are natural chemicals that improve our mood and help us feel better. It has been demonstrated that aerobic activity releases endorphins.

Next, learn and put relaxing techniques into practice. Everyday relaxation helps to regulate stress and shield the body from its negative consequences. Deep breathing, visualization, gradual muscular

relaxation, and mindfulness meditation are just a few of the approaches we can use. Many web and mobile apps serve as a guide for these tactics; while some need purchases, many are available for free.

Besides that, having a good relationship between relatives and friends might help with mental health distress. People with whom we can discuss our feelings include family and friends. Make sure to discuss our worries and present feelings with reliable people. We might also discuss our issues with them and ask for advice or aid. Be sure to maintain contact while engaging in social distance; for instance, communicate online, via social media, by phone, or via email; many of these options are accessible and cost nothing.

The study has only been done with a limited sample size of 404 respondents among adults in Malaysia, and this sample size cannot represents all the Malaysian community as a whole.

CONCLUSION

In conclusion, this study found that 8.9% have a severe level of anxiety and 12.9% have a very severe level of anxiety. Moreover, 9.4% have a severe level of depression while 2.5% have a very severe level of depression. These findings showed that most Malaysian adults are experiencing serious mental health distress as a result of COVID-19 lockdown and measures should be taken to help them overcome this. Therefore, in general, Malaysian adults have poor mental health status during COVID-19 lockdown. A big sample size and more responders are required to provide outstanding findings in terms of precision.

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Original Article

PERCEPTIONS OF MEDICAL STUDENTS IN MALAYSIA TOWARDS ONLINE ANATOMY LEARNING DURING THE COVID-19 PANDEMIC

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ABSTRACT

Since the first case of COVID-19 in 2019, the World Health Organisation has declared the sudden break of the COVID-19 outbreak as a worldwide pandemic. Due to the closure of institutions, universities and medical schools promptly shifted from face-to-face to online learning until the cases decreased. This study evaluates the perceptions of medical students towards online and face-to-face anatomy learning. A cross-sectional study was conducted for three weeks on 312 medical students in Malaysia to evaluate their experiences on both face-to-face and online anatomy learning. Apart from demographic information, a part of the questionnaire was adopted from Students' Perceptions of Learning from Dundee Ready Educational Environment Measure (DREEM), a reliable and validated inventory to measure students' perceptions of their learning. There was a significant difference in students' perceptions between face-to-face and online anatomy learning ($p < 0.05$). The mean score for face-to-face learning is higher (37.5/48) than online anatomy learning (25.4/48). Out of a total of 12 items, 2 items for online learning and 1 item for face-to-face learning scored less than 2, which indicates the area of significant problems that need to be addressed urgently. Almost 58% of participants prefer to have anatomy learning through face-to-face rather than online and 38.5% of them are willing to have hybrid learning. Overall, medical students in Malaysia have better perceptions of face-to-face anatomy learning compared to online learning. Moving forward, we anticipate more incorporation of online teaching methods within conventional medical education. This need to be carefully done with enough preparation and support systems to achieve its objectives.

INTRODUCTION

The World Health Organisation has declared the COVID-19 outbreak a worldwide pandemic and implemented preventive measures including the closure of universities and medical schools [1–3]. Hence, educational institutions modified their teaching and learning activities to online platforms in order to avoid interruptions [4]. Online learning is defined as technology-based learning in which learning materials are distributed digitally to distant learners over a computer network [5]. Previously, studying medicine had never been done through online or distance learning. However, this is inevitable during the pandemic [6,7]. Currently, there are only a few studies on the impacts of transitioning from traditional face-to-face classrooms to online learning [6–8]. This is very crucial for medical schools to explore especially on the impacts to the students who are currently learning anatomy subject.

The Dundee Ready Educational Environment Measure (DREEM) was used to evaluate students' perceptions

of their educational environments in medical schools and other health training settings. It was published in 1997 and originally designed in English but it has been translated into various languages such as Spanish and Greek [9]. The DREEM tool has 50 items or statements with five subscales include students' perceptions of learning (12 items), students' perceptions of teachers (11 items), students' academic self-perceptions (8 items), perception of the atmosphere (12 items), and social self-perceptions (7 items) [10]. Currently, the DREEM tool has been used widely across the world, especially among medical educators. The educational environment is vital as it is a major determinant in motivation, academic achievement, satisfaction and success in students' learning [11].

The components of the educational environment are not limited, it can be non-physical or physical facilities evaluation. For example, the quality of lecture halls and rooms for clinical activities, the environment in the class created by other students and lecturers, and student learning opportunities. In

a study using the DREEM survey, it was discovered medical students preferred face-to-face over online learning due to less engagement in online classes [1]. Many benefits may manifest in online learning, but these advantages may not apply to all forms of online teaching. Surely, there are several barriers shown to be impacted by online learning during COVID-19 that eventually affected medical students' studies. We are concerned about medical students' perceptions focusing on online anatomy learning, leaving the traditional methods such as cadaveric dissections and formal lectures via face-to-face.

MATERIALS AND METHODS

Study design

This is a cross-sectional and descriptive study which involves 312 participants. A 12-item questionnaire was taken from a section of the DREEM (Students' perceptions of learning). The options given were 5- point Likert- type, with 1 being strongly disagree and 5 being strongly agree. The remaining items in the questionnaire comprised a mixture of question styles to investigate further the advantages and disadvantages of online anatomy learning.

The question items were initially drafted and pilot-tested on 33 medical students before undergoing a careful review and editing process. The questionnaire was created using Google Form and distributed through social media platforms such as Facebook, Instagram, and WhatsApp. The Cronbach Alpha coefficient for the questionnaire was 0.87. This study was conducted from the end of March until mid-June 2022.

Participants

The minimum sample size is calculated by using the Cochran formula. The sample of 373 was obtained with 5% of allowable error (e) at 95% of confidence interval (CI) or Z in the Cochran formula.

All participants were recruited from currently studying medical students (Year 1 - Year 5) in any public and private medical schools in Malaysia and experienced both face-to-face and online anatomy learning.

Participant consent

Participation was voluntary and informed consent was taken from each participant. A mandatory selection box consenting to participation was included at the beginning of the survey, ensuring a 100% consent rate.

Statistical analysis

Data analysis was performed using SPSS version 26. The following statistical methods were used such as descriptive statistics to describe the socio-demographics of participants, chi-square test to determine the association between variables and paired T-test to compare the means between online and face-to-face anatomy learning taken from the same individual. P values <0.05 were considered statistically significant.

RESULTS

Demographics

The participants were well distributed in terms of gender, area of residence and university (Table 1).

Table 1: Demographic characteristics of the participants (n =312)

	Characteristics	Values (percents)
Gender	Male	158 (50.6)
	Female	154 (49.4)
Year of study	Year 1	161 (51.6)
	Year 2	123 (39.4)
	Year 3	13 (4.2)
	Year 4	14 (4.5)
	Year 5	1 (0.3)
Ethnicity	Malay	216 (69.2)
	Chinese	52 (16.7)
	Indian	43 (13.8)
	Others	1 (0.3)
Religion	Islam	220 (70.0)
	Hindu	36 (12.0)
	Christian	34 (11.0)
	Buddha	22 (7.0)
Area of residence	Urban	178 (57.1)
	Rural	134 (42.9)
Marital status	Single	309 (99.0)
	Married	3 (1.0)
University	Government (IPTA)	170 (54.5)
	Private (IPTS)	142 (45.5)

From 312 participants recruited, 50.6% (n=158) of participants were male and 49.4% (n= 154) were female. Majority of the participants were year1 and 2 medical students, Malay, Islam and single. There were significant associations ($p<0.05$) between online anatomy learning with the year of study, university, ethnicity and religion.

Students' engagement on online anatomy learning platforms

Before the pandemic, medical students used various online anatomy learning platforms such as videos, recording lectures, anatomy websites and applications and online quizzes. During the pandemic when teaching was shifted to online

learning, these platforms were more frequently used by the majority of the students. All online platforms showed an increment in their usage during online anatomy learning as shown in Figure 1.

In regards to the number of hours spent on online anatomy learning platforms, the majority of students spent only 0 to 4 hours per week during face-to-face learning. However, during online learning, 107 of them spent 10 to 14 hours and another 91 medical students spent 5 to 9 hours on these platforms (Figure 2). It showed majority of medical students spent longer duration on these online platforms during online learning, perhaps due to time

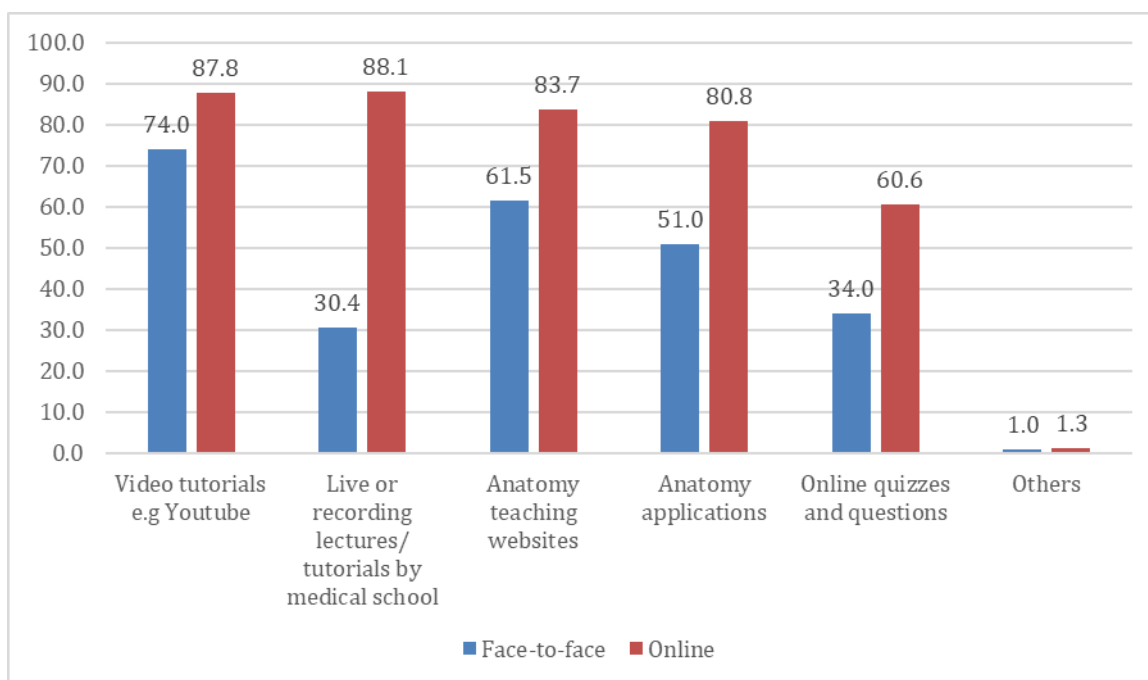


Figure 1: Different types of online anatomy learning platforms used during face-to-face and online anatomy learning.

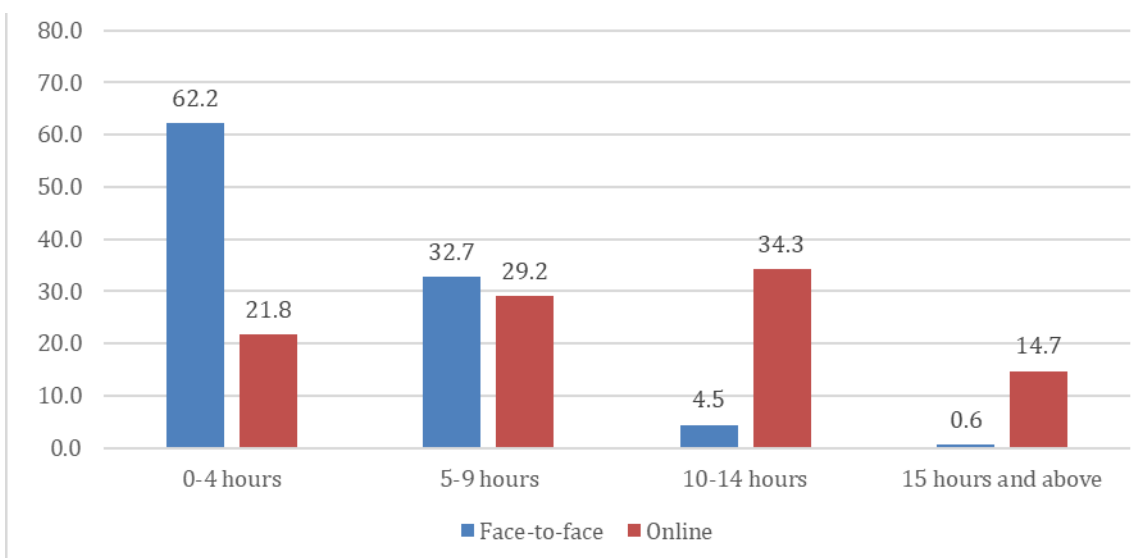


Figure 2: Number of hours spent on online anatomy platforms during face-to-face and online anatomy learning.

flexibility and students-centred learning approaches.

Students’ perceptions of face-to-face and online anatomy learning

Based on the mean score of each individual item, the mean score of 0 to 1 indicates problem areas that need to be addressed urgently, 2 to 3 indicates could be enhanced and 4 means real positive points. Overall, students did not find online anatomy learning to be a suitable or pleasant experience for them. Most of the question items were scored lower during online learning except for one item (Table 2). This is consistent with the challenges for online anatomy learning that they have listed in Figure 3. The majority of them were having problem with internet connections (78.5%), family distractions when studying at home specifically during the pandemic (63.1%) and psychological distress

(64.1%). At the same time, they agreed that online learning did provide some benefits such as no travel (67%), cost savings (65.7%) and the ability to learn at their own pace (60.6%).

Overall, the mean score of students’ perceptions on face-to-face learning is 37.52 while the mean score of students’ perceptions on online learning is 25.39 only. It indicates that anatomy teaching is highly regarded during face-to-face compared to online learning.

Furthermore, most participants prefer face-to-face anatomy learning with a percentage of 57.7%. It is followed by hybrid (38.5%) and only 4% of them choose online anatomy learning (Figure 4). It shows a good indicator to medical educationists to implement technological innovation in anatomy learning wherever possible.

Table 2: Mean score for students' perceptions of face-to-face and online anatomy learning.

Questions	MEAN – Face-to-Face	MEAN - Online
Encouraged to participate in class	3.65	2.18
Often stimulating	3.49	2.17
Student-centered	3.48	2.17
Develop competence	3.51	2.05
Well focused	3.49	2.11
Prepared well for profession	3.41	2.04
Teaching time is put to good use	3.44	2.58
Too focused on factual learning (reversely marked)	0.78	1.33
Clear about the learning objectives of the course	3.47	2.76
Encourages students to be an active learner	3.45	2.24
Life-long learning is emphasized over short-term learning	3.26	2.15
Too teacher oriented	2.08	1.62

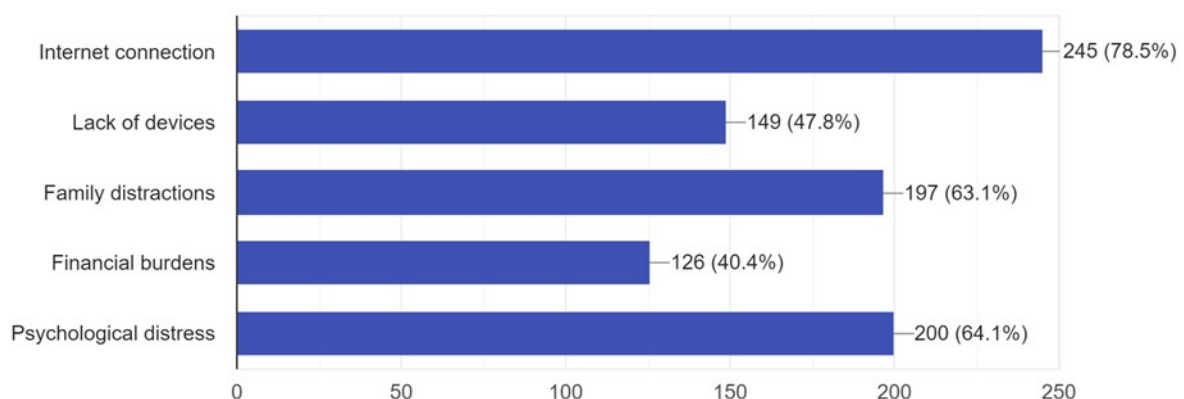


Figure 3: Barriers to online anatomy learning.

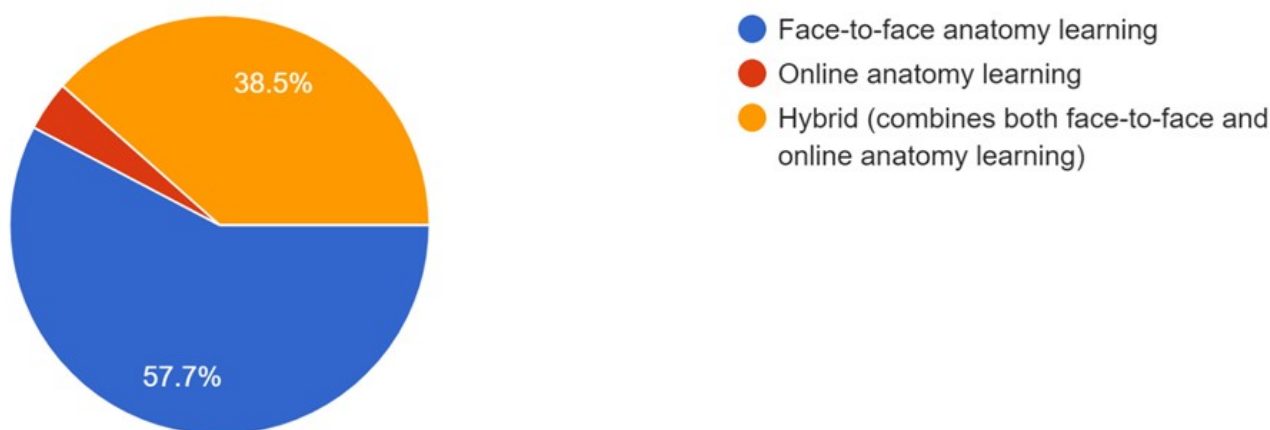


Figure 4: Students' preference for anatomy learning method

DISCUSSIONS

This study was conducted within the population of medical students in Malaysia from year 1 until year 5. During the COVID-19 pandemic, specifically during Movement Control Order (MCO), Malaysia was restricted from going out and they were instructed to always stay at home. This order was one of the ways to mitigate the cases of COVID-19 daily as people stayed at home and thus avoiding the spread of the COVID-19 virus from one person to another person. All activities outside of their home were prohibited. People needed to do everything online such as work and study from home. As for medical schools, they modified their teaching and learning activities to online platforms to avoid interruptions.

Benefits and barriers of online anatomy learning

The majority of the responses in our study are from Year 1 (n=161) and Year 2 (n=123) because they get more affected in anatomy learning. This study involved 42.9% of students who live in rural areas. The area of residence can be a great barrier to effective online anatomy learning. Some of them need to change to other internet providers while the others may need to relocate or go to other places to ensure stable internet network [12,13].

Online learning can encourage students to be an active learner. It is because online classes created by lecturers can be recorded and students can view them over and over again. The usage of anatomy applications that display the actual visual of the structure of the human body will make anatomy learning more attractive for students to explore [14]. Next, the online method adopts a student-centred approach. Procrastination is perhaps the worst enemy of online anatomy education. So, the student needs to manage their time accordingly. Indirectly, it will cultivate the value of self-discipline for pre-clinical students to step into the clinical phase at the hospital.

However, some students may find that they do not have enough resources such as medical books that can be found in the university's library and anatomical models and cadavers in the anatomy museum. Online anatomy learning can also cause problems for those with many family distractions. Poor internet connection may affect the quality of anatomy learning. The mental health of students worsened during online anatomy learning. These can be associated with inadequate interactions with friends that lead to rising psychological distress. Big family and noise distractions may affect concentration in learning sessions [15–17].

Face-to-face vs online anatomy learning

A high mean score for 'encouraged to participate in class' as well as 'encourage to be active learner' for face-to-face anatomy learning compared with online anatomy learning, showing physical classrooms encouraged students to engage with activities such as dissecting. Participation can also help students learn from each other, increasing comprehension through cooperation. Active learning sessions were more effective for learning [18]. Teaching engagement can increase the chances of students' participation to ask and discuss questions in class among friends and teachers.

A high mean score for 'teaching is well focused' and 'teaching is often stimulating' for face-to-face compared with a score of 2.17 for online anatomy learning, showing classrooms is intriguing for the students to acquire knowledge and skills. As well as, the classroom setting provided no or less distraction.

Our study assessed that students have highly positive perceptions of face-to-face anatomy learning except for being too focused on factual learning items. However, it should be highlighted that the classroom supposedly encourages

students to engage with relevant knowledge to strengthen and integrate their problem-solving skills more than factual learning.

Limitations and future direction

First and foremost, there is a possibility of recall bias in this study. The data collection was conducted a few months after the students experienced online anatomy learning. The students may be unable to accurately recall the event, which affects the accuracy of their answers. One of the suggestions is to ideally use face-to-face or telephone surveys. Interviewees should be allowed sufficient time for adequate recall of long-term memory. Secondly, the sample size for this study is moderate. A larger sample size might help in improving the accuracy, validity and reliability of the study. Therefore, a longer study period will be appropriate to increase the number of participants.

CONCLUSIONS

In conclusion, this study concludes that medical students in Malaysia prefer to have face-to-face anatomy learning rather than online. However, it is undeniable that online anatomy learning also does provide many great benefits to medical students nowadays. Thus, this suggests the need for medical schools to manage the barriers and challenges with online anatomy learning to ensure effective delivery of teaching and learning. Hence, we will be able to maximize the benefits that the students gain from both face-to-face and online anatomy learning.

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Case Report

INTIMATE PARTNER VIOLENCE

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ABSTRACT

A 27-year-old married woman presented with anxiety after several episodes of physical and emotional abuse leading to a suicide attempt. She is diagnosed with acute stress disorder resulting from intimate partner violence. She is predisposed to be a vulnerable victim, having experienced the loss of a father figure, rejection and hatred towards her father in her childhood. This condition is precipitated by a few physical and mental abuses that cause an acute stress response, which manifests as feelings of anxiety, fear, and sadness. It is perpetuated by the lack of social support and the absence of a close confidant. Psychodynamically, the unconsciousness mental mechanism of this patient's is thought to employ signal anxiety as a protective function against the threat; using denial, acting out, and repetitive compulsions as defence mechanisms to cope with the trauma. The patient is treated with various treatment modalities, including antidepressants for mood regulation and supportive psychotherapy. Alternatively, psychodynamic psychotherapy and cognitive behavioural therapy could be used to treat this patient. Psychosocial support is provided to her by the Women Aid Organization, the One-Stop Crisis Centre, the police, the social services department, and the legal department. Abusive behaviour toward women is forbidden in Islam because it contradicts the goal of Islamic jurisprudence.

INTRODUCTION

The prevalence of Intimate Partner Violence (IPV) in Malaysia ranges from 4.94 to 35.9%. Two studies reported emotional or psychological abuse as the most common form of IPV (13% of 22%) and (29.8%; CI = [0.27, 0.32]). IPV occurs at all levels of society, but few are reported and brought for psychiatric treatment [1]. This is partly because victims are ashamed and afraid to report the acts. As a result, patients suffer a variety of psychological consequences, including depression and post-traumatic stress disorder (PTSD).

The objective of this case report is (i) to discuss Intimate Partner Violence, particularly the victim's experience of trauma, from a psychodynamic perspective and (ii) to examine bio-psycho-social-spiritual perspective in the management of intimate partner violence.

CASE PRESENTATION

A 27-year-old married Malay woman, childless, school employee, presented to the psychiatric clinic complaining of feeling anxious and exhaustion for the past two months. She described going "crazy" with the anxiety she was feeling. It started with her feeling

stressed most of the time, sleeping poorly, having frequent headaches, and constantly worrying about her living situation. It ended with her feeling down and not feeling like eating anything, especially food, as she complained of low appetite and weight loss.

She lives alone because her husband has moved in with his mistress. She described him as abusive and intimidating. She had constant fears that her husband would visit and physically abuse her again. She believed her husband was stalking her and watching her every move. Whenever she thinks about her husband, she feels so terrible that she breathes heavily for at least an hour, has palpitations, cold sweats, and shakes.

As a result, she had difficulty concentrating or thinking about anything other than worrying about her husband. She also has difficulty falling asleep, which causes her to feel exhausted at work.

A week before admission, she had some thoughts of death based on text messages from her husband. She thought that she would be comfortable if she died and her husband would no longer bother her. She had the urge to kill herself because she felt her life was coming apart at the seams. Two weeks earlier, she had attempted suicide by ingesting a handful of paracetamols, which she fortunately spit

out, feeling very guilty about it. She insisted on being admitted to the ward because she still has suicidal thoughts and no one can stop her since she lives alone. Her greatest fear is her inability to control herself since she has no close friend. She has no psychotic or manic symptoms. She has no history of abuse of illegal substances.

Her father, a 55-year-old retired police officer, and her mother, a 59-year-old housewife, had divorced when she was just six years old because she had previously been abused. She and her little sister came to live with her mother. Her life took a complete turn when she had to help her mother bake cakes that she sold in the market to pay her school fees, as she gradually developed a hatred for her father who had abused the family. On the other hand, her mother has become a strict and punishing mother as she did not want her to end up like her. Her mother scolds her for no reason when she complains about her life. Her relationship with her mother became worse and worse after her husband left her. Even when she told her mother that she was suffering from anxiety, her mother did not believe her and accused her of not being in the right frame of mind and being ungrateful to God for what He had given her. Her mother accused her of being overdramatic and unfaithful to God. She was left without family support and made the black sheep of her family.

She graduated from the Polytechnic and later worked as a school clerk. At work, she was aloof and did not share her problems with anyone, because her husband did not allow her to make too much friendship with anyone. The husband was a gentle gentleman when they first met on an online platform and courted 6 months later. It was a love marriage. Unfortunately, he started to turn into a jealous man who kept an eye on every detail of her and checked her phone to make sure she was not cheating on him by contacting someone else. She was always accused of infidelity when her husband was suspicious of her. He restricted her friends and called her a whore when he was angry. She felt tormented, and this made her husband apologize, and the cycle repeated itself when her husband was jealous of her. She later found out that her husband had a mistress, after which she felt betrayed and tormented. They got into a physical fight and her husband hit her a few times. He left the house and never came back.

Mental status examination reveals a Malay woman of medium height, dressed normally, who appears tired, anxious, and agitated. She is cooperative and speaks in Malay. Her speech is rational, relevant, and coherent. The mood is euthymic and affect is appropriate. She cries through tears and appears anxious when speaking of her husband. No formal thought disorders. She also does not exhibit psychotic features. Her cognitive functions are intact. She has good judgement and insight. Physical examinations are normal.

A diagnosis of Acute stress disorder resulting from Intimate Partner Violence (Battered wife syndrome) is made. She is predisposed to be a vulnerable victim because of her childhood experience of loss of father figure, rejection and hatred of her father. This

condition is precipitated by some physical and emotional abuses that cause an acute stress reaction, expressed in anxiety, fear and sadness. It is perpetuated by the lack of social support and the absence of a close confidant.

Biological investigations such as a complete full blood count, renal profile, liver function test, thyroid function test, fasting blood glucose, and lipid profile show no abnormalities. Psychosocial investigations also show no abnormalities.

Treatment includes prescription of selective serotonin reuptake inhibitors, escitalopram 10 mg nocte, and supportive psychotherapy. Support groups help improve social support and alleviate social stigma. The prognosis depends on the safety of her living environment, the availability of social and legal support, and the coping strategies she uses to deal with stress reactions to physical violence and emotional neglect.

DISCUSSION

Intimate partner violence (IPV) is the surrogate for battered wife syndrome. It is defined as physical, sexual, and emotional abuse and controlling behaviours by an intimate partner. It refers to acts of physical violence such as slapping, punching, kicking, and spanking, including sexual violence such as forced sexual intercourse and other forms of sexual coercion. Emotional (psychological) abuse such as insults, belittling, constant humiliation, intimidation, threats of harm, and threats to take children away is also included. Controlling behaviours such as isolating a person from family and friends, monitoring their movements, and restricting access to financial resources, employment, education, or medical care are not exceptions. The term "domestic violence," on the other hand, refers to intimate partner violence, but can also include child or elder abuse or abuse by any member of a household. Battering refers to a severe and escalating form of intimate partner violence characterised by multiple forms of abuse, terrorising, and threatening behaviour, as well as increasingly possessive and controlling behaviour by the perpetrator [2].

This case illustrates the extent of IPV on the patient's acute emotional status. The psychodynamic hypothesis is that the anxiety is an affective signal of danger that arises in her ego as part of a protective function against threat, i.e., against the agonizing danger posed by the loss of her father through the divorce of her parents when she was six years old. When she married a man she initially loved, only to find out later that her love had been betrayed by her husband. Her subconscious recalls similar signals that later reactivate secondary defenses such as denial (e.g., *when she fell in love with her future husband and thought he was a more sympathetic person than her real father, which turned out to be untrue*) and acting out (*committing suicide by taking paracetamol to cope with the thought that it would be better if she died so her husband would stop bothering her*).

It is also hypothesized that she may have an unconscious desire to re-enact earlier trauma. Through the use of repetition compulsion (*as brought up by her mother when the patient was accused of being overdramatic*) as she attempts to victimize her husband for the pain she endures from her childhood trauma. Staying with a partner who cheats on her and abuses her physically and emotionally could also be a way of dealing with the trauma, she has experienced in the past.

Lenore Walker (1979) (Figure 1) has suggested four stages in the cycle of abuse, namely: (1) build-up of tension, (2) an incident of abuse, (3) reconciliation, and (4) calm [3]. As can be seen in this case, the tension usually builds when the abusive partner becomes excessively angry and even calls her a "whore" This is followed by name-calling, threats of harm, and physical violence. When the tension gradually subsides, the abuser apologizes, remains calm and peaceful. But then the cycle repeats itself over time.

After acquiring a comprehensive understanding of the conscious, unconscious conflict and abuse cycle, coping capabilities are assessed and conceptualized. Part of the treatment is to build up a stable therapeutic alliances and the improvement of her emotional regulation. In this case, an antidepressant is used to regulate her mood.

Next, she should work on her suicidal "acting out". A treatment contract that specifies commandments and prohibitions will help monitor, regulate and prevent suicidal impulses and other disruptive behaviours. Regressive behaviours will not be discouraged.

Cognitive behavioural therapy (CBT) is another option for treating these patients. Therapists can

encourage patients to re-evaluate their thinking patterns and assumptions in order to change thinking distortions such as overgeneralizing bad outcomes, negative thinking that diminishes positive thinking, and constantly expecting catastrophic outcomes into more balanced and effective thinking patterns. These are designed to help the person reconceptualize their understanding of traumatic experiences as well as their understanding of themselves and their ability to cope.

Exposure to the trauma narrative of domestic violence and reminders of the trauma or emotions associated with the trauma are often used to help the patient reduce avoidance behaviours and maladaptive associations with the trauma. The goal is to return the patient to a sense of control, self-confidence, predictability and to reduce escape and avoidance behaviours.

CBT also offers some methods for dealing with suicidal thoughts. These include emotional regulation strategies such as action urges and choices, emotion thermometers, index cue cards, mindfulness, opposite action, distress tolerance skills, and problem solving strategies.

From a psychosocial point of view, she must be taken to safety, since she is already traumatized and living in unsafe conditions, to avoid future harassment. She is advised to contact the Women Aid Organization (WAO) for counselling.

In the event of a crisis, she can seek help at the One Stop Crisis Centre (OSCC) at a nearby government hospital. A police report can be filed at the OSCC. Police will provide security in the hospital. The OSCC provides shelter, legal assistance, and counselling. The social worker can issue an emergency protection order instructing the husband

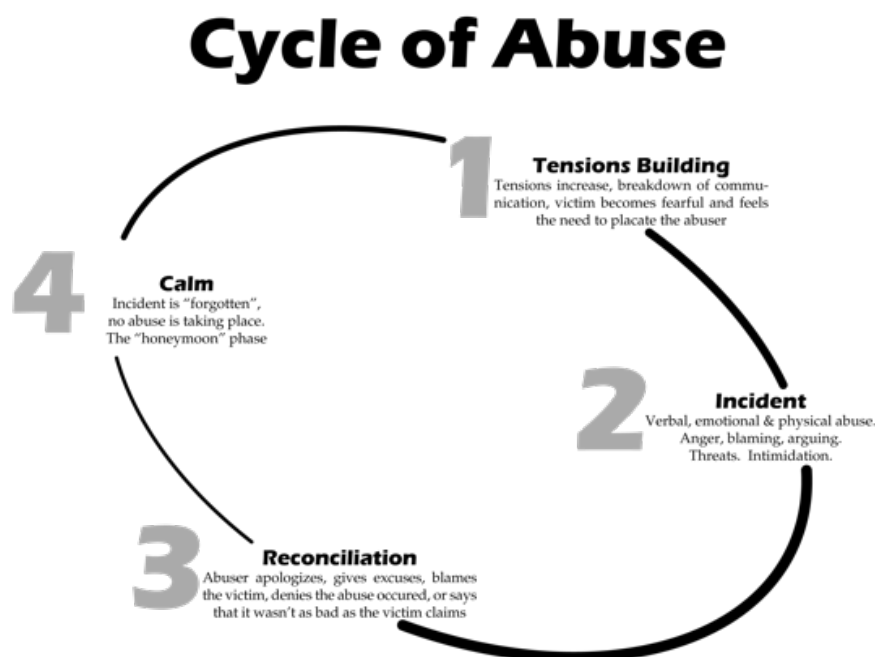


Figure 1: Cycle of abuse by Lenore Walker (1979)

not to commit any further acts of violence. A report can also be filed at the police station. The police officer can petition the court for an interim protective order prohibiting the husband from further abuse.

Islam's stance on domestic violence is clear. Abusive behaviour toward a woman is forbidden because it contradicts the goal of Islamic jurisprudence -particularly the preservation of life and reason, as well as the Quranic injunctions of righteousness and kind treatment.

The Quran and prophetic practise clearly illustrate the relationship between spouses. The Quran states that the relationship is based on tranquilly, unconditional love, tenderness, protection, encouragement, peace, kindness, comfort, justice, and mercy. Domestic violence is dealt with in Islamic law under the concept of harm (darar). This includes the husband's denial of obligatory financial support (nafaqa) to his wife, the husband's prolonged absence from home, the husband's inability to satisfy his wife's sexual needs, or his mistreatment of the wife's family members. If, on the other hand, the wife shows disobedience, shameless defiance and misbehaviour to husband (nushuz), Islam have some solutions as described in Al Quran, Surah an-Nisa', Verses 4:43 [4].

الرِّجَالُ قَوَّامُونَ عَلَى النِّسَاءِ بِمَا فَضَّلَ اللَّهُ بَعْضَهُمْ عَلَى بَعْضٍ وَبِمَا أَنْفَقُوا مِنْ
 أَمْوَالِهِمْ فَإِذَا فَضَّلْتُمْ عَلَيْهِنَّ فِي مَالٍ فَضْلًا فَاذْكُرْنَ أَصْنَافَهُنَّ إِنَّ اللَّهَ كَانَ عَلِيمًا
 حَكِيمًا
 فَعِظُوهُنَّ بِاللَّيْلِ وَالنَّهَارِ وَغِيظِهِنَّ فِي الْمَضَاجِعِ وَأَضْرِبُوهُنَّ فَإِنْ
 أَطَعْنَكُمْ فَلَا تَبْغُوا عَلَيْهِنَّ سَبِيلًا إِنَّ اللَّهَ كَانَ عَلِيمًا حَكِيمًا ﴿٣٤﴾

"Men are in charge of women by [right of] what Allah has given one over the other and what they spend [for maintenance] from their wealth. So righteous women are devoutly obedient, guarding in [the husband's] absence what Allah would have them guard.

But those [wives] from whom you fear arrogance - [first] advise them; [then if they persist], forsake them in bed; and [finally], strike them. But if they obey you [once more], seek no means against them. Indeed, Allah is ever Exalted and Grand."

(Surah An-Nisa', Verse 4:34 of the Qur'an)

CONCLUSION

Intimate Partner Violence can be understood from a psychodynamic perspective and treated according to the bio-psychosocial-spiritual paradigm.

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Original Article

KNOWLEDGE, ATTITUDE AND ACCEPTANCE TOWARDS COVID-19 VACCINES IN MALAYSIA

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ABSTRACT

Total number of COVID-19 cases reported in Malaysia is increasing day by day, and the number of severely sick patients necessitating ICU and ventilator treatment has risen. In order to combat this pandemic, vaccines are one of the most effective approaches to safeguard our civilization from COVID-19. Malaysia has launched National COVID-19 Immunisation Programs to stop the outbreak from becoming worse. Therefore, a study was conducted to assess the attitude and acceptance of COVID-19 vaccine in Malaysia. A cross-sectional study was conducted involving a total number of 700 respondents from 29th March 2021 to 28th July 2021. The distribution of questionnaires in dual languages by using Google form was through social media platforms. The questionnaires consisted of 35 questions with socio-demographic information and questions on knowledge, attitude and acceptance towards vaccines in Malaysia. SPSS version 26 was used to analyse the data. The result found that quarter of the respondents do not know about the mechanism of vaccine action, side effects of vaccine and safety after taking vaccine jab. Attitudes of Malaysian towards the COVID-19 vaccine were not very convincing when this study found that only 58% had good attitudes while the other 42% had bad attitudes. Malaysian attitudes depend on gender, ethnicity, age, region, marital status, monthly income, and level of education. However, the acceptance rate was high, where 81% of Malaysian are willing to accept vaccines, and only 19% reject vaccines. The main reasons for rejecting COVID-19 vaccines were worries about the unforeseen effect and efficiency of COVID-19 vaccines. There is an urgent need to counter misinformation and provide accurate and reliable information. Strategies to increase good attitudes and acceptance rates towards vaccines should target community-specific concerns. This study will guide government and public health officials to develop an efficient campaign to deliver public health messages regarding vaccines in Malaysia.

INTRODUCTION

COVID-19, also known as coronavirus disease, is caused by SARS-CoV-2 originating from Wuhan, China, in December 2019. In a short period of time, its spreading has affected the populations of many countries; thus has been declared as a pandemic as of 11th March 2020 by the World Health Organization. Malaysia, as an addition to the total of 79 states worldwide, to be in a state of emergency in response to the pandemic [1]. There were thousands of daily cases reported in Malaysia and even up to hundreds of thousands that have been recorded by other countries. Hence, make up the total new cases of the world beyond control, highlighting the urgency of vaccination. Thus, the production of vaccines against COVID-19 mushroomed worldwide as an alternative to prepare the body's immune system against the coronavirus

since prevention is better than cure. Various sources, including news, newspaper, and social media, are contributing a vital role by advertising the vaccination to the citizens as COVID-19 Vaccine jabs are being distributed everywhere in the world now.

All states and territories have showed an increase in new COVID-19 patients [2]. The vaccination programme in Malaysia or known as National COVID-19 Immunization Programme had been launched on 24 February of 2021. This programme had been launched by Prime Minister Muhyiddin Yassin. The purpose of this programme are to reduce the burden of disease for those in high-risks groups from the COVID-19 infections [3]. Besides, this programme also purposed to control this pandemic of covid-19 by the strategy of vaccination

distribution to those which had been prioritized based on the phases to receive the vaccination.

The groups that had been prioritized for the vaccination on the first phase that will be conducted from February until April of 2021 are the front liners that comprising for public and private health care personnel and for those front liners that consisting of essential services, defence and security personnel. The Ministry of Health has estimate that 500 thousands people will receive the vaccination from February until April of 2021 [4].

The second phase of vaccination programme that will be held from April until Augusts of 2021. The priority groups for this second phase are those remainder of health care workers as well as those in essential services, defence and security personnel. The senior citizens which are in range of aged 60 and over, the high-risk group with chronic diseases such as heart disease, obesity, diabetes and high blood pressure and people with disabilities (OKU) will also had been prioritized to receive vaccination in this second phase. The Ministry of health has estimate that 9.4 million people will be receive the vaccination on this second phase [4]. However, the information be reviewed periodically.

The third phase of vaccination programme that will be held from May of 2021 until February of 2022. The groups of this phase are among those adult population that are in range of aged 18 years old and above which are either citizens or non-citizens. However the priority will be given to those in the red zones followed by those in yellow zones and finally for those in green zones. The Ministry of Health has estimate that around 13.7 million people or more will be receive vaccination on this third phase [4].

There were four types of vaccines from different pharmaceutical companies that have been signed by Malaysia, which are Pfizer, Astra Zeneca, Sinovac and CanSinoBIO [3]. The mechanism of each type of the vaccines may differ or may also have similarities in between. For instance, Pfizer contains an mRNA sequence, whereas Sinovac utilizes virus that has been killed. Meanwhile, Astra Zeneca and CanSinoBIO perform a similar mechanism through a modified (vector) virus. On the other hand, the types of vaccine also influenced its advantages and weaknesses as it might be related to the mechanism factor. Pfizer is simple and quick to produce, but it must be stored in extremely cold conditions, and its type is used for the first time as a vaccine. Meanwhile, Sinovac is suitable for those who have a weak immune system; even so, its manufacturing cost is high. On the other hand, Astra Zeneca and CanSinoBIO are proven technology, yet there is still a need to ensure that the virus is safe to use. As some of the vaccines vary from each other and all of them came from different manufacturers, so does the efficacy that it has on individuals. As to specify, Pfizer, Astra Zeneca, Sinovac and CanSinoBIO can work well up to 95%, 62%-90%, 50.4%-91.25%, and 65.7% respectively.

Herd immunity can be obtained if the vaccination takes place among the population [5]. Therefore, to achieve immunisation in Malaysia through vaccination, this study should be conducted to assess how far the population in Malaysia has knowledge towards COVID-19 vaccine. The knowledge criteria in this study encompass the production and usage, effects, implementation, as well as religious views and beliefs towards the COVID-19 vaccine. Thus, the knowledge is essential for the authorities to take further action towards the government implementation associate with COVID-19.

METHODOLOGY

A total number of 700 responses were received from this cross-sectional study which was conducted from 29th March 2021 to 28 July 2021. Data was collected via online questionnaires by using Google Form. A questionnaire was developed comprises 35 questions with socio-demographic data, knowledge, attitude and acceptance towards COVID-19 vaccine in Malaysia. To identify these factors systematically, literature review and the pilot test were being use as a guide. A pilot study was conducted prior to the actual data collection. The Cronbach alpha value was 0.84. The dual language questionnaire was then distributed through social media platforms such as Facebook, Instagram, WhatsApp and email. The inclusion criteria for this study were Malaysian citizen, age 18 years old and above, and have not yet received the COVID-19 vaccine.

In this study, the sample size consists of 700 respondents with age of 18 to 65 years old. The sampling method was stratified convenience random sampling which involved 297 (42.4 %) male and 403 (57.6 %) females. Any information about the respondent's full name, IC number, or actual address were collected, so they will remain anonymous. Malaysian citizens, age 18 above, and not received the COVID-19 vaccine yet.

Statistical Analysis

The SPSS statistical package version 26 was used to examine all of the data. For categorical variables, the Likelihood Ratio (chi-square) and Games-Howell test were used to compare two groups. T-test and one-way ANOVA tests were conducted to assess differences between groups for continuous variables. A p-value of less than 0.05 was considered significant for all of these statistics.

Calculation of Score

Each answer from 15 questions regarding knowledge in the questionnaire was given a score with a "1" for the positive answer and a "0" for negative answer. Knowledge towards COVID-19 vaccines was categorized into three; poor, moderate and good knowledge. Respondents with score of 0 to 5 were considered as having poor knowledge. Those with score of 6 to 10 were considered as having moderate knowledge. While respondents with score of 11 to 15 were considered as having good knowledge.

In calculation of score for attitude towards COVID-19 vaccines, each respondent will get score for 8 questions regarding attitude. Respondent with score 0-4 was categorised as having bad attitude, while the respondent with score 5-8 was considered as having good attitude towards COVID-19 vaccines. Calculation for acceptance was direct from the only one question either the respondent answer accepts or reject of taking COVID-19 vaccines.

RESULTS

The number of participants in this study was 700 respondents which constitute of 58% (403) females and 42% (297) males (Figure 1). The respondents were categorized into three age groups. The highest number of respondents were from young adults

(18-39 years old) which is 519 (74.1%), followed by middle age adults (40-59 years old) which is 170 (24.3%), and old adults (more than 60 years old). The majority of ethnicity was Malay with 622 respondents (89%), followed by Indian with 49 respondents (7%), Chinese with 12 respondents (2%) and from other ethnicity with 17 respondents (2%). For religion, the highest percentage was Islam (91%), followed by Hindu (6%), Buddha (2%) and Christian only (1%).

The respondent whom single were 445 (63%), married 244 (35%) and divorced or separated or widowed were only 11 (1%). Most respondents had degree and above (65.5%), followed by respondents with diploma or vocational (23.2%), primary and secondary school (9%) and lastly the respondents with no formal education (0.3%) respondents. Lastly, the others was 14 (2%).

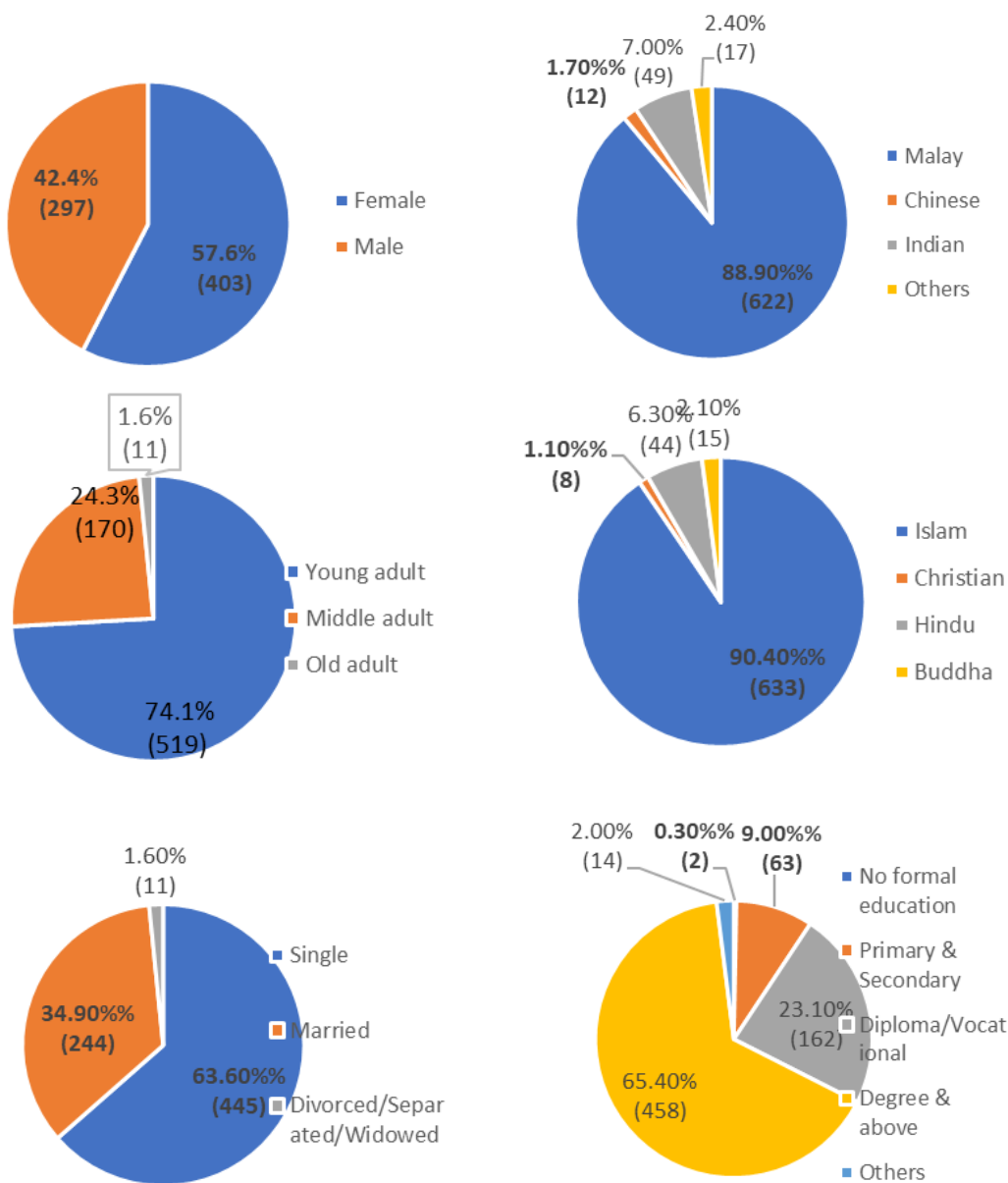


Figure 1: Demographic data

Most of the respondents were from northern peninsular of Malaysia with 41%, followed by respondents from middle peninsular (20%), east peninsular (22%), southern peninsular (12%) and lastly from East Malaysia with only 5%. Mostly respondent were not working which consist of 350 respondents (50%). Respondents in B40 group were 155 (22.1%) and those in the M40 group were 141 (20.1%). T20 group and others group had the lowest number of respondents as those in the T20 group were only 19 (2.7%) and the others group consist of only 35(5%).

Knowledge Towards COVID-19 Vaccines

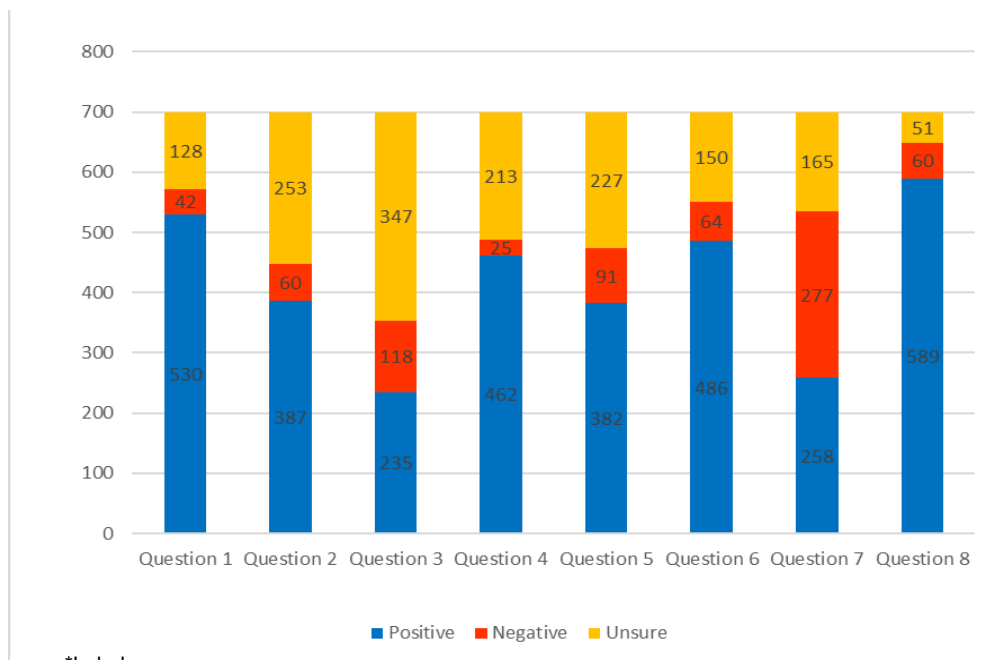
The result in this study revealed that 609 respondents have good knowledge towards COVID-19 vaccines, followed by 83 respondents with moderate knowledge and 8 respondents with poor knowledge. Table 1 showed the percentages was 87%, 11.86% and 1.14% respectively.

Attitude Towards COVID-19 Vaccines

Figure 2 depicts respondents' answers for eight questions regarding attitudes towards COVID-19 vaccine. Overall, question 8 has the most positive

Table 1: Knowledge towards COVID-19 vaccines

LEVEL	SCORE RANGE	COUNT	PERCENTAGE
GOOD	11-15	609	87%
MODERATE	6-10	83	11.86%
POOR	0-5	8	1.14%



*Label

Q1: Do you think that vaccine COVID-19 is essential for us?

Q2: Do you think that vaccine COVID-19 is safe?

Q3: Do you think that vaccine will cause death?

Q4: Do you think COVID-19 vaccine is halal?

Q5: Do you think COVID-19 vaccine is a conspiracy agenda?

Q6: Will you encourage your family, friends and relative to get vaccinated?

Q7: Do you think that COVID-19 can be eradicated if you just follow SOP without vaccination?

Q8: Do you think that after getting vaccinated, you can disobey SOP?

Figure 2: Question on Attitudes toward COVID-19 vaccine.

answer which respondents think that they cannot disobey SOP even after getting vaccinated. Question 3 has the highest number of negative answer (including unsure), that think COVID-19 vaccine will cause death. The number was found to be quite alarming.

had score 5 and above in attitude score. Respondents that had score 4 and below were considered as having bad attitude towards COVID-19 vaccine, comprising of 293 respondents (41.9%). Figure 3 describing the attitude of Malaysian based on socio-demographic factors.

Respondents with good attitude were 58.1%, whom

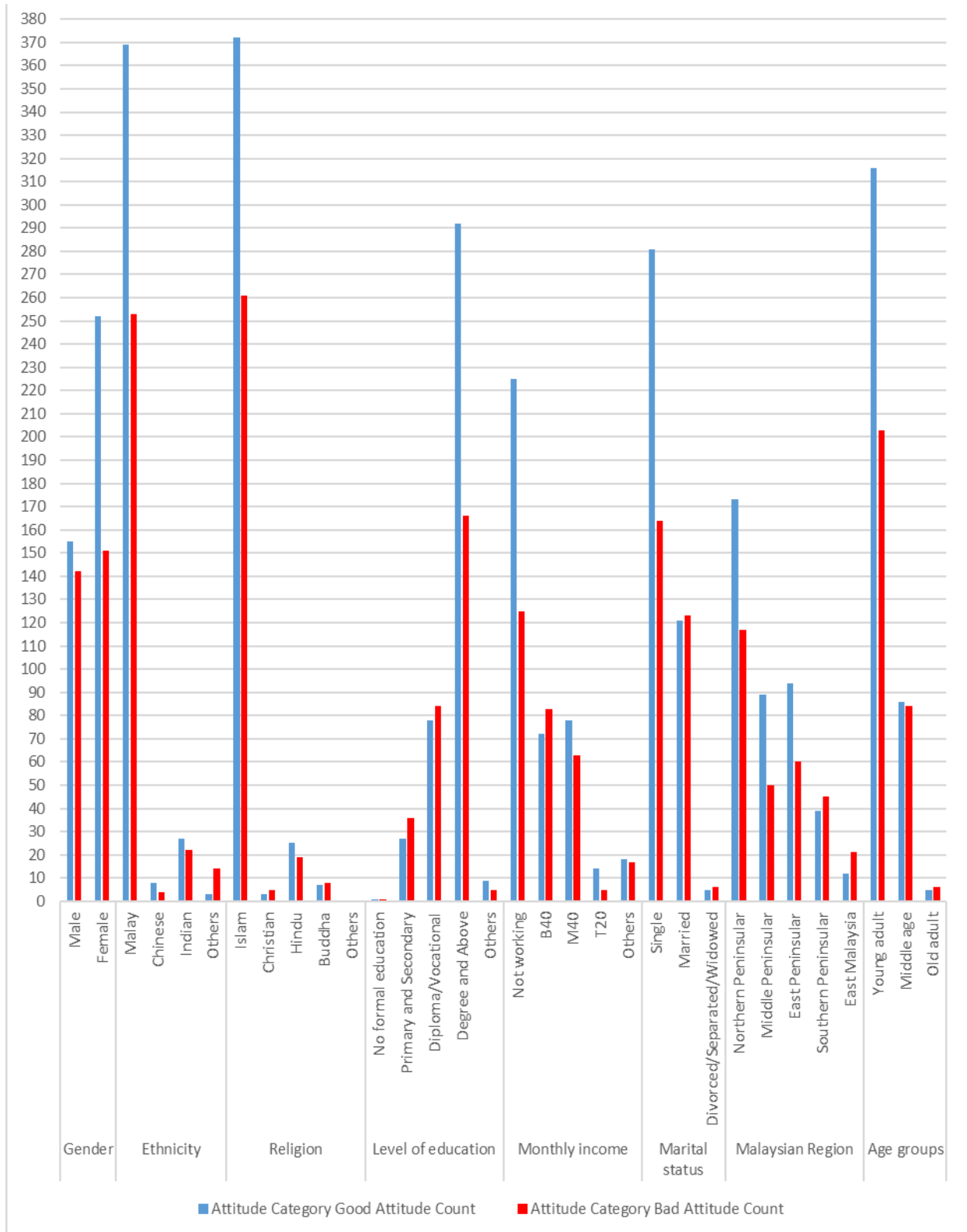


Figure 3: Attitudes category based on socio-demographic factors.

Acceptance Towards COVID-19 Vaccines

The results of acceptance towards COVID-19 vaccine found that 569 respondents (81.3%) accepted vaccine, while 131 respondents (18.7%) rejected vaccine. Figure 4 showed a clearer picture of how

many Malaysians accepted and rejected COVID-19 vaccine based on socio-demographic factors. Most people whom rejected COVID-19 vaccine came from low education background and young people.

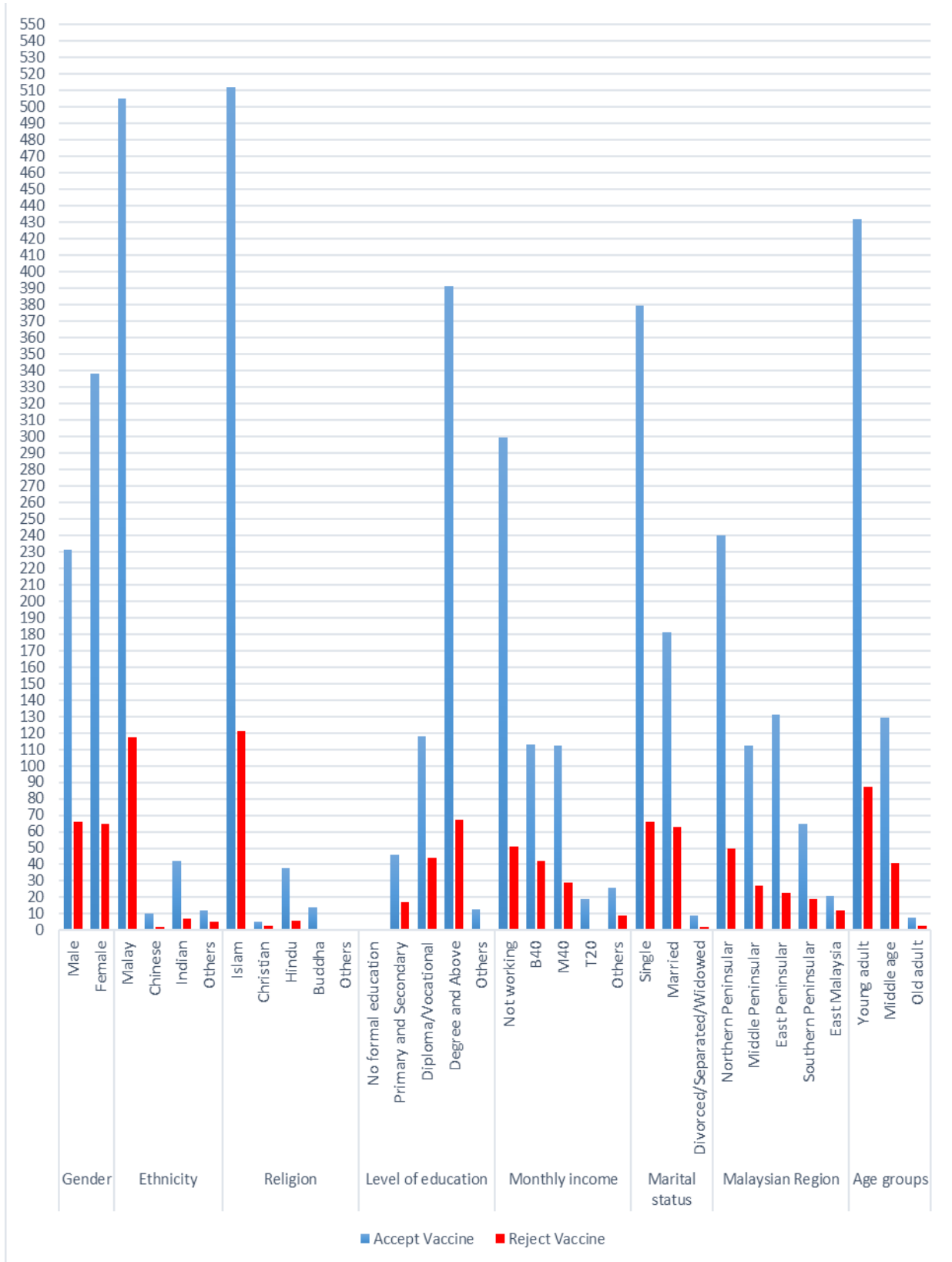


Figure 4: Acceptance Towards COVID-19 Vaccines based on socio-demographic factors.

Based on Chi-square test, it is found that category of attitude either the respondent had good or bad attitude was influenced by gender, age group, ethnicity, state, level of education, monthly income, marital status, did not influence by religion. There was a significant association ($p < 0.05$) between acceptance category and gender, Malaysian regions, level of education, monthly income and marital status. There was no significant association ($p > 0.05$) between acceptance category and ethnicity, religion and age group.

In the last part of the questionnaire, respondents were asked to list down the reason of rejecting vaccines. The reasons were showed in Figure 5. The main reason was that Malaysians are worried about unforeseen effect from COVID-19 vaccine and not really sure about the effectiveness of the vaccines.

DISCUSSIONS

This study showed that the percentage of respondents with good knowledge on COVID-19 vaccination is high (87%). This percentage shows that most of Malaysians have good knowledge on COVID-19 vaccination. To compare this result with previous studies, what can we say is that all results are consistent. Study by Negin Vaghefi et al. and Azlan

A et al. gave the results 94% and 80.5%. Knowledge towards COVID-19 were associated with educational level. This shows that educational level has important role in determining the level of knowledge. In this study we found that respondents with bachelor's degree or above have higher knowledge level compared to lower educational level. As educational level is related to cognitive ability, then it is not surprising to see such finding.

Malaysia has a high acceptance rate (81%) towards COVID-19 vaccine, and only 19% Malaysian adults reject vaccine. The result was similar to a study by Syed Alwi (2021) which was conducted in December 23–29, 2020, recorded 83.3% acceptance rate in Malaysia [6]. A study by Vaghefi (2021) which was conducted from 1 December 2020 to 25 January 2021, recorded 72% acceptance rate in Penang population [7].

However, this study found that only 58% Malaysians are having good attitude towards COVID-19 vaccine while the other 42% are having bad attitude. It does not in accordance with the high acceptance rate, probably the questions were not enough to reflect the real situation. But, if this is true, there is an urgent need to counter misinformation and provide accurate and reliable information.

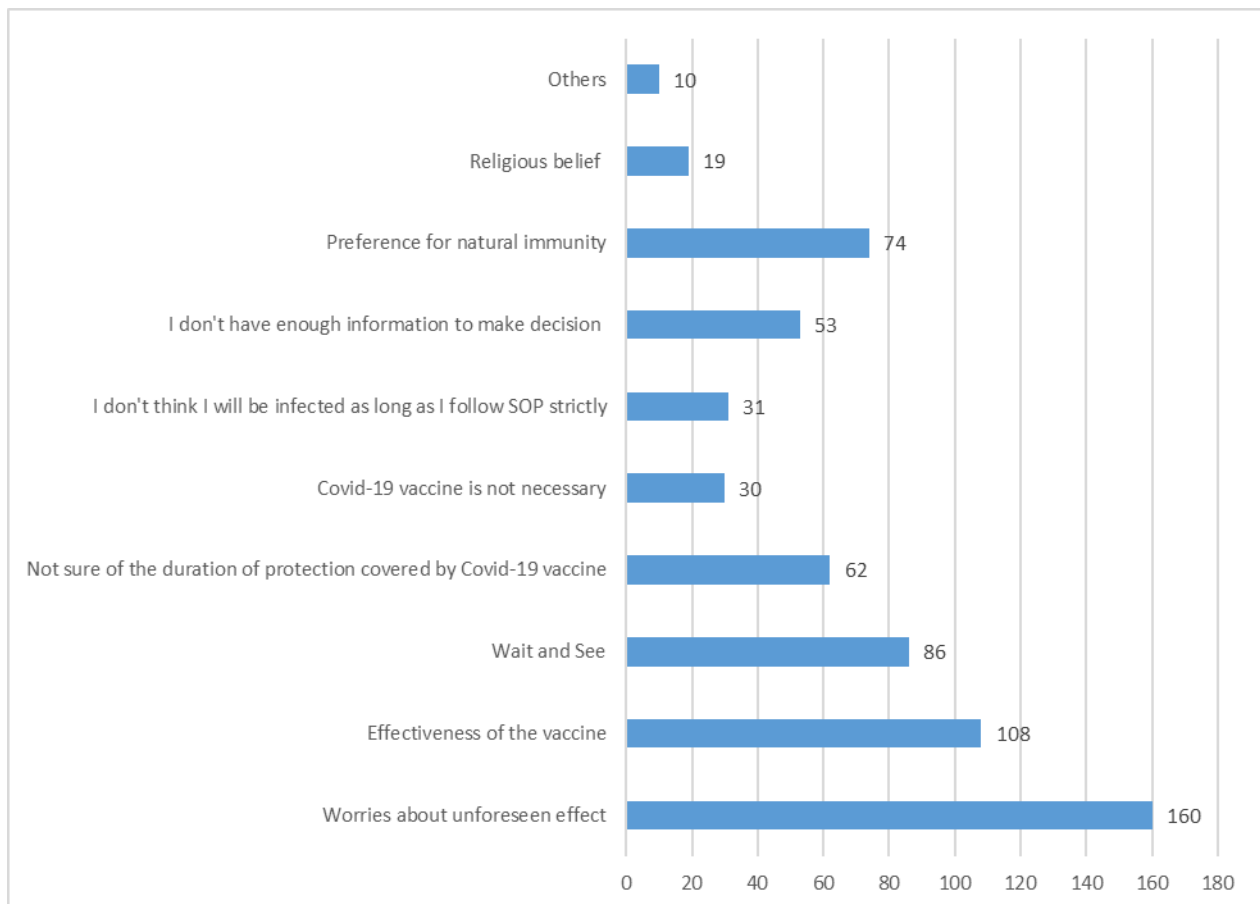


Figure 5: Reasons of rejecting COVID-19 Vaccines.

Other countries having high acceptance rate were Ecuador (97.0%), Indonesia (93.3%) and China (91.3%). Lower COVID-19 vaccine acceptance rate were reported in the Middle East Kuwait 53.1% [8], Russia, Africa and several European countries [9]. Several surveys about COVID-19 vaccine acceptance and hesitancy were also conducted in countries such as Canada [10]., Kuwait, America (79%) and Australia (85.8%) [11].

Malaysian has a low degree of COVID-19 vaccine hesitancy. Differences in COVID-19 vaccine acceptance, non-acceptance, or hesitancy may be attributed to differences in socio-demographic characteristics, health characteristics, human behaviour, vaccine availability, control of rumours and misinformation, confidence in the health system, type of vaccines available, side effect concerns, and level of trust in vaccine advantages [12]. In this study we found that Malaysians reasons of rejecting were due to worry about the unforeseen effect and the effectiveness of the vaccines. Furthermore, the prevalence of worries about unintended consequences was associated to a greater likelihood of vaccination non-acceptance. This is in line with a recent American/Canadian study, which found that vaccination rejection was most closely linked to a scepticism of vaccine efficacy as well as a fear of unanticipated possible side effects. Herd immunity would be difficult, if not impossible, to achieve with these views. Moreover, the unacceptance of vaccine can be due to females' concerns about the vaccine's unforeseeable and long-term adverse effects on pregnancy and future generations, as well as the fact that a significant number of females are pregnant, breastfeeding, or expecting to become pregnant in the near future [12].

The subjects who have health-related risks were less likely have a will to take the vaccine. There is also respondent who reject vaccine as he need to undergo chemotherapy. The major issue about obtaining the vaccination is not whether it is safe for cancer patients, but rather how successful it will be, especially in those with compromised immune systems. Chemotherapy, radiation, stem cell or bone marrow transplants, and immunotherapy are all cancer therapies that might impact the immune system, making the vaccination less effective. People who have certain malignancies, such as leukaemia or lymphoma, may have weaker immune systems, making the vaccination less effective.

Respondent with lower education level is less likely to accept the vaccination in comparison to those with higher education level. This is due to the lesser amount of knowledge they can access or exposed to. Furthermore, many studies agreed with the findings that education is a factor in acceptance toward COVID-19 vaccine. A worldwide scale study had determined that respondents with higher knowledge about COVID-19 had higher chance of accepting COVID-19 vaccination, and university graduates had higher chance of accepting vaccination compared to respondents with primary or secondary school education. This disparity in the willingness to take COVID-19 vaccination was also

found in a U.S. study, where those who did not complete high school education reported lower acceptance prevalence as compared to those who did. Therefore, increasing knowledge about COVID-19, especially among those with fewer years of education, should be an effective way to increase willingness to take the

Vaccines are an extremely effective weapon in the battle against COVID-19. Some side effects will be experienced, which are common signs that the body is preparing to defend itself. These side effects may make it difficult to perform daily tasks, but they should subside within a few days. Some people experience no negative side effects [13] Pain at the injection site, tiredness, headache, muscle pain, chills, joint pain, and fever were the most commonly reported side effects, which typically lasted several days. It is worth noting that these side effects were more common after the second dose than after the first, so vaccination providers and recipients should expect some side effects after either dose, especially after the second [7,13].

However, it is equally crucial to remember the dangers of COVID-19 infection. The chance of major side effects from vaccination is far lower than the chance of major disease or even death from COVID-19 infection. After the first injection, body starts making antibodies against the coronavirus. These antibodies aid the immune system in fighting the virus if the body are exposed, lowering the risk of contracting the illness. Antibodies, which are big proteins, are one of the ways the immune system fights infection. These antibodies serve as scouts, tracking down the infectious pathogen and designating it for immune system destruction. Each antibody is unique to the bacterium or virus it has identified, and it will elicit a distinct immune response. After the illness has passed, these particular antibodies will stay in the immune system. This implies that if someone contract the same illness again, immune system will have a 'memory' of it and will be ready to eliminate it before become ill and any symptoms appear [15]. Various types of vaccinations provide protection in different ways. However, all vaccinations leave the body with a supply of "memory" T-lymphocytes and B-lymphocytes that will remember how to fight the virus in the future. The body normally produces T-lymphocytes and B-lymphocytes a few weeks following immunisation. As a result, a person might become infected with the virus that causes COVID-19 either before or shortly after immunisation and become ill as a result of the vaccine failing to give adequate protection [16].

However, someone can still be infected after getting vaccinated, but due to something called herd immunity, your odds of being sick are decreased even further. As a result, getting vaccinated not only lowers your risk of infection, but it also helps to safeguard the community by lowering the risk of viral transmission. This is a positive step since it allows us to return to regular life by establishing herd immunity [17].

All vaccines must go through a rigorous and detailed process before being approved for use [18]. Clinical trials for vaccines were completed faster than for other vaccines. This was made feasible by a large amount of prior research that aided in their design, as well as vast financial resources that allowed several development procedures to be completed simultaneously rather than sequentially, as would normally be the case. There has been expert and careful review of the science. The data from the vaccine trials were reviewed by both the FDA and independent scientists. The COVID-19 vaccines are not considered experimental. The data from the Pfizer-BioNTech, Moderna, and Janssen COVID-19 vaccines show they are highly effective in preventing severe COVID-19 and have revealed no safety concerns, including in people with chronic disease. Most people will tolerate the COVID-19 vaccine well.

In this study, 118 Malaysians think that vaccine causes death, 235 says no and the remaining 347 were unsure. Pfizer and AstraZeneca are two of the vaccines in use in Malaysia, together with other vaccines also approved and used by the National Pharmaceutical Regulatory Agency. Both the Pfizer and AstraZeneca vaccines are known to be effective in protecting individuals from severe disease and risk of death due to COVID-19 in adults of all ages. In the case of AstraZeneca, there have been reports of a serious, but very rare, side effect of blood clotting. To date, this condition has occurred in fewer than 10 people out of every million people that have received this vaccine. It is important for people and health workers to understand that this risk exists and to be alert to report and provide immediate medical care when these occurs. However, it is also important to remember that the benefits of vaccination far outweigh the risks of these serious adverse events. This is why WHO continues to recommend vaccination against COVID-19, especially for priority groups such as health workers, older persons and those with underlying health conditions. The number of cases of COVID-19 in Malaysia is currently rising. Vaccination, combined with other public health measures, is the best way to protect yourself and help control the infection rate. This is the reason of government authority recommends taking the vaccine when available.

Religiosity, when combined with enough understanding about the efficiency and effectiveness of COVID-19 vaccinations, tends to influence the decision to receive the vaccine. Religious views impact medical and scientifically solid evidence, leading to a variety of responses to vaccination, such as vaccination hesitancy [19]. The relationship between religious beliefs and vaccination is likewise complicated, with differences between and within religious groups. The US Catholic bishops have declared COVID-19 immunisation an "act of charity for the other members of our community," using spiritually grounded understandings of the common good. At the same time,

certain Christian groups have expressed ethical concerns about the use of foetal cells in the production or testing of particular vaccinations. The halal status of different vaccinations is a source of worry for some Muslims [20]. On the international scale, major fatwa organisations, like the al-Azhar al-Sharif and the National Fatwa Council of the United Arab Emirates, have issued fatwas on the permissibility of vaccination usage [21].

There were some limitation in this study. Sample size was limited in terms of religion and ethnicity. In this study, the result is dominated mainly by Malays, Muslims, females and youths with age between 18-25. This inequality could cause biases in this study. Increasing the number of non-dominant respondents may give different and more accurate result. Secondly, data collection was conducted online, which means that may not have reached vulnerable groups such as the lower socioeconomic background and those who are illiterate. Lastly, a larger percentage of the respondents were from a single geographic area (Northern Peninsular Malaysia), which may impact the generalisation of the survey results.

CONCLUSION

This study showed that Malaysian adults having high percentage (87%) of good knowledge towards COVID-19 vaccine. Malaysians have received adequate knowledge on production, usage, effect, implementation and religious view about COVID-19 vaccination. Level of education has a significant association with the results. Meanwhile, attitudes of Malaysian towards COVID-19 vaccine was not very convincing when this study found that only 58% had good attitude while the other 42% had bad attitude. There is an urgent need to counter misinformation and provide accurate and reliable information. This study also found that 81% Malaysian are willing to accept vaccine and only 19% reject vaccine. The reasons of rejecting was due to worry about the unforeseen effect and the effectiveness of the vaccines.

Strategies to build good attitudes towards vaccine and acceptance rate should directly address community-specific concerns or misconceptions. Therefore, this study will help government and public health officials develop a proper strategy and efficiently deliver public health messages. The high knowledge of Malaysians on COVID-19 proved the success of recent policies showing that it should be maintained but the attitude of Malaysian towards vaccine need to be improved with proper strategies targeting the specific sociodemographic groups.

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Original Article

FAST FOOD CONSUMPTION AMONG ADULTS IN MALAYSIA DURING COVID-19 LOCKDOWN

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ABSTRACT

Malaysia's first confirmed case of COVID-19 was on 25th January 2020 by three Chinese nationals who had been in close contact with an infected person from Singapore. This leads to several changes occurring in Malaysia's food intake particularly fast food consumption. The COVID-19 epidemic and related measures substantially impacted daily food patterns, diet, and fast food-purchase behavior. Risk perception associated with COVID-19 may influence people's fast food purchase and consumption behaviors. This res study was conducted to investigate the attitude and practice of fast food consumption among adults in Malaysia during Covid-19 lockdown which started from 2nd June until 7th July 2022. The survey instrument consisted of demographic characteristics, 17 items on attitude, 15 items on practices. Descriptive statistics, chi-square tests, t-tests and one-way analysis of variance (ANOVA) were used to analyze the data obtained. This study involved 318 numbers of participants. The result showed the majority of the study participants (76.1%) were females and the rest of them (23.9%) were males. For the race, 98.1% were Malays, 0.9 % from other races. From our study, we found that there is a statistically significant association ($p < 0.05$) between level of practice and gender, between level of attitude and age group, between level of attitude and marital status and between level of attitude and occupation. Our findings may be useful for Malaysian Ministry of Health to reconstruct policies or planning to change the attitude and practice among Malaysian adults towards fast food consumption since our findings showed that Malaysian adults have a moderate attitude and practice towards fast food consumption. There is also a need to educate young married people about practicing a healthy diet in their daily life. In addition, the implication from this study is to create awareness of healthy food selection in Malaysian adults.

INTRODUCTION

Movement Control Order (MCO) was implemented by Malaysian government on March 2020 to limit spread of Coronavirus disease (COVID-19) [1]. People were forced to stay at home and practice online working and/or online learning and were allowed to leave their homes only for prespecified occasions, such as medical reasons, essential work, physical activity, purchasing food and in emergencies [2]. One obvious consequence that cause by MCO is how a person or society eats, which has an impact on household spending, particularly on food. A person's or a community of people's eating habits, which also include their dietary preferences, attitudes, and beliefs, are how they satisfy their nutritional demands. Depending on the ideals that an individual or group of people grew up with, attitudes about food can be either positive or negative. Meal quality will depend on how excellent or poor, appealing or undesirable the food is

[3]. The final meal decision will be impacted by these attitudes and beliefs. About 58.2% of people consumes more food, and 82.5 percent of them ate a lot of fast food that has little nutritious value when they were bored at home during the MCO [4]. The amount of food consumed, the variety of food consumed, breakfast habits, the habit of preparing their own meals and experimenting with new recipes are just a few of the dietary changes related to the COVID-19 pandemic. Other modifications, such as adjustments to the location and how fast and convenient to get foods affects changes in eating pattern [5].

A higher calorie intake and/or overeating may also result from changes in the everyday routine and time spent away from work, both of which can be attributed to stress and boredom. Stress makes people eat more than they should, especially "comfort foods" like fast food that high in salt and

sugar, which are referred to as "food cravings" [6]. These meals, which are mostly high in simple carbs, help lower stress because they promote serotonin synthesis, which improves mood. In this research project, we are mainly focused on conducting a survey to investigate the fast food consumption among adults during COVID-19 lockdown to have a greater knowledge on how this lockdown can change the dietary habits among adults.

The COVID-19 epidemic and related measures substantially impacted daily food patterns, diet, and food-purchase behavior. Risk perception associated with COVID-19 may influence people's food purchase and consumption behaviors. For example, people may become very stress during the lockdown and had to find their comfort food and something sweet and sugary to eat like fast food [7]. Some adults were so busy because they need to work from home, so they had to find food that were fast and convenient to be eaten and only take some times for the delivery. Some also believe fast food are more cheaper than other food or buying groceries at mall [8]. Moreover, they did not even realize about getting fat or getting heavier during that time. To limit the infection of covid-19 virus, it is better to stay at home than going out. Because of this, it is so hard to buy the groceries and to prepare the meal itself at home which is much more healthy than fast food [9]. In comparison, the COVID-19 lockdown in Qatar also changes people's eating and dietary patterns, leading to a deterioration of nutritional and health status at both individual and country levels. The lockdown is also affecting the quality of diets [10]. Consumers are shifting towards greater consumption of processed food, such as fast foods, junk foods and snacks. There is also a possibility of a decrease in meat consumption (as a result of fears—not science-based—that animals might be hosts of the virus) and other higher-value products like fruits and vegetables (which are likely to cause price decreases) [11]. However, there are still people who eat healthy food and prepare the food itself at home because some people do early preparation by stocking up all the grocery before the lockdown [12]. Therefore, the study was conducted to investigate the attitude and practice of fast food consumption among adults in Malaysia during COVID-19 lockdown.

METHODOLOGY

Study design

The retrospective study was started from 2nd June 2022 until 7th July 2022. A quantitative approach was utilised to achieve the objectives of this study. A retrospective survey was appropriate to conduct for collecting the information about fast food consumption among adults in Malaysia during COVID-19 lockdown. Social media was used to call for participation.

Sampling

The target sample size was at least 385 respondents, determined by identifying the smallest acceptable size of a demographic subgroup with a $\pm 5\%$ of margin error and 95% of confidential level [13]. The

researchers opted to use Google form as an online survey since it is not feasible to conduct a systematic nationwide sampling during this period. Malaysian citizens above the age of 18 and recently residing in the country were eligible to participate in the survey. Several strategies were used to reach as many respondents as possible in Malaysia within 35 days data collection period. Social media (Facebook and Instagram), WhatsApp and Telegram were the platforms used to disseminate this questionnaire. WhatsApp and Facebook were chosen since they were the most popular social and communication platforms nowadays. Instagram are renowned among the younger generations while older Malaysians generally preferred Facebook. WhatsApp message with the standardised general description about the survey was provided before the link was given in both English and Malay language versions of the questionnaire. A total data of 318 respondents have been collected.

Study instrument

The survey instrument was adapted from a study on fast food consumption among adults in Malaysia during COVID-19 lockdown [14]. The questionnaire consisted of four main themes: 1) Demographics which study respondents' socio-demographic information, including gender, race, age, marital status, education, occupation, place of current residence and regional; 2) Attitudes towards fast food consumption among adults in Malaysia during COVID-19 lockdown 4) Practices relevant to fast food consumption. To measure attitudes towards fast food consumption during COVID-19 lockdown, study participants were assessed whether they agree (yes) or disagree (no) this MCO affected fast food consumption. Also, to evaluate their opinions regarding the conspiracy of COVID-19. The range from 0-10 is the maximum total score, with a higher score (7-10) indicating good attitude, a score of 4-6 indicating moderate attitude and a score of 1-3 indicating poor attitude. Meanwhile, to measure practices, the study participants were asked whether their purchasing habit of fast food is influenced by social media, frequencies of eating fast food and eating fast food due to online class. The range from 0-10 is the maximum total score, with a higher score (7-10) indicating good practice, a score of 4-6 indicating moderate practice and a score of 1-3 indicating poor practice.

Statistical analysis

The data was analyzed using Statistical Package for the Social Science (SPSS) software version 26. Frequencies and percentages were determined using descriptive analysis. The reliability of the variables was tested by using the Cronbach alpha coefficient to determine the internal consistency of Attitude and Practice. The results showed that Cronbach alpha for attitude (10 items) was 0.718 and practices (9 items) was 0.802. Independent T-test and One-way analysis of variance (ANOVA) followed by post-hoc Tukey test were used to determine the significant level of means (dependent variables) for demographics. Chi-square was used to determine the correlation between independent

and dependent variables. *P*-value that is less than 0.05 will be considered significant.

RESULTS

This study involved 318 numbers of participants. Data shows the majority of the study participants (76.1%) were females and the rest of them (23.9%) were males. For the race, 98.1% were Malays, 0.9 % were Chinese, 0.9 % were Indians and no participants from other races. Most of our study participants were aged between 18 and 25 years old with 64.2% overall percentage. While only 1.9% form the age range of 26-35 years old and 3.5 % of them were aged 56 and above. Besides, the majority of study participants were single (64.8%) for their marital status, with 34.3% were married. All of them came from a variety education background like SPM, Pre-university, Bachelor, Master and PhD but mostly were Bachelor's holders (69.5%). Among them, the majority are students (60.7%) compared to employed (34.0%), unemployed (4.1%) and retired (1.3 %). Relating to the residency of our study participants, most of them (59.1 %) were living in urban areas and came from northern Malaysia (56.0%). Our participant mostly come from middle income family which household income is between RM 4851 – RM 10970 (37.1%) followed by those with income less than RM 4851 (36.5%) and only 25.8 % with monthly come more than RM 10970.

There is no significant mean difference ($p > 0.05$) between attitude score and gender. There is no significant mean difference ($p > 0.05$) between

practice score and gender. There is no significant mean difference ($p > 0.05$) between attitude score and different race. There is no significant mean difference ($p > 0.05$) between practice score and different race. There is significant mean difference ($p < 0.05$) between attitude score and different age group in adults (18-25) (36-45)/(18-25) (46-55). There is significant mean difference ($p < 0.05$) between practice score and different age group in adults (18-25) (46-55). There is significant mean difference ($p < 0.05$) between attitude score and different education level (preU and Master). There is significant mean difference ($p < 0.05$) between practice score and different marital level (preU and Master). There is significant mean difference ($p < 0.05$) between attitude score and different marital status (married and single). There is significant mean difference ($p < 0.05$) between practice score and different marital status (married and single). There is significant mean difference ($p < 0.05$) between attitude score and different occupation (employed and student).

Besides, there is significant mean difference ($p < 0.05$) between practice score and different occupation (employed and student). There is no significant mean difference ($p > 0.05$) between attitude score and different area of residence. There is no significant mean difference ($p > 0.05$) between practice score and different area of residence. There is no significant mean difference ($p > 0.05$) between attitude score and different regional. There is no significant mean difference ($p > 0.05$) between practice score and different regional. There is no significant mean difference

Table 1: Demographic of study participants and attitude score

Characteristic		Number of participants	Attitude score (Mean ±SD)	t/F	p-value
Gender	Male	76 (76.1 %)	50.105 ± 6.032	3.804	0.052 ($p < 0.05$)
	Female	242 (23.9 %)	49.570 ± 5.201		
Race	Malays	311 (98.11%)	49.7436 ± 5.43405	0.766	0.466 ($p > 0.05$)
	Chinese	3 (0.94%)	48.666 ± 3.78594		
	Indian	3 (0.94%)	46.000 ± 2.000		
	Others	0 (0.0%)	49.698 ± 5.406		
Age	18-29	203 (64.15%)	50.691 ± 5.664	5.226	0.000 ($p < 0.05$)
	30-39	6 (1.89%)	48.000 ± 4.4271		
	40-49	38 (11.95%)	48.131 ± 4.7826		
	50-59	59 (18.55%)	47.593 ± 4.1527		
	Above 60	11 (3.46%)	48.909 ± 4.7635		

($p > 0.05$) between attitude score and monthly income. There is no significant mean difference ($p > 0.05$) between practice score and monthly income. There is no significant association ($p > 0.05$) between level of attitude and gender. There is significant association ($p < 0.05$) between level of practice and gender. There is no significant association ($p > 0.05$) between level of attitude and different race. There is no significant association ($p > 0.05$) between level of practice and different race.

On the other hand, here is significant association ($p < 0.05$) between level of attitude and age group.

There is no significant association ($p > 0.05$) between level of practice and age group. There is no significant association ($p > 0.05$) between level of attitude and education level. There is no significant association ($p > 0.05$) between level of practice and education level. There is significant association ($p < 0.05$) between level of attitude and marital status. There is no significant association ($p > 0.05$) between level of practice and marital status. There is significant association ($p < 0.05$) between level of attitude and occupation. There is no significant association ($p > 0.05$) between level of practice and occupation. There is no significant association

Table 1: Demographic of study participants and attitude score

Characteristic		Number of participants	Attitude score (Mean \pm SD)	t/F	p-value
Marital status	Married	109 (34.28%)	48.018 \pm 4.4200	9.417	0.000 ($p < 0.05$)
	Single	205 (64.78%)	50.635 \pm 5.6808		
	Others	3 (0.94%)	46.333 \pm 2.8867		
Education	SPM	12 (3.77%)	47.000 \pm 4.177	4.068	0.001 ($p < 0.05$)
	Pre-University and its equivalent	59 (18.55%)	50.949 \pm 49.705		
	Bachelor's degree	220 (69.50%)	45.416 \pm 5.2821		
	Master's degree	12 (3.77%)	38.000 \pm 0.000		
	PhD	1 (0.31%)	51.230 \pm 5.644		
	Others	13 (4.09%)	\pm		
Occupation	Employed	108 (33.96%)	\pm		
	Unemployed	13 (4.09%)	\pm		
	Student	193 (60.69%)	\pm		
	Retired	4 (1.26%)	\pm		
Place of current residence	Urban	187 (59.12%)	\pm		
	Rural	130 (40.88%)	\pm		
Regional	Central	32 (10.06%)	\pm		
	Northern	178 (55.97%)	\pm		
	Southern	10 (3.14%)	\pm		
	Eastern	98 (30.82%)	\pm		
	Sabah & Sarawak	0 (0.0%)	\pm		

Table 2: Demographic of study participants and attitude category.

Demographic		No. of participants	Attitude category			Chi square value pearson	P value
			Poor	Moderate	Strong		
Gender	Male	76 (76.1 %)	0 (0.0%)	66 (86.8%)	10 (13.2%)	1.057	0.304 (p>0.05)
	Female	242 (23.9 %)	0 (0.0%)	220 (90.9%)	22 (9.1%)		
Race	Malay	311 (98.11%)	0 (0.0%)	280 (89.7%)	32 (10.3%)	0.684	0.710 (p>0.05)
	Chinese	3 (0.94%)	0 (0.0%)	3 (100.0%)	0 (0.0%)		
	Indian	3 (0.94%)	0 (0.0%)	3 (100.0%)	0 (0.0%)		
	Others	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Age	18-25	203 (64.15%)	0 (0.0%)	175 (85.8%)	29 (14.2%)	11.322	0.023 (p<0.05)
	26-35	6 (1.89%)	0 (0.0%)	6 (100.0%)	0 (0.0%)		
	36-45	38 (11.95%)	0 (0.0%)	36 (94.7%)	2 (5.3%)		
	46-55	59 (18.55%)	0 (0.0%)	58 (98.3%)	1 (1.7%)		
	Above 56	11 (3.46%)	0 (0.0%)	11 (100.0%)	0 (0.0%)		
Marital status	Married	109 (34.28%)	0 (0.0%)	106 (97.2%)	3 (2.8%)	10.441	0.005 p<0.05
	Unmarried	205 (64.78%)	0 (0.0%)	177 (85.9%)	29 (14.1%)		
	Others	3 (0.94%)	0 (0.0%)	3 (100.0%)	0 (0.0%)		
Education	SPM	12 (3.77%)	0 (0.0%)	12 (100.0%)	0 (0.0%)	8.846	0.115 (p>0.05)
	Pre-University and its equivalent	59 (18.55%)	0 (0.0%)	49 (83.1%)	10 (16.9%)		
	Bachelor's Degree	220 (69.50%)	0 (0.0%)	202 (91.4%)	19 (8.6%)		
	Master	12 (3.77%)	0 (0.0%)	12 (100.0%)	0 (0.0%)		
	Phd	1 (0.31%)	0 (0.0%)	1 (100.0%)	0 (0.0%)		
Others	13 (4.09%)	0 (0.0%)	10 (76.9%)	3 (23.1%)			

Table 2: Demographic of study participants and attitude category.

Demographic		No. of participants	Attitude category			Chi square value pearson	P value
			n%	Poor	Moderate		
Occupation	Employed	108 (33.96%)	0 (0.0%)	104 (96.3%)	4 (3.7%)	8.642	0.034 (p<0.05)
	Unemployed	13 (4.09%)	0 (0.0%)	12 (92.3%)	1 (7.7%)		
	Student	193 (60.69%)	0 (0.0%)	166 (86.0%)	27 (14.0%)		
	Retired	4 (1.26%)	0 (0.0%)	4 (100.0%)	0 (0.0%)		
Area of residence	Urban	187 (59.12%)	0 (0.0%)	165 (87.8%)	23 (12.2%)	2.395	0.122 (p>0.05)
	Rural	130 (40.88%)	0 (0.0%)	121 (93.1%)	9 (6.9%)		
Region	Central	32 (10.06%)	0 (0.0%)	31 (96.9%)	1 (3.1%)	4.819	0.186 (p>0.05)
	Northern	178 (55.97%)	0 (0.0%)	155 (87.1%)	23 (12.9%)		
	Southern	10 (3.14%)	0 (0.0%)	10 (100.0%)	0 (0.0%)		
	Eastern	98 (30.82%)	0 (0.0%)	90 (91.8%)	8 (8.2%)		
	Sabah & Sarawak	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Monthly Income	< RM4851	116 (36.48%)	0 (0.0%)	101 (87.1%)	15 (12.9%)	2.659	0.265 (p>0.05)
	RM4851 – RM10970	120 (37.74%)	0 (0.0%)	112 (93.3%)	8 (6.7%)		
	>RM10970	82 (25.79%)	0 (0.0%)	73 (89.0%)	9 (11.0%)		

Table 3: Demographic of study participants and practice score.

Characteristic		Number of participants	Practice score (Mean \pm SD)	t/F	p-value
Gender	Male	76 (76.1 %)	43.2237 \pm 7.76419	5.536	0.019 (P<0.05)
	Female	242 (23.9 %)	44.7344 \pm 6.23532		
Race	Malays	311 (98.11%)	44.4148 \pm 6.68496	0.337	0.714 (P>0.05)
	Chinese	3 (0.94%)	42.3333 \pm 6.80686		
	Indian	3 (0.94%)	42.0000 \pm 2.0000		
	Others	0 (0.0%)	0.0000 \pm 0.0000		
Age	18-29	203 (64.15%)	45.4729 \pm 6.58854	5.362	0.000 (P<0.05)
	30-39	6 (1.89%)	44.6667 \pm 6.56252		
	40-49	38 (11.95%)	44.0526 \pm 5.91355		
	50-59	59 (18.55%)	41.3729 \pm 6.11639		
	Above 60	11 (3.46%)	41.0909 \pm 7.98066		
Marital status	Married	109 (34.28%)	42.3761 \pm 6.46614	8.431	0.000 (P<0.05)
	Single	205 (64.78%)	45.4780 \pm 6.52414		
	Others	3 (0.94%)	41.3333 \pm 6.02771		
Education	SPM	12 (3.77%)	41.9167 \pm 6.08214	2.267	0.048 (P<0.05)
	Pre-University and its equivalent	59 (18.55%)	45.3729 \pm 6.93293		
	Bachelor's degree	220 (69.50%)	44.5773 \pm 6.50454		
	Master's degree	12 (3.77%)	39.0833 \pm 6.96038		
	PhD	1 (0.31%)	46.0000 \pm 0.0000		
	Others	13 (4.09%)	43.3846 \pm 6.44901		

Table 3: Demographic of study participants and practice score.

Occupation	Employed	108 (33.96%)	42.6204 ± 6.23933	4.868	0.003 (P<0.05)
	Unemployed	13 (4.09%)	43.2308 ± 5.77572		
	Student	193 (60.69%)	45.4948 ± 6.66553		
	Retired	4 (1.26%)	41.5000 ± 10.14889		
Place of current residence	Urban	187 (59.12%)	44.7701 ± 6.88661	0.668	0.414 (P>0.05)
	Rural	130 (40.88%)	43.8000 ± 6.28200		
Regional	Central	32 (10.06%)	44.1875 ± 7.23539	0.369	0.775 (P>0.05)
	Northern	178 (55.97%)	44.0734 ± 6.62727		
	Southern	10 (3.14%)	45.1000 ± 5.64604		
	Eastern	98 (30.82%)	44.8980 ± 6.65418		
	Sabah & Sarawak	0 (0.0%)	0.0000 ± 0.0000		

($p>0.05$) between level of attitude and area. There is no significant association ($p>0.05$) between level of practice and area. There is no significant association ($p>0.05$) between level of attitude and regional. There is no significant association ($p>0.05$) between level of practice and regional. There is no significant association ($p>0.05$) between level of attitude and monthly income. There is no significant association ($p>0.05$) between level of practice and monthly income.

DISCUSSION

From our study, we found that there is a statistically significant association ($p<0.05$) between level of practice and gender. Men consumed food to satisfy their needs such as high-calorie items like fast food and numerous oily foods [15]. There are a small number of men that have poor practice which means they consume a lot of healthy food. On the other hand, our findings are different from [16] revealed that women are more likely to eat healthy food than men. We found that mostly men and women fall within a moderate category of practice towards fast food consumption and just a few of them have poor practice [17]. This due to Malaysian adults mostly not control their diet strictly and do not mind eating fast food. They may not have a good understanding and awareness regarding healthy diet. It can be due to their daily habits. They may have the knowledge about healthy diet but do not mind eating fast food. Those people who are not concerned about their diet or healthy eating tend to eat out more [18].

Our study also found there is significant association ($p<0.05$) between level of attitude with age. Our findings are corresponding to a report from the American diet among adults which found that the increase in age leads to decrease in fast food consumption and the highest is among younger people aged 20-39 and least among elderly [19]. Our finding showed that there is a decrease in attitude as the age increases but does not fall within a poor attitude. But, young people have better attitudes towards fast food [20]. This is because they are more educate about fast food and its consequences, but their modern lifestyle causes them to choose fast food. Elderly have a lower attitude as their health condition starts to worsen, which makes them consume a lower amount of fast food. Every house has fast food stored in their house [21]. Since almost every house has fast food stored and stocked, especially during Covid-19 lockdown, this will attract them to consume this food. Retired elderly that just stayed in the house may be exposed to fast food stocks in the house and causes them to increase attitude with fast food [22].

The present study showed there is a significant association ($p<0.05$) between level of attitude and marital status. The is a new finding regarding attitude toward fast food consumption and marital status from our study which are not been found yet in Malaysia or other countries. A study reported that marital status gives impacts on their health, including daily food consumption [23]. The married couple, with low financial resources, tends to buy fast food such as canned Sardine, maggie,

Table 4: Demographic of study participants and practice category

Demographic		No. of participants	Practice category n%			Chi square value	P value
			Poor	Moderate	Strong		
Gender	Male	76 (76.1 %)	2 (2.6%)	58 (76.3%)	16 (21.1%)	7.346	0.025 (p<0.05)
	Female	242 (23.9 %)	0 (0.0%)	201 (83.4%)	41 (16.6%)		
Race	Malay	311 (98.11%)	2 (0.6%)	253 (81.4%)	56 (18.0%)	1.370	0.849 (p>0.05)
	Chinese	3 (0.94%)	0 (0.0%)	3 (100.0%)	0 (0.0%)		
	Indian	3 (0.94%)	0 (0.0%)	3 (100.0%)	0 (0.0%)		
	Others	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Age	18-25	203 (64.15%)	2 (1.0%)	158 (77.8%)	43 (21.2%)	10.570	0.227 (p>0.05)
	26-35	6 (1.89%)	0 (0.0%)	4 (66.7%)	2 (33.3%)		
	36-45	38 (11.95%)	0 (0.0%)	32 (84.2%)	6 (15.8%)		
	46-55	59 (18.55%)	0 (0.0%)	56 (94.9%)	3 (5.1%)		
	Above 56	11 (3.46%)	0 (0.0%)	9 (81.8%)	2 (18.2%)		
Marital status	Married	109 (34.28%)	0 (0.0%)	96 (88.1%)	13 (11.9%)	5.926	0.205 (p>0.05)
	Unmarried	205 (64.78%)	2 (1.0%)	160 (78.0%)	43 (21.0%)		
	Others	3 (0.94%)	0 (0.0%)	3 (100.0%)	0 (0.0%)		
Education	SPM	12 (3.77%)	0 (0.0%)	11 (91.7%)	1 (8.3%)	6.077	0.809 (p>0.05)
	Pre-University and its equivalent	59 (18.55%)	1 (1.7%)	45 (76.3%)	13 (22.0%)		
	Bachelor's Degree	220 (69.50%)	1 (0.5%)	180 (81.8%)	39 (17.7%)		
	Master	12 (3.77%)	0 (0.0%)	12 (100.0%)	0 (0.0%)		
	Phd	1 (0.31%)	0 (0.0%)	1 (100.0%)	0 (0.0%)		
	Others	13 (4.09%)	0 (0.0%)	10 (76.9%)	3 (23.1%)		
Occupation	Employed	108 (33.96%)	0 (0.0%)	96 (88.9%)	12 (11.1%)	6.680	0.351 (p>0.05)
	Unemployed	13 (4.09%)	0 (0.0%)	11 (84.6%)	2 (15.4%)		
	Student	193 (60.69%)	2 (1.0%)	149 (77.6%)	41 (21.4%)		
	Retired	4 (1.26%)	0 (0.0%)	3 (75.0%)	1 (25.0%)		

Table 4: Demographic of study participants and practice category

Demographic	No. of participants	Practice category			Chi square value	P value
		n%	Poor	Moderate		
Area of residence	Urban	187 (59.12%)	0 (0.0%)	152 (81.3%)	35 (18.7%)	3.172 (p<0.05)
	Rural	130 (40.88%)	2 (1.5%)	107 (82.3%)	21 (16.2%)	
Region	Central	32 (10.06%)	0 (0.0%)	27 (84.4%)	5 (15.6%)	2.368 (p>0.05)
	Northern	178 (55.97%)	2 (1.1%)	146 (82.5%)	29 (16.4%)	
	Southern	10 (3.14%)	0 (0.0%)	8 (80.0%)	2 (20.0%)	
	Eastern	98 (30.82%)	0 (0.0%)	78 (79.6%)	20 (20.4%)	
	Sabah & Sarawak	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Monthly Income	< RM4851	116 (36.48%)	1 (0.9%)	93 (80.9%)	21 (18.3%)	1.542 (p>0.05)
	RM4851 – RM 10970	120 (37.74%)	0 (0.0%)	98 (81.7%)	22 (18.3%)	
	>RM10970	82 (25.79%)	1 (1.2%)	68 (82.9%)	13 (15.9%)	

and processed food since fast food is much cheaper. Another reason that may indicate these findings is that married couples think it is better to cook at home during lockdown than to buy food outside since they can have quality time together at home; they get to experiment with different flavors and create new, often healthier dishes with their partner [16]. Besides that, most married couples usually have kids, and the monthly income may decrease during the lockdown. This is a way to save more on daily expenses [24]. The occupation was significantly associated with the level of attitude ($p<0.05$) [16]. This study showed that students have a better attitude toward fast food consumption. This means students are more likely to think about fast food than healthy food. During the pandemic, society including college students did more activity in the house [25].

Previous studies have shown that most students at home perform less physical activity and more

sedentary activity. This is due to an overloaded assignment which cause them having no time to eat. This can be exacerbated by unhealthy eating habits that lead to weight gain and obesity among students [26]. Student food consumption has increased significantly, and is not following the recommended balanced diet. The students have higher stress levels, and most of them eat fast food as their comfort food to fight emotional stress. Aside from boredom due to online classes, being unable to hang out with their friends and being locked in a room most of the time might be frustrating and stressful [27]. Stress causes them to over-eating, mainly 'comfort foods' high in sugar, usually referred to as "food craving." Comfort food such as biscuits, instant noodles, and others primarily high in simple carbs can help alleviate stress by increasing serotonin production. In addition, serotonin helps to boost a positive mood [28].

The findings from this study may give implications to some factors, especially related to health policies. Our findings may be useful for them to reconstruct policies or planning to change the attitude and practice among Malaysian adults towards fast food consumption since our findings showed that Malaysian adults have a moderate attitude and practice towards fast food consumption [29]. These findings proved that there is a change needed in policies to lower the attitude of Malaysians towards fast food consumption. There is also a need to educate young married people about practicing a healthy diet in their daily life. In addition, implication from this study is to create awareness of healthy food selection in Malaysian adults [30]. A solution is needed as Malaysian adults have moderate attitudes on fast food consumption which means they have a knowledge about the consequences of fast food consumption but tends to ignore about it [31].

CONCLUSION

Based on this study about attitude and practice towards fast food consumption among adults in Malaysia during Covid-19 lockdown, we concluded that most Malaysians have moderate practice and good attitudes. Male and female have resulted in moderate practice towards fast food consumption among adults in Malaysia during Covid-19 lockdown while for the level of the attitude, young people have better attitude than elderly, 3.8% of the married couple record good attitude and most of them result in good attitude of the fast food consumption. This study also shows there is significant association between gender and practice towards the fast food consumption during the lockdown. This proves that gender also contributes to the consumption of fast food in Malaysia. More young people between ages 18-25 years old consume more fast food than the eldest due to their preference. Moreover, marital status also shows significant association with the attitude towards the consumption of fast food. Students have a better attitude toward fast food consumption because they tend to eat more fast food when they are stressed out and have no time to cook. In conclusion, various factors have been identified that have led to a decrease or increase in fast food consumption. It also depends on the level of attitude and practice of each individual toward the fast food during the lockdown. It also associates with the level of the awareness of each individual to live a healthy lifestyle or sedentary life.

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Original Article

ONLINE LEARNING DURING PANDEMIC COVID-19 AND ITS IMPACT ON UNIVERSITY STUDENTS IN MALAYSIA

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ABSTRACT

The novel coronavirus is an unprecedented global war. Many countries have made a drastic effort to mitigate the transmission of COVID-19 among their population. Most students worldwide are affected when their schools and institutions have started to close their operations to curb the spread of this contagious pandemic. Thus, online learning had been introduced to continue the teaching and learning processes. This study is to look for various factors affecting students related to online learning. A prospective cross-sectional study was conducted involving 390 undergraduate students currently studying IPTAs and IPTSs in Malaysia from 27th March 2022 to 2nd April 2022. The questionnaire was generated via Google Form. It was distributed through social media platforms (WhatsApp, Instagram, Facebook). Data was collected after taking informed consent from the participants. There was a significant difference between gender in the effect of online learning on their study (P -value < 0.05 ; $n = 390$). There were also significant differences between different age groups and sleep deprivation during online learning, social media distraction and student who seek professional help for mental health issues (P -value < 0.05 ; $n = 390$). ANOVA analysis further indicates significant differences in mental health issues during online learning between public and private universities and sleep deprivation during online learning between private and public universities (P -value < 0.05 , $n = 390$). This research showed that online learning during pandemic COVID-19 had a significant impact on study, financial burden, physical activities, sleep qualities, mental health status, and social media distractions to varying degrees. This study can be improved by increasing sample size, distributing questionnaires equally among each variable and collecting data over a longer period.

INTRODUCTION

COVID-19, also known as coronavirus disease, is caused by SARS-CoV-2 originating from Wuhan, China, in December 2019. In a blink of an eye, its spreading has affected the populations of many countries. Up to date, the world population is struggling to handle this COVID-19 outbreak, and on 12th March 2020, the World Health Organization (WHO) has confirmed COVID-19 as a pandemic that threatens human life [1]. Malaysia, to be added to the total of 79 states worldwide, to be in a state of emergency in response to the pandemic [2]. There were thousands of daily cases reported in Malaysia and even up to hundreds of thousands that have been recorded by other countries.

The invisible enemy that the people are facing today has also affected all the industries in the world, including the education sector. Due to the virus's spread, the global higher education landscape has shifted drastically in recent months [3]. Most of the

students worldwide are affected when their schools and institutions have started to close the operations to curb the spread of this contagious pandemic. Many countries have made a drastic effort to mitigate the transmission of the COVID-19 among their population, i.e., by the widespread closure of primary and secondary schools, colleges, hospitals, universities, and other public facilities.

Based on the existing large body of literature, closing educational facilities is one of the most effective ways to sever vital transmission chains and reduce the dissemination of virus infection in the population [4]. In terms of the increasing alarm regarding the spread of COVID-19 pandemic, many universities worldwide have decided, either cancelled or delayed all campus gatherings, including face-to-face lectures, seminars, conventions, and intra and inter-university sports tournaments, and other activities. The university management has worked quickly to

transform their courses and services from a conventional delivery style (face-to-face approach) to an online delivery learning [5].

Online teaching is becoming a normalization approach and no longer a new method of delivery for most university students. The faculty staff is trained to adopt online learning systems as the sole mode of delivery teaching or as a supplement to face-to-face instruction (also known as a hybrid platform). Therefore, COVID-19 transmissions are confirmed will incur other effects (internally and externally) upon the parties involved, especially on the student [6].

This study was conducted to identify the impact of online learning during COVID-19 pandemic with parameter of study, financial burden, physical activities, sleep qualities, mental health status and social media distractions.

METHODOLOGY

In the midst of the global pandemic, Google Form was used since it appeared to be a simple way to create a questionnaire as well as gather information more systematically. The source population (target population) is from the population of university students in IPTA/IPTS in Malaysia. A random sample among the population of university student in Malaysia was surveyed for the study. It comprised 17 questions and aimed at gathering data from the population of university student in Malaysia. In a database, we have over 390 responses. The participant's age is above 18 years old. The individuals' sociodemographic information was obtained but we did not collect any information about the respondent's full name, IC number, or actual address; therefore, they will stay anonymous.

Inclusion criteria

All university students in IPTA/IPTS age ≥ 18 years old were included in this study, however foundation/matriculation and postgraduates' students were excluded.

Research Tools and Materials

We created our own questionnaire by using Google Form, which includes six key questions about the relationships of the factors such as study, sleep qualities, mental health issue, financial burden, distraction, and sedentary lifestyle with online learning. A pilot test survey was also administered to 20 people randomly to assess its clarity, relevance, and acceptance.

Data Collection

The study starts from 27th March 2022 until 2nd April 2022. The link to the survey was distributed through social media platforms such as Facebook, Instagram, and WhatsApp. Participants were urged to distribute the survey to their friends and acquaintances. As a result, this can be a very effective method of raising the number of respondents.

Data Analysis

The SPSS statistical package version 27 was used to examine all of the data. For categorical variables, the Likelihood Ratio (chi-square) was used to see the association of two groups. T-test and one-way ANOVA tests were conducted to assess differences between groups for continuous variables. A p-value of less than 0.05 was considered significant for all of these statistics.

RESULTS

Sociodemographic data were summarise in Table 1-5. Result showed that female have the largest sample size in this study based on gender, with 197 (50.5%) compared to male 193 (49.5%). Age of 18-25 years old have the largest sample size with 366 (93.8%) followed by age of 26-30 years old 22 (5.6%) and age more than 30 years old with 2 respondents (0.5%). Result of the questionnaire were tabulated in Table 6-22.

Table 1: Gender of Respondents

Gender	Frequency	Percent (%)
Male	193	49.5
Female	197	50.5
Total	390	100.0

Table 2: Age of Respondents

Age	Frequency	Percent (%)
18-25 years old	366	93.8
26-30 years old	22	5.6
> 30 years old	2	0.5
Total	390	100.0

Table 3: Types of University

University	Frequency	Percent (%)
IPTA	304	77.9
IPTS	86	22.1
Total	390	100.0

Table 4: Education Levels

Education Levels	Frequency	Percent (%)
Diploma	65	16.7
Degree	325	83.3
Total	390	100.0

Table 5: Academic Year

Academic Year	Frequency	Percent (%)
Year 1	52	13.3
Year 2	130	33.3
Year 3	110	28.2
Year 4	83	21.3
Year 5	15	3.8
Total	390	100.0

Table 6: Q1: Online learning during the COVID-19 pandemic affects my study

Likert Scale	Frequency	Percentage (%)
Greatly Affected	79	20.3
Affected	223	57.2
Not Sure	26	6.7
Slightly Affected	49	12.6
Not Affected	13	3.3
Total	390	100.0

Table 7: Q2: Online learning makes it difficult for me to understand the course

Likert Scale	Frequency	Percentage (%)
Strongly Agree	76	19.5
Agree	238	61
Not Sure	37	9.5
Disagree	31	7.9
Strongly Disagree	8	2.1
Total	390	100.0

Table 8: Q3: Face-to-face learning makes me concentrate more during classes

Likert Scale	Frequency	Percentage (%)
Strongly Agree	102	26.2
Agree	206	52.8
Not Sure	47	12.1
Disagree	30	7.7
Strongly Disagree	5	1.3
Total	390	100.0

Table 9: Q4: Online learning causes difficulty to fall asleep or to maintaining sleep

Likert Scale	Frequency	Percentage (%)
Strongly Agree	59	15.1
Agree	181	46.4
Not Sure	71	18.2
Disagree	61	15.6
Strongly Disagree	18	4.6
Total	390	100.0

Table 10: Q5: I slept for long-duration than usual during online learning in COVID-19 pandemic

Likert Scale	Frequency	Percentage (%)
Strongly Agree	79	20.3
Agree	199	51.0
Not Sure	48	12.3
Disagree	56	14.4
Strongly Disagree	8	2.1
Total	390	100.0

Table 11: Q6: Online learning affects my quality and quantity of sleep in a wrong way

Likert Scale	Frequency	Percentage (%)
Strongly Agree	62	15.9
Agree	188	48.2
Not Sure	67	17.2
Disagree	64	16.4
Strongly Disagree	9	2.3
Total	390	100.0

Table 12: Q7: Online learning during pandemic COVID-19 affects my mental health (such as depression, stress, and anxiety)

Likert Scale	Frequency	Percentage (%)
Strongly Agree	60	15.4
Agree	195	50.0
Not Sure	54	13.8
Disagree	54	13.8
Strongly Disagree	27	6.9
Total	390	100.0

Table 13: Q8: I seek professional/counsellor help for my mental health issue

Seek professional/counsellor	Frequency	Percentage (%)
Yes	49	12.6
No	341	87.4
Total	390	100.0

Table 14: Q9: You quickly get distracted by social media during online classes

Likert Scale	Frequency	Percentage (%)
Strongly Agree	84	21.5
Agree	203	52.1
Not Sure	41	10.5
Disagree	53	13.6
Strongly Disagree	9	2.3
Total	390	100.0

Table 15: Q10: You only switch to social media when you find online courses boring

Likert Scale	Frequency	Percentage (%)
Strongly Agree	69	17.7
Agree	267	68.5
Not Sure	27	6.9
Disagree	25	6.4
Strongly Disagree	2	0.5
Total	390	100.0

Table 16: Q11: You find that social media distractions are the biggest challenges facing during online classes

Likert Scale	Frequency	Percentage (%)
Strongly Agree	73	18.7
Agree	226	57.9
Not Sure	41	10.5
Disagree	41	10.5
Strongly Disagree	9	2.3
Total	390	100.0

Table 17: Q12: Online learning can save cost of my parents and I

Likert Scale	Frequency	Percentage (%)
Strongly Agree	68	17.4
Agree	232	59.5
Not Sure	57	14.6
Disagree	31	7.9
Strongly Disagree	2	0.5
Total	390	100.0

Table 18: Q13: My parents have to spend more to buy internet data so that my online learning runs smoothly

Likert Scale	Frequency	Percentage (%)
Strongly Agree	43	11.0
Agree	225	57.7
Not Sure	50	12.8
Disagree	62	15.9
Strongly Disagree	10	2.6
Total	390	100.0

Table 19: Q14: I don't have to spend money on transportation to go to educational institutions while learning online

Likert Scale	Frequency	Percentage (%)
Strongly Agree	79	20.3
Agree	226	57.9
Not Sure	48	12.3
Disagree	34	8.7
Strongly Disagree	3	0.8
Total	390	100.0

Table 20: Q15: Online learning affects my physical activity such as jogging, cycling, and doing sports

Likert Scale	Frequency	Percentage (%)
Greatly Affected	33	8.5
Affected	190	48.7
Not Sure	77	19.7
Slightly Affected	63	16.2
Not Affected	27	6.9
Total	390	100.0

Table 21: Q16: I have less time doing any sports and physical activities due to online learning

Likert Scale	Frequency	Percentage (%)
Greatly Affected	39	10.0
Affected	202	51.8
Not Sure	56	14.4
Slightly Affected	78	20.0
Not Affected	15	3.8
Total	390	100.0

Table 22: Q17: I can do lots of physical activity during face-to-face learning than during online learning

Likert Scale	Frequency	Percentage (%)
Strongly Agree	60	15.4
Agree	219	56.2
Not Sure	55	14.1
Disagree	53	13.6
Strongly Disagree	3	0.8
Total	390	100.0

DISCUSSIONS

Online Learning and Academic Performance

Online coursework generally yields worse students' study than in-person coursework. The negative effects of online course-taking are particularly pronounced for less-academically prepared students and for students pursuing bachelor's degrees. New evidence from 2020 also suggests that the switch to online course-taking in the pandemic led to declines in course completion. From the study, the percentage of respondents whose study are affected by online learning are high (57.2%) which shows majority of the students' study are affected by online learning. This may be due to lack of motivation as a challenge that they face when learning online. This could be attributed to lengthened university closures and significantly reduced social interaction with their peers [7-10].

Internet accessibility is also a key issue for many students and poor internet connection is a challenge for them. Unclear & inconsistent learning structures remains to be a key challenge that students face in online learning. Many students share stories of unproductive classes and lack of clarity surrounding how & when they will be learning [11]. Student whose academic courses are mostly conducted in theory are expected to be less affected compared to student whose academic course have more practical session or hands on approach. From our research, we find that study had significant association based on gender, education level and academic year.

Online Learning and Sleep Qualities

The percentage of respondents whose sleep qualities are affected by online learning are high (46.4%) and almost half of the respondent agree that online learning result in longer duration of sleep. Home confinement during this pandemic COVID-19 result in more time spent at home with no or little physical activity that could led to more tendencies to increase their daytime sleep. In other way, due to workload and submission of assignment on a given period of time, this can affect their night-time routine [11-13]. Some of them might use a lot of their time to complete the assignment and this may affect their sleep qualities. Consequently, lack of sleep among this category of student makes them having problem with their cognition such as difficulty in organizing thought, concentration difficulties, feeling sleepier during online classes, and depressed [14]. From our study, we find that students experiencing higher risk of experiencing changes in sleep pattern and affecting the qualities. This is influenced further by education level and academic year. From our perspective, we assume that degree student experience higher level of workload or assignment as most of them are coming from science-related courses which seem to be more complicated compared to diploma students. Student entering their final year will become more busy than usual compared to new student in their first year of university life.

Online Learning and Mental Health Status

While for mental health status, half of the respondents (50%) are affected and most of them (87.4%) are not keen to seek professional/counsellor help. Numerous studies have shown social isolation can cause higher rates of negative outcomes for the mental and physical health of individuals [15-16]. Other studies have found that face-to-face interactions can help reduce depression and anxiety. Less social interaction may increase feelings of social anxiety and pressures [17-18]. Since the COVID-19 pandemic, there's a lack of interaction and students face social isolation. This greatly impacts a student's mental health. The lack of social interaction in online learning leads to feelings of loneliness, lack of motivation, and isolation [19]. There is this newly coined term during the COVID era, called "Zoom Fatigue". The term Zoom Fatigue refers to feelings of exhaustion after long Zoom classes or video conference calls. It may not be a formal diagnosis but Zoom fatigue does exist especially in virtual learning. During an online class, there's information overload plus facing the screen for prolonged periods is mentally draining [20-21].

It's more challenging for students to learn new information, and even though they just sit in front of the computer, they feel like they are physically tired. Virtual learning fatigue is real, and it may lead to anxiety and stress for both students and professors. Staying focused on online classes is a challenge. Separating home life and class time, not following a routine schedule, the distractions at home, caused students not to be able to concentrate well with their classes. As a result, students tend to procrastinate and set things aside, then deadlines are missed. This causes pressure, stress, and anxiety to both students and their parents. Student wellbeing during the pandemic remains an ongoing and major concern for higher education institutions across the globe [22].

The world has witnessed protests with students marching through cities and occupying buildings to express their anger and frustration over a perceived lack of mental health support received from universities. There is also a surge of media reports on the rising rate of poor mental health among students as a direct result of the COVID-19 pandemic, with warnings from student representatives of the worsening of an existing mental health crisis among students internationally. Some students are facing consequences like boredom, stress, anxiety, and depression. The lack of physical contact, outlets for socializing and communication with peers and teachers, restrictions on travel, and reduced physical activities have contributed to this emotional issue [23].

Other sources of stress for some students include the inability to afford educational resources such as computers, separate rooms conducive for learning, high-speed internet for each family member who require educational facilities, and new expenses associated with the procurement of computing

devices as a consequence of the change in educational modality. Distance learning is also limited in the ability to facilitate all the learning outcomes of professional education that require hands-on practice such as medicine, dentistry, nursing, nutrition, and other allied health courses. In the case of countries with partial or no lockdown, students need to maintain physical distancing and grapple with the constant fear of contracting infection or spreading it to a family member, fear of job loss, and the inability to pay for the basic life needs such as food or housing expenses.

The observed changes in sleep pattern and increase in screen use by students have been previously reported. A significant deterioration in sleep quality of students during the pandemic may be due to late night browsing on social media, chatting, and checking online news from mobile devices as well as the increased use of screens for educational purposes, which is also associated with late night use of electronic devices. The significant increase in exposure to screens may lead to longer waking hours and reduce sleep duration as a result of blue light emitted from mobile screens, inhibiting melatonin production. This adjusts the sleep-wake cycle with a resultant increase in stresses, depression, and negative emotions. Our observation that students reported changes in sleep pattern and increases in screen use may make the explanations proffered by prior studies applicable to our study findings [24].

Online Learning and Financial Burden

Online learning also gives negative impact in term of financial. This is because most of them have to spent more on internet data services. Student who are part timer job to support their lives or those that lose their jobs might experience financial hardships. This can lead to stressful situation which eventually affecting their mental wellbeing. Online class alone are putting them in a stressful environment already as they need to spend extra money for internet data. For students who come from lower social economic status or backgrounds often felt more burdened plus their house area have lack of internet access. Having lack of proper devices, internet access and proper environment resulted in most of the education delivered by educators are not well received by the students themselves. Financial burden can indirectly lead to mental health problem. At the same time, online learning can also give positive impact in term of transportation cost [25].

Online Learning and Physical Activities

Besides, online learning led to sedentary lifestyle as their physical activities such as jogging, cycling, and doing sports are affected. COVID-19 pandemic and the resulting lockdown have restricted many elements of our environment. From our research, it shows an overall negative effect on physical activity. This confinement may be due to increase in sedentary behaviour and consumption of less healthy foods. As the students had to continue their classes via online platform, their social lives were

limited due to prohibition on going outside. During this online learning phase, physical activity could have been an opportunity to pass the time, or, conversely, sedentary behaviour could have increased. Their mental health state and low motivation could have either facilitated or interfered with the decision to exercise.

The hypothesis put forward was that students' sedentary behaviour would have increased during lockdown since they were confined to their homes, and that their physical activity would have decreased since they could not go outside to exercise. In fact, not only among university students but all people would have modified their lifestyles during this lockdown period, with an increase in sitting time due to people spending more time at home and there was also a reduction in the amount of time spent on physical activity. We do not know the exact reasons why physical activity increased, and we do not know if the effects on physical activity habits would have been maintained if the lockdown had gone on for longer [26].

In the study, we can observe that the physical activities are influenced by academic year and level of education. We considered that the higher the academic year the more sedentary lifestyle they could have during this lockdown as they have more and complex assignment to be completed and submitted, thus increasing their screen time, and sitting time.

Online learning and Social Media Distraction

For many students, the transition from in-person to online classes from home comes with many distractions. Locked indoors with family, roommates and pets running about is not an ideal academic environment. With social isolation, limited activity, and the very real option of spending the entire day in bed, some are finding it tough to remain focused. There are significant differences on the relationship between online learning and social media distractions in which 52.1% respondent agree and 21.5% strongly agree. Outside of university, when the time is on your hands, instead of working on homework and studying for tests and quizzes students usually turn to their smart phone, computers, and tablets. Applications such as Netflix and Hulu provide multiple shows and movies which students can spend hours watching [27].

Moreover, the online platform for their classes enables the students to turn off the video and thus they feel the freedom to do anything without being seen by their lecturers. Online classes are more towards one way teaching which can distract their focus especially when the classes continue for more than an hour. Students tend to be distracted by social media especially when the classes become boring, and they lost their focus. Most of them agree that social media distraction is the biggest challenge faced during online classes even though there are so many other distractions that

come from the home environment and their family. This may eventually affect their study. Compared to a lecture-supervised classes, online students are more likely to send text messages, answer email, chat on Facebook, WhatsApp, watch videos on Youtube, surf on google, play video games, or listen to music while taking an online course. A study conducted by researchers at Kent State University confirmed what for many seems obvious, online students multitask more than their peers in classes. The result is poor academic performance. The researchers analyzed the behavior of 300 university students who took online and face-to-face courses, 25% said they were more likely to listen to music, send text messages, chat on social networks, or surf the Internet in online courses than in a classroom [10,27].

Online students who had a greater tendency to multitask, scored lower in academic tests compared to their performance on face-to-face courses. Even those students who assumed great ability to self-regulate this behavior could not resist performing other tasks in their online classes. They multitasked with a frequency similar to that of other students who felt more prone to distraction.

Andrew Lepp, a professor at Kent State University, points out: "in face-to-face courses, a physically present teacher and the presence of conscientious students help to enforce classroom policies and behavioral norms against multitasking. Because multitasking during educational activities has a negative impact on learning, it is important to develop methods for reducing this academically disadvantageous behavior, particularly in the increasingly common online learning environment" [28].

Study Limitation

With a short period this research managed to get minimum of 385 respondents among all diploma and degree student in public and private universities in Malaysia. This surely would not represent the actual population of university students. In order to achieve more accurate and excellent result in term of precision, a large sample size and increasing the number of respondents are needed to get higher accuracy.

Moreover, in COVID-era, method of collecting data from the respondents was limited to online. It is not unusual to have some of the respondents who do not want to cooperate as they might have problem with internet access or lack of knowledge regarding the research. Maybe some of them might having busy schedule or working that make them unable to get involved which result in difficulty to collect data. Because our target population is among the university students, so most of them may not have time to answer our questionnaire due to their busy with online classes.

Study Bias

Bias can occur at any phase of research including

study design or data collection. Bias is a form of systematic error that can affect the scientific investigation and distort the measurement process. There are some biases in this study, such as in term of education level which dominating the number of respondents. We were managed to gather data from degree student for a total of 325 which account for 83.3 % while diploma student only 65 which accounts for only 16.7 % of our respondents.

Furthermore, the bias can also be seen from the university involved. Respondents from public universities (304 with percentage of 77.9%) are higher compared to respondents from private universities (86 with percentage of 22.1%).

CONCLUSION

The result of this research prove study, financial burden, physical activities, sleep qualities, and mental health status had significant impact towards online learning during pandemic COVID-19 There is correlation between online learning and social media distractions. The result also shows that online learning during COVID-19 pandemic affected the study of most participants with varying degrees.

In the future, this study can be improved by increasing sample size, distributing questionnaire equally among each variable, increasing randomness and collecting data in a longer period. Further study can be conducted to identify the common problems and challenges with online learning and how it effects student from different academic courses and social status.

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Clinical Quiz

FLUORODEOXYGLUCOSE-AVID SOLITARY RETRO-AREOLAR BREAST LESION: A RARE ENCOUNTER

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ABSTRACT

This clinical quiz highlights the utilisation and findings of fluorodeoxyglucose positron emission tomography/computerised tomography (FDG PET/CT) in the management of a rare breast lesion and further discusses issues related to the matter.

CASE PRESENTATION

A 67-year-old lady with underlying diabetes mellitus, hypertension and ischaemic heart disease had presented with left breast lump for the past six months duration. She denies having nipple discharge, constitutional symptoms, or any family history of malignancy. She was further investigated and underwent mammogram with complementary ultrasound of both breasts. No significant architectural distortion detected on mammogram and no suspicious malignant sonographic features seen on ultrasound. However, an indeterminate left breast lesion was noted at 3 o'clock position associated with heterogeneously dense fibroglandular breast parenchyma pattern.

She was subjected to left breast trucut biopsy that revealed high nuclear to cytoplasmic ratio with irregular nuclear borders, vascular chromatin and prominent nucleoli with benign ducts and mature adipocytes seen interspersed between tumour cells. The diagnosis of diffuse large B-cell lymphoma was made based on the microscopic findings supported with positive immunohistochemical analysis. Bone marrow aspiration showed no significant marrow involvement with no obvious abnormal lymphoid cells or excess of blasts noted.

A staging contrasted CT scan demonstrated only focal disease in the left breast. Chemotherapy with RCHOP regime was commenced and later completed for six cycles. A repeat contrasted CT scan showed partial resolution of the left breast lesion. However, breast mammogram did not provide much interval information. She was referred to our institution and underwent

fluorodeoxyglucose positron emission tomography/computerised tomography (FDG PET/CT) for response assessment after completion of chemotherapy. The known left breast lesion demonstrated abnormal intensely FDG avid increased uptake associated with no other FDG avid lesion seen elsewhere (Figure 1). The scan findings were suggestive of metabolically active residual lymphoma.

Question 1: Which of the following is not a possible preliminary differential clinical diagnosis for the breast lesion in this patient?

- A. Breast cyst
- B. Fibroadenoma
- C. Galactocele
- D. Invasive ductal carcinoma
- E. Invasive lobular carcinoma

Question 2: Select the recommended assessment classification used in FDG PET/CT for lymphoma cases

- A. TNM Staging
- B. Ann-Arbor Staging
- C. BIRADS Classification
- D. Deauville Criteria
- E. PERCIST Criteria

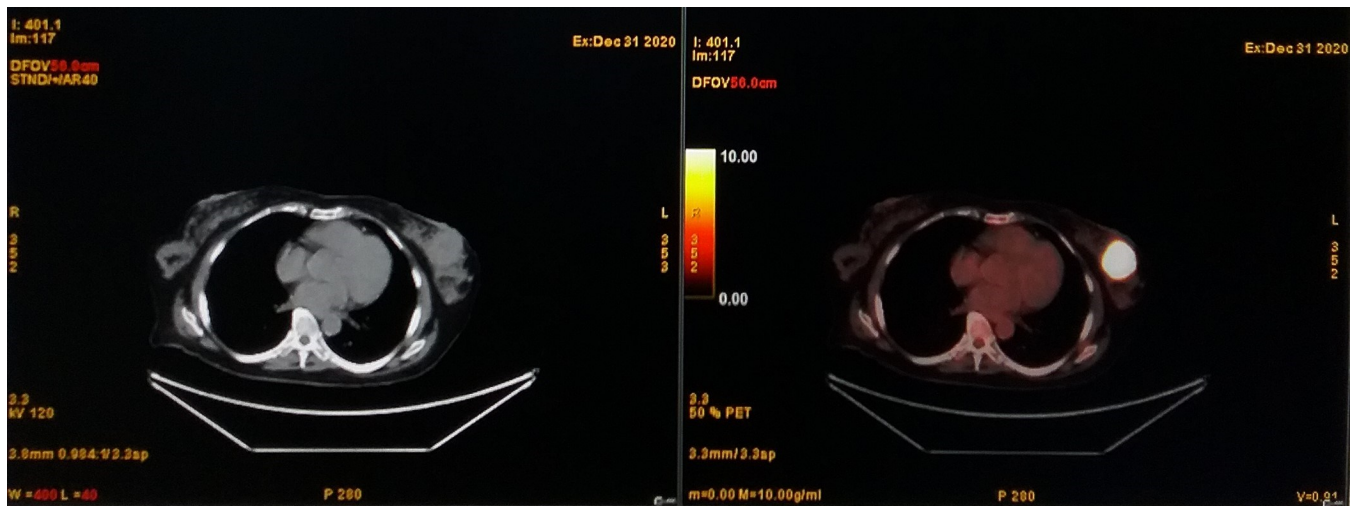


Figure 1: Axial PET/CT images demonstrate intensely FDG avid left breast lesion.

DISCUSSION

Differential diagnoses of breast lump include benign conditions such as fibroadenoma and cyst as well as malignant lesions such as invasive ductal and lobular carcinoma [1]. Although galactocele is the most common benign breast lesions during breastfeeding period that can mimic carcinoma, it is unlikely in this patient in view of her age and presentation. Following clinical evaluation, important investigations for a breast lump to rule out malignancy are imaging and pathology analysis. Imaging using mammography and ultrasound will enable the lesion to be further characterised. Subsequent fine needle aspiration cytology or core biopsy should be performed to ascertain the histopathological diagnosis.

Primary lymphomatous disease or secondary involvement of the breast is rare. It is reported that breast lymphoma accounts for about 0.5-1% of breast malignancies and approximately 2-3% of extra-nodal lymphomas [2-4]. Patient may only present with a breast lump without any other constitutional or B symptoms as highlighted in this case. Furthermore, first line treatment of breast lymphoma is mainly chemotherapy regime tailored to treating underlying histological type of the lymphoma such as R-CHOP regime consisting of rituximab, cyclophosphamide, doxorubicin hydrochloride, vincristine, and prednisone for non-Hodgkin lymphoma [5-7].

FDG PET/CT plays important role in lymphoma and breast cancer management. It is widely used in disease staging and treatment response assessment. FDG uptake has been reported in both benign and malignant lesion in the breast. Breast lymphoma can present as unilateral or bilateral involvement and unifocal, multifocal or diffuse activity with high-

grade tumour exhibiting more intense FDG uptake [8-9]. A recommended reporting system to describe lymphomatous lesion in FDG PET/CT is the Lugano classification or Deauville scoring system [10-11]. Each lesion is rated independently with score 1 = no uptake or no residual uptake when used as interim, 2 = slight uptake but equal to or below mediastinal blood pool, 3 = uptake above mediastinal but below or equal to liver activity, 4 = uptake slightly to moderately higher than liver and 5 = markedly increased uptake or any new lesion when done for response evaluation. Scores of 4 and 5 are positive for active lymphomatous disease.

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Review Article

NORMAL TENSION GLAUCOMA AND FINGER PHOTOPLETHYSMOGRAPHY FITNESS INDEX

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ABSTRACT

Normal tension glaucoma (NTG) is a subset of Primary open angle glaucoma (POAG), characterized by glaucomatous structural changes of optic nerve associated with functional Visual field changes similar to POAG and intraocular pressure of lower than 21 mmHg. Vascular dysregulation is believed to contribute to NTG pathogenesis. In this narrative review we report studies that investigate Finger Photoplethysmography (PPG) and Photoplethysmography Fitness Index (PPGF). Being non-invasive in nature, the PPGF index may be utilized to evaluate vascular fitness in NTG patients.

INTRODUCTION

Normal tension glaucoma (NTG) is a subgroup of primary open angle glaucoma (POAG) characterized by progressive optic neuropathy while the intraocular pressure (IOP) is within the normal range [1]. The prevalence of POAG in Asia is about 2.34 % and the proportion of NTG varies depending on population and country in Asians such as 92% in Japan and 84.6% in Singapore [2,3,4]. However, in the Western population the proportion of NTG is only around 30 - 40% [5,6].

The etiology of NTG is multifactorial and is still not well understood. Apart from lower IOP threshold and lower intracranial pressure, insufficient blood supply and vascular dysregulation may contribute to NTG pathogenesis, particularly systemic hypotension with nocturnal low blood pressure (BP) and circadian fluctuations [7,8]. There is visual field (VF) defect progression observed among NTG patients with reduced nocturnal BP 10 mmHg lower than daytime BP [9]. Thus, this vascular dysregulation contribute to lower mean ocular perfusion pressure (OPP) in NTG patients especially in patients with obstructive sleep apnea, hypertension and uncontrolled diabetes.

Normal tension glaucoma is diagnosed by excluding other optic nerve diseases and having fulfilled the diagnostic criteria for glaucoma which include glaucomatous structural changes of the optic nerve, functional changes on VF similar to POAG but IOP being consistently < 21mmHg.

Systemic vascular risk factors in Normal Tension Glaucoma

The pathogenesis of NTG is uncertain, and perhaps a complex interaction of several systemic and ocular factors contributes to the development of the disease. Different studies have shown that intracranial pressure as well as cardiovascular risk factors are involved leading to optic nerve damage.

a) Systemic Vascular Risk Factor

There is evidence supporting a correlation between systemic vasculopathy with increased risk of NTG and disease progression among NTG patients. One of the studies evaluated the presence of diabetes

mellitus and stroke among unilateral and bilateral NTG. These two vasculopathy risk factors increase the odds ratio of bilateral NTG to up to 2.31 and 4.27, respectively [10]. Similarly, a case control study by Phelps et al found that migraine is more common among NTG patients compared to other groups including POAG and ocular hypertension patients [11]. Moreover, the study also highlighted that migraine as a systemic vasculopathy disease was found to occur at a significantly higher rate in NTG patients than in the general population.

b) Nocturnal Blood Pressure

A systematic review with meta-analysis was published in 2015 comparing POAG versus NTG patients on the involvement of circadian variations in arterial blood pressure (BP) and glaucomatous optic neuropathy (GON) [12]. The study concluded that there is no correlation between diurnal mean systolic or diastolic BP with nocturnal BP among patients with or without progression of VF defects. However, VF loss progression is significant if the nocturnal dips are greater than 10% of daily systolic or diastolic BP.

Another prospective study among NTG patients was done by monitoring the arterial BP every 30 min over a 48-hour period at baseline and at the 6th and 12th month follow-up visits [8]. About 29% out of the 85 patients enrolled had progressive VF loss. A multivariate analysis showed that the duration and magnitude of nocturnal BP reduction during sleep, especially 10 mmHg lower than daytime BP, predicted VF progression. The association between a pronounced fall in BP during sleep and glaucomatous progression can be postulated by low ocular perfusion pressure (OPP) causing ischemic insults to the optic nerve head [9]. The OPP can be calculated indirectly with arterial BP and IOP.

c) Autonomic dysfunction

The sympathetic neural activity is important in regulating our circadian variations of BP. This system activity leads to an increase in heart rate, stroke volume, and vasoconstriction. A prolonged predominance of sympathetic activity due to a chronic imbalance between the sympathetic and parasympathetic activity may result in arterial and cardiac remodelling, endothelial dysfunction, local blood flow reduction, and increase in tissue oxygen demand [13].

Study by Wierzbowska J et al (2012) and Park HY et al (2014) showed that the NTG may result from sympathovagal imbalance of the autonomic nervous system that has been shifted towards sympathetic activity [14,15]. Moreover, Park HY et al (2014) in another study also found that patients with a low heart rate variability, which indicates autonomic dysfunction with predominant sympathetic activity, have a greater risk for central VF damage progression than patients with a high heart rate variability [16]. Vascular dysfunction in peripheral microcirculation was also associated with central VF defects in NTG patients which can be evaluated by nail fold capillaroscopy.

Finger Photoplethysmography (PPG) and Photoplethysmography Fitness Index (PPGF)

a) Photoplethysmography (PPG)

Photoplethysmography is a low-cost optical measurement technique used to detect blood volume changes in the microvascular bed of a tissue [17]. This technology has been used in medical devices such as pulse oximeters and BP measurement systems. The PPG technology requires two opto-electronic components: (a) an infra-red light source to illuminate the tissue, and (b) a photodetector to measure the small variations in light intensity associated with changes in the blood vessels volume [17,18].

It is generally accepted that finger PPG can provide valuable information about the cardiovascular system [18]. Each cardiac cycle provides a signal of relative blood volume changes in peripheral circulation detected by PPG in the form of waveform. This signal is affected by many factors including heartbeat; local haemodynamic interaction such as ventricular ejection, arterial stiffness and arterial resistance; physiological factor such as sympathetic activity and environmental factors such as temperature [17,18].

A typical PPG waveform consists of a rising edge, a primary peak, a secondary peak and a dicrotic notch. (19) A typical appearance of a PPG pulse is divided into two phases as shown in Figure 1 [18].

b) Factors affecting PPG values

Previous study showed that PPGF has good reproducibility and repeatability. A study by Chellapan et al found that the co-efficient of repeatability is more than 90% for all readings [24]. However, several factors affect PPG values. Conditions such as high blood pressure, ageing and diabetes have been shown to portray distinctive PPG waveform morphology changes. Figure 2 shows an example of a PPG waveform morphology changes due to diabetes.

Various parameters and indices have been derived from different components of PPG waveform. These include pulse transit time (PTT), augmentation index (AIx), reflection index (RI), stiffness index (SI), crest time (CT) and aging index (AI). These parameters provide information on vascular aging and health [18,21].

c) Photoplethysmography Fitness Index (PPGF), vascular risk and vascular aging

Chellapan et al. (2010) introduced photoplethysmography fitness index (PPGF) in percentage (%) as an index of vascular risk and vascular aging based on PPG waveform [22]. It indicates better vascular fitness with higher PPGF value with less risk of developing cardiovascular events.

Photoplethysmography fitness index (PPGF) was derived based on morphological investigation comparing the diseased PPG pulse with a reference pulse (the PPG pulse of a clinically verified healthy

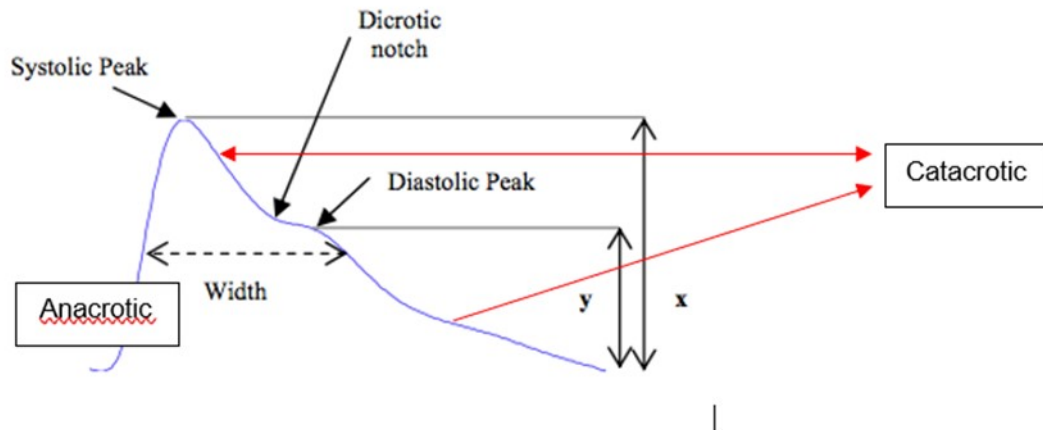
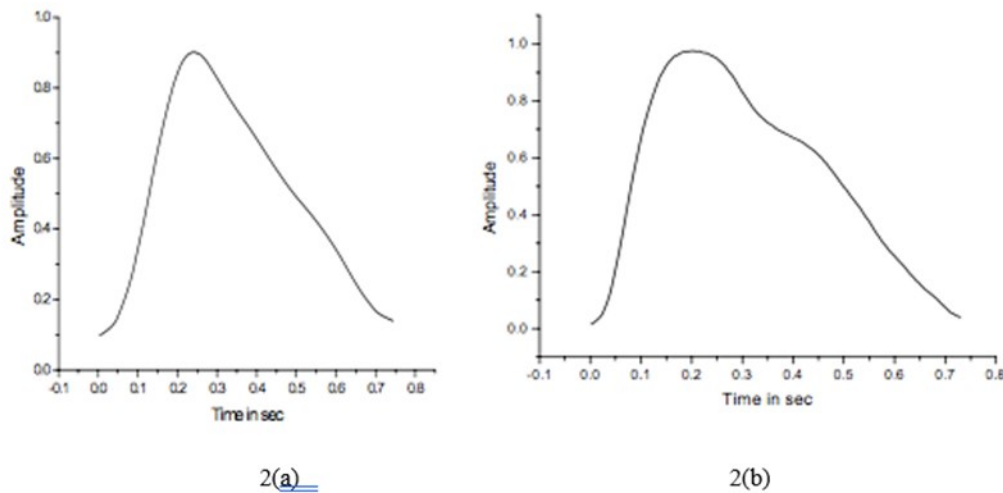


Figure 1: A typical waveform of the PPG and its characteristic parameters



Figures 2(a) and 2(b) : PPG waveform of a diabetic and a non-diabetic 38-year-old subject respectively. PPG waveform of the diabetic subject shows lack of dicotic notch [20].

19-year-old male or female subject). The value was calculated as a percentage pulse contour difference referencing to the reference signal as in Figure 3.

The study was conducted on a group of healthy individuals (female and male) with age ranged from 19 to 68 years old, and showed an inverse relationship between aging and PPGF, ie PPGF value decreased with increasing age [22] PPGF also has a good reproducibility record [22,23].

d) Finger Photoplethysmography (PPG), Photo-plethysmography Fitness Index (PPGF) and cardiovascular disease (CVD) Risk Factors

Photoplethysmography waveform reflect the CVD risk factors which include hypertension, dyslipidemia and diabetes due to altered arterial structure, properties and stiffness. In the past, PPG was widely used to evaluate CVD risks in relation to SBP, lipid profile, BMI and HbA1c [18,24–26].

Photoplethysmography parameters also have been used in diabetic populations. The area under the curve for PPG (AUC-PPG) was higher in Type 2 DM patients with HbA1c <8% compared to those with HbA1c >10%. (27) In diabetic patients, crest time ratio (CTR) was increased and subtle changes in diabetic-associated atherosclerosis can be detected using PPG [28].

Photoplethysmography parameters were able to stratify different categories of BP (normotensive, prehypertensive and hypertensive) based on SBP [29]. Stiffness Index (SI) and RI increased with higher BP, total cholesterol and LDL-cholesterol [26]. These parameter were also able to detect different PPG profile based on lipid abnormalities with different waveform morphologies as shown in Figure 5 [30,31]. Crest Time (CT) and PPGF values also demonstrated improvement in patients' lipid profile and has proposed PPG as a potential

$$PPGF = 100 \times \left(1 - \frac{\sqrt{\sum ((x - \bar{x}) - (y - \bar{y}))^2}}{\sqrt{\sum (y - \bar{y})^2}} \right)$$

x = reference pulse amplitude

y = tested pulse amplitude

Figure 3 : Formula of PPGF calculation

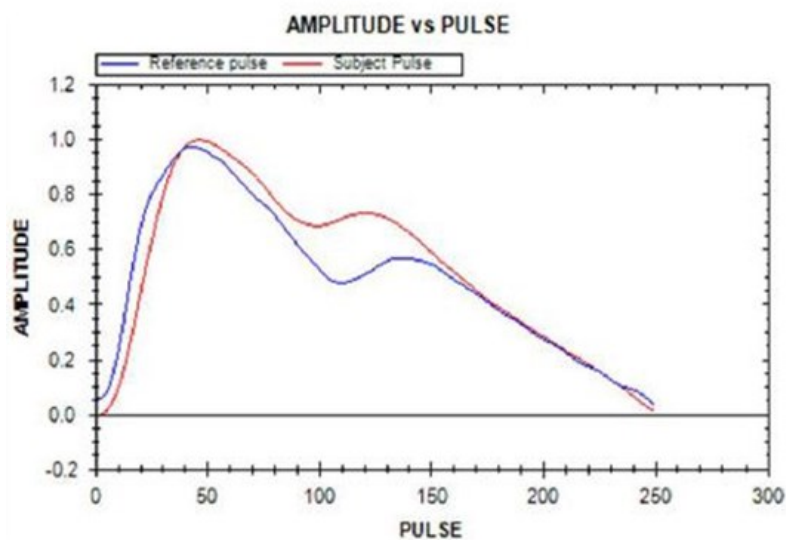


Figure 4: PPGF waveform (Blue: 19-year-old healthy reference pulse; Red: target subject)

monitoring device in patients with cardiovascular risks [30].

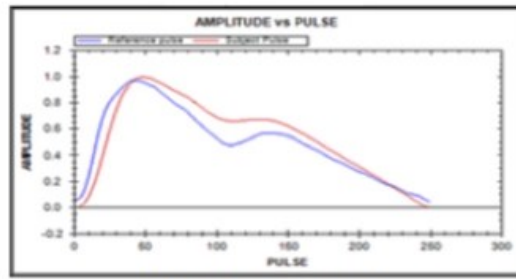
The PPGF is an index of vascular fitness, and is derived by analyzing the entire morphology of the PPG waveform (rising and falling edge of PPG waveform) [22]. It has been shown to have good reproducibility and was proposed to be a better representative of the vascular health status. Consistent results have been discovered by previous researchers linking the PPGF with all CVD risk factors [22,24, 32, 33]. Photoplethysmography Fitness (PPGF) Index was found to be lower in subjects with CVD risk factors (hypertension, dyslipidemia and diabetes) and was able to differentiate between those who have the risk factors and those without [34]. Higher PPGF value has been demonstrated with lower blood pressure level and improvement in lipid profile demonstrated improved PPGF value [31,33].

NTG is known to be characterized by optic disc excavation and VF defects in the absence of an elevated IOP. With the multiple postulations of non-IOP related pathogenesis in NTG, broadly divided into vascular and mechanical causes which eventually leads to retinal ganglion cell (RGC) death, these systemic factors may potentially be used to screen for NTG (Figure 6) [35].

Of note, endothelial cell dysfunction or damage is one of the proposed mechanisms contributing to reduced ocular blood flow. By detecting early endothelial damage using the PPG, early detection of NTG may be made possible in this way.

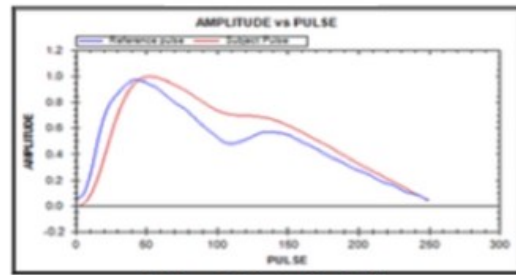
Since the previous PPG study shows good reproducibility (28), this tool may be able to detect and monitor disease progression, potentially enabling earlier screening using PPG for population at risk for NTG, a disease which is often detected late and results in significant economic burden to patients and society.

**LDL high,
TG normal**



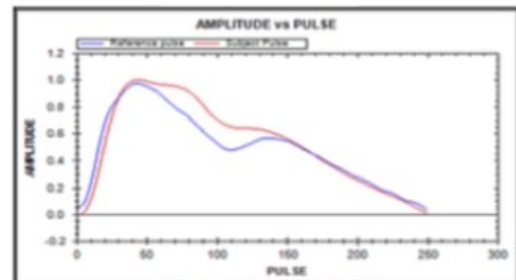
LDL = 5.08, TG = 1.32

**LDL normal,
TG high**



LDL = 3.28, TG = 2.81

**LDL high,
TG high**



LDL = 3.53, TG = 2.0

Figure 5 : PPG waveform morphological properties versus lipid profile [30].

- Subjects with high LDL and normal TG show consistent changes in rising edge of the PPG waveform.
- Subjects with high TG and normal LDL show a shift in the first peak and changes in rising edge.
- Subjects with high in both LDL and TG adopt both changes with a significant budge after the first peak (Raifana et. al 2014)

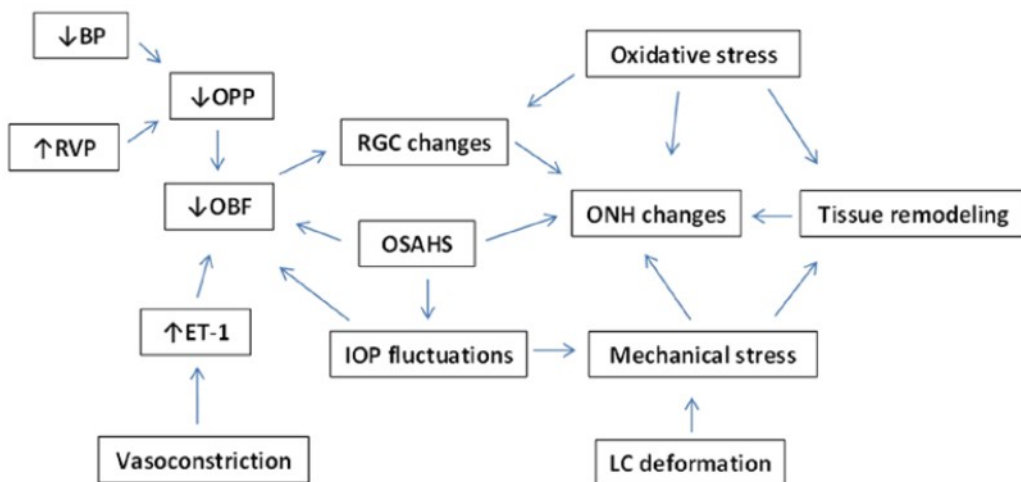


Figure 6. Factors contributing to normal tension glaucoma (NTG): BP (blood pressure); RVP (retinal venous pressure); OPP (ocular perfusion pressure); OBF (ocular blood flow); ET-1 (endothelin-1); RGC (retinal ganglion cell); OSAHS (obstructive sleep apnea/hypopnea syndrome); IOP (intraocular pressure); ONH (optic nerve head); LC (lamina cribrosa).

CONCLUSION

Based on the consistent and convincing evidences of PPGF adding on to its convenient and non-invasive nature, the PPGF index may be utilized to evaluate vascular fitness in NTG patients with CVD risk factors.

There are still limited studies on PPGF in ophthalmology. There is no previous study done on PPGF in relation to normal tension glaucoma. The reliability of PPG to detect NTG disease is still unknown. Since the previous PPG study shows good reproducibility, this tool may potentially be able to detect and monitor disease progression, potentially enabling earlier screening using PPG for population at risk for NTG, a disease which is often detected late and results in significant economic burden to patients and society [28].

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Case Report

RENAL CELL CARCINOMA CHOROIDAL METASTASIS WITHOUT THE PRIMARY TUMOUR: A CASE REPORT AND REVIEW

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ABSTRACT

A 65-year-old Chinese man sought treatment for right painful blind eye of 2 years duration which progressively worsened over time. His vision had been poor since the age of 15 years old. He was unsure of the cause. He was initially treated as a case of painful blind eye secondary to glaucoma and evisceration was performed. The vitreous cavity was found to be filled with hard fibrotic tissue. Histopathological examination revealed metastatic renal cell carcinoma, clear cell variant. Further investigation was performed and he underwent exenteration in view of right optic nerve involvement. All tumour markers were negative. Computed Tomography (CT) thorax, abdomen and pelvis did not reveal any primary tumour. There were no signs and symptoms to suggest renal pathology.

INTRODUCTION

Renal cell carcinoma (RCC) is a rare malignancy characterized by a variety of clinical features. It represents approximately 3% of all adult malignancies and ranks 13th in frequency of all carcinomas [1,2]. Renal cell carcinoma has been documented to metastasize to every organ in the body although metastasis to the eye and orbit is uncommon. Metastases may present decades after the removal of the primary disease. However, it is uncommon for patients who present with ocular metastasis before primary RCC is identified. We report a rare and unique case of metastatic renal cell carcinoma presenting as a choroidal mass despite no evidence of primary tumour.

CASE REPORT

A 65-year-old, Chinese gentleman, with underlying hypertension, dyslipidemia and ischemic heart disease presented with a right-sided painful blind eye for 2 years which became progressively more intense. He had a history of right poor vision since the age of 15 but was unsure of the cause. The pain was associated with redness and tearing of the affected eye. He experienced headache, but no nausea or vomiting. There was no aggravation factor and occasionally relieved by analgesia. On the first visit to the ophthalmologist, he was told to have high intraocular pressure and planned for laser transscleral

cyclophotocoagulation and counselled for evisceration. He was referred to us for a second opinion. On examination, he has no perception of light in his right eye, while the left best corrected visual acuity (BCVA) was 6/12 due to very early cataract. The affected eye was phthisical with the presence of generalized conjunctiva injection and uveal tissue visualised underneath thinned sclera at 11 o'clock. Seidel test was negative. Intraocular pressure (IOP) was 90 mmHg. Due to cornea opacity, the posterior segment was unable to be examined. We proceed with B-scan ultrasonography examination of the right eye which revealed the loss of globe contour with no obvious mass detected (Figure 1). A diagnosis of painful blind eye secondary to absolute glaucoma was made hence evisceration was performed. Intraoperatively, we noticed that there was multiple strongly adhered hard fibrotic mass on the inner surface of the scleral shell. Histopathological examination showed hyaline stroma infiltrated by atypical cells arranged in nest and papillary-like pattern, hyperchromatic nuclei, with a surrounding area of osseous metaplasia, haemorrhage and tissues necrosis which suspicious of metastatic renal cell carcinoma (Figure 2).

A systemic workup was done and tumour marker showed negative for α -Fetoprotein (AFP), prostate-specific antigen (PSA), carcinogenic embryonic antigen (CEA), CA 125 and CA 19-9. CT scan of the brain, orbit, thorax, abdomen and pelvis was

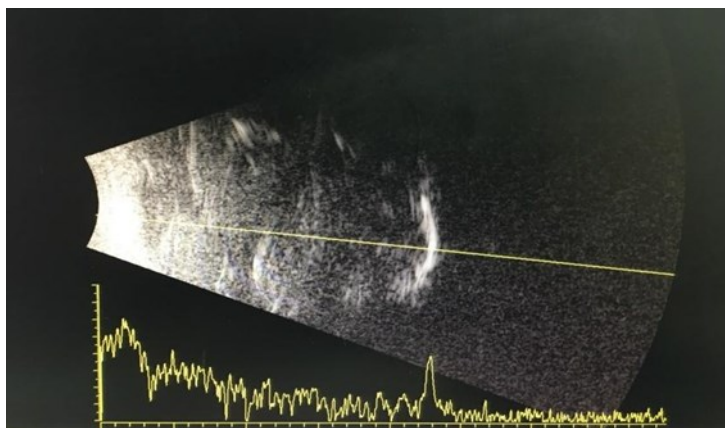


Figure 1: B-scan showing loss of globe contour with no obvious mass able to be detected.

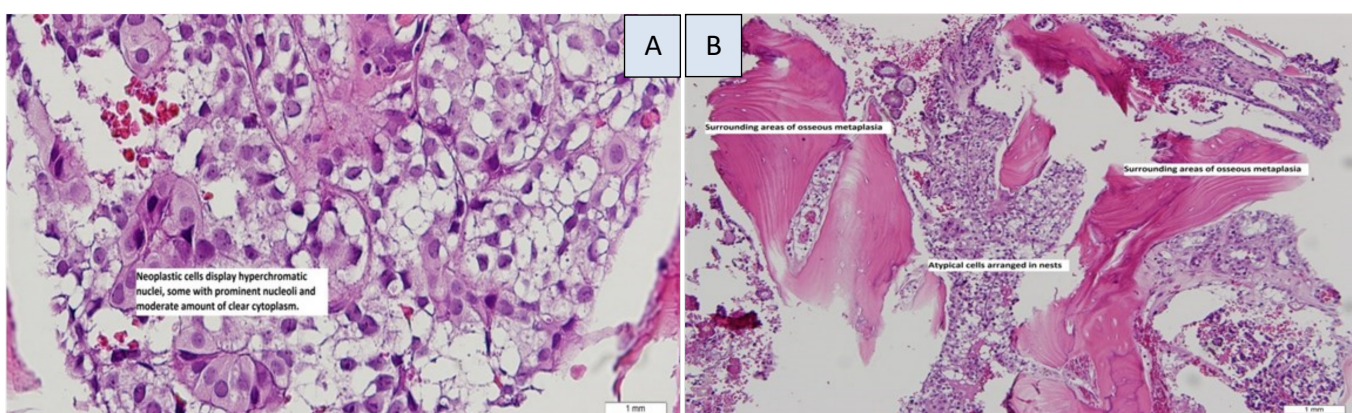


Figure 2A: Neoplastic cells display hyperchromatic nuclei, some with prominent nucleoli and moderate amount of clear cytoplasm.

Figure 2B: Hyaline stroma infiltrated by atypical cells arranged in nest and papillary-like pattern with surrounding area of osseous metaplasia.

performed to search for the primary tumour. A well-defined heterogeneously enhancing right intraconal lesion was seen, which arose from the distal part of the affected optic nerve, with the lesion abutting the right superior rectus muscle. The rest of the right optic nerve appeared bulky and enhancing (Figure 3). Otherwise, it did not extend intracranially. The lungs, abdomen and both kidneys showed normal enhancement with no focal lesion seen. Interestingly, there was no CT evidence of primary renal tumour.

Subsequently, we proceeded with exenteration of his right orbit. Biopsy from optic nerve was taken. Microscopically, it showed infiltration of malignant cells arranged in papillary architecture with a fibrovascular core consistent with papillary adenocarcinoma (Figure 4). Immunohistochemically, the malignant cells are positive for renal cell carcinoma and PAX8, which suggest kidney in origin (Figure 5). He was then referred to the oncology department and started with radiotherapy.

DISCUSSION

Renal cell carcinoma (RCC) is previously known as hypernephroma to describe adenocarcinoma or clear cell carcinoma of the kidney. It represents approximately 3% of all adult malignancies and ranks 13th in frequency of all carcinomas [1,2]. It usually occurs in male between the ages of 30 and 60 years. Metastases commonly occur, with about 40% of patients presenting with metastatic disease [1,2]. The occurrence of distant metastasis appears in approximately one-third of cases after nephrectomy. However, metastasis can also appear as the first presenting sign of RCC. The most common sites of metastatic spread are lung (76%), regional lymph nodes (66%), bone (42%), and liver (41%) [1]. Among all eye neoplasms, only a minority is due to renal cell carcinoma. In a pathology survey, only 7 out of 196 cases of ocular metastatic carcinoma originated from renal cell carcinomas [3]. Ocular structures involved include iris (9%), ciliary bodies (2%) and choroid (88%) although eyelid, orbital, extraocular muscles,



Figure 3: Arrow showing a well-defined heterogeneously enhancing right intraconal lesion, which appeared to arise from distal part of the right optic nerve. The rest of the right optic nerve appeared bulky.

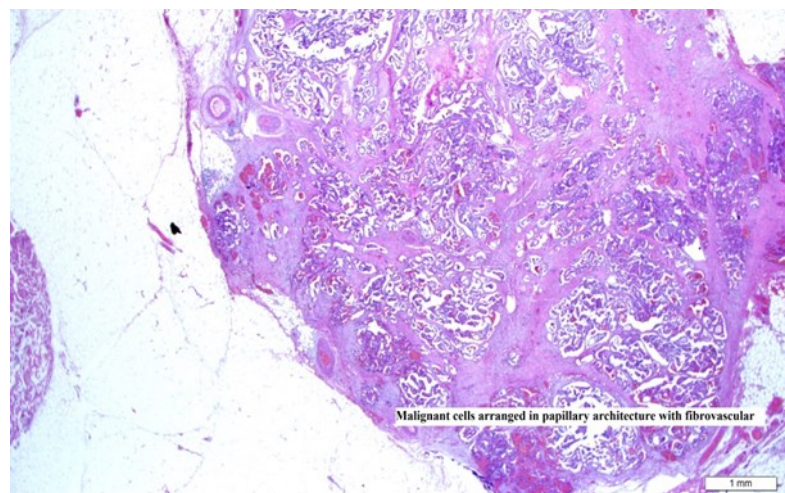


Figure 4: Infiltration of malignant cells arranged in papillary architecture with fibrovascular core, consistent with papillary carcinoma

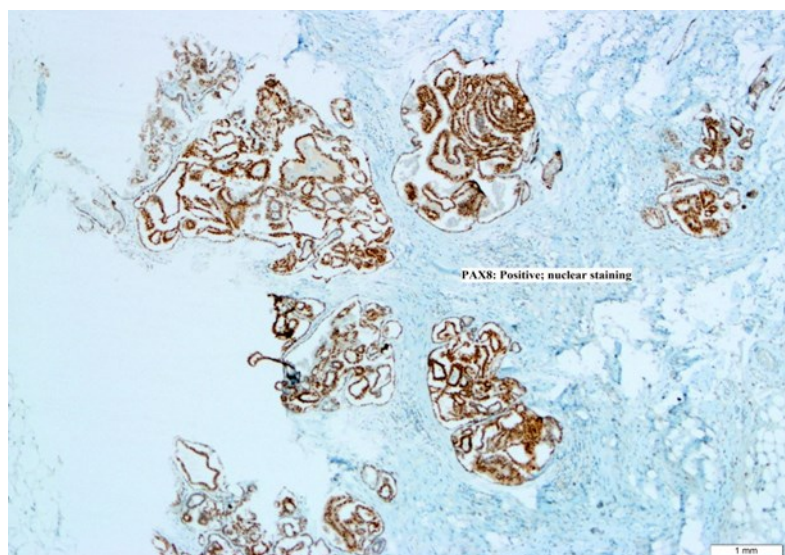


Figure 5: Nuclear staining positive for PAX 8 in immunohistochemistry test

lacrimal gland, conjunctiva, sclera, retina and optic nerve involvement have also been reported [4,5].

Choroid is the most common site for ocular metastasis due to its high vascularity. Metastasis to the ciliary body and iris is rare but has been described as a fleshy mass with prominent vascularisation [4]. Choroidal metastases generally appear as a unifocal, solitary, yellow or reddish-orange-coloured mass in fundus examination. However, it is difficult to distinguish it from non-pigmented choroidal melanoma and other types of metastases. This reddish coloured tumour can also be seen in cases of choroidal haemangioma and other metastases [6]. A study of uveal metastasis in 520 eyes by Shield et al revealed that tumour appeared as a solitary mass (71%) with the mean basal width of 9 mm and mean thickness of 3 mm. Other associated findings include subretinal fluid (73%) and retinal pigment epithelial alterations (57%), vitreous opacities, retinal infiltrates and haemorrhages [7]. There is also finding of vitreous haemorrhage as an initial sign of RCC. Haimovici et al. (1997) described a case of a 77-year-old man with known renal cell carcinoma who presented with hemorrhagic retinal detachment from choroidal metastasis [6].

Reported cases of ocular metastasis from renal cell carcinoma are summarized in Table 1. The clinical features of choroidal metastases are variable and till now no sufficient data to distinguish them from other types of metastatic carcinoma. Choroidal metastases commonly present with complaints of painless loss of vision, loss of peripheral visual field, myodesopsia or pain due to neovascular glaucoma [8]. In our case, the patient presented with right painful blind eye with high intraocular pressure. Given the history of many years of unknown cause for poor vision since childhood with no known systemic illness, a diagnosis of secondary glaucoma was made, hence laser transscleral cyclophotocoagulation (TSCPC) was performed once by the first attending ophthalmologist. He was then referred to our centre for intolerable eye pain despite TSCPC and maximum topical anti glaucoma medication.

Metastasis from renal cell carcinoma frequently cause diagnostic confusion as it may not present with the clinical triad of haematuria, pain, and abdominal swelling. Other signs and symptoms include weight loss, night sweats and malaise. The most common eye symptoms are blurred vision, flashes of lights and floaters. Orbital proptosis, ptosis, lid swelling, diplopia, or cranial nerve palsies are commonly associated with orbital metastasis. Patients may complain of pain due to secondary inflammation and glaucoma. However, these symptoms occur in only less than 10% of cases [8]. Almost half of the cases with ocular metastases had ocular signs and symptoms that preceded the diagnosis [3,9], similar to our case. Interestingly, another feature of RCC is the tendency for long latency periods between the primary diagnosis and metastatic presentation which can manifest from months to years, with the most extended case reported up to 25 years after the nephrectomy [10]. In contrast, all these signs and symptoms were

absent in our case, except for recent unilateral painful blind eye which accounts for only 10% of RCC cases as reported by Kurli et al. [8].

A retrospective review conducted by Shields et al. (1997) revealed that among 520 patients with uveal metastasis, only 2% of them were found to have primary renal cell carcinoma [9]. Shield also revealed that 34% of patients had no previous history of cancer and at the end of the study, the primary site remains unknown in approximately half of these patients (17%) despite extensive investigations [9]. Many of them have a high risk of mortality and eventually die by a disseminated metastatic disease with the primary site still undiscovered as demonstrated in our case. Majority of RCC cases were detected through systemic evaluation and multi-modality imaging of ultrasonography, CT scan and magnetic resonance imaging. However, in our case, CT scan of thorax, abdomen and pelvis revealed no evidence of primary tumour.

In our patient, we postulated the lesion was from uveal tissue, judging from visualized uveal tissue seen underneath the thinned sclera. Its origin was unsure as we were unable to view the fundus as the cornea was very opaque. The origin of the lesion cannot be ascertained from B-scan ultrasonography due to loss of globe contour with no apparent mass can be detected. B-scan has substantial clinical variability with findings usually mimic choroidal melanoma mass, with low internal reflectivity and acoustically hollow lesion [2,11]. In case of choroidal involvement in RCC, there is homogenous lesion with presence of a dome-shaped lesion and collar button configuration seen in B-scan [2]. Our patient had no known history of renal cell carcinoma, and no suspicion for metastases when performing B-scan. The only information that alerted us was the presence of hard fibrotic mass intra-operatively, which strongly adhered to the inner scleral shell which probably arises from the choroid.

Accurate diagnosis is possible through clinical findings in only 11 (16.4%) out of 68 cases of ophthalmic metastasis of RCC in the literature, whereas histopathology examination (HPE) is crucial in aiding diagnosis in the rest [12]. This emphasises the role of histopathology and immunohistochemistry in the diagnosis of metastatic renal cell carcinoma as per our case. It was only confirmed after second biopsy from the optic nerve, which revealed positive nuclear staining for PAX 8 in immunohistochemistry test (Figure 5).

The management of renal cell carcinoma involves treatments of the primary tumour with one or a combination of surgery, chemotherapy, radiotherapy, or immunotherapy. If nephrectomy for primary tumour has already performed, the intraocular and orbital metastasis is generally treated with radiotherapy [12]. Realistically, ophthalmologic treatment, in our case, was exenteration for his intractable pain since he also had optic nerve involvement. Our patient was also referred to the oncology team for radiotherapy.

Table 1: Review of the reported cases of ocular metastasis from renal cell carcinoma

Authors	Case	Age	Sex	Chief complaint	Duration	RCC	Location of ocular mets	Ophthalmic examination	Imaging	Biopsy
Wyzinski P et al (1981)	1	60	M	Right painless blurred vision	1month	Nil	Bilateral iris	2.8mm fleshy mass at both iris collarette	-	Iris mass: Clear cell carcinoma
Kindermann WR et al (1981)	2	66	M	Expanding mass Left upper lid	10 days	Nephrectomy & radiotherapy 15 months earlier	Left upper eyelid	Ovoid mass 12x 8x 4mm pointed towards lid margin	-	Eyelid mass: Metastasis from RCC
	3	58	M	Left eye photopsia, floaters, nasal field defect	5 weeks	Nephrectomy for urinating blood 9 years earlier	Left posterior segment	Choroidal mass 12mm diameter and 5mm elevation	USG : dome shaped mass lesion 8mm, acoustic hollowness with choroidal excavation	Enucleated eye: Malignant cells suggestive of RCC
	4	58	M	Vertical diplopia	-	Nephrectomy 15 years earlier	Right eye inferior orbital rim	Mahogany-coloured mass 15 x 10mm, posterior to orbital septum, not adherent to periosteum	USG : Discrete mass that was separate from globe CT orbit : well delineated mass suggestive orbital hemangioma	Malignant tumour cells suggestive of RCC
Haimovici R et al (1997)	5	54	M	Left eye foreign body sensation	2 months	Right Nephrectomy 18 years earlier for chronic flank pain	Left posterior segment	Reddish-white, dome-shaped mass 9mm x 8mm diameter superotemporal, serous retinal detachment (RD)	A-scan : choroidal mass 3.9mm with medium-to-high reflectivity	Autopsy done for sudden death : RCC found in left choroid, right lung, peripancreatic lymph nodes, left kidney, right cerebellum
	6	62	M	Left eye pain, decreased vision, floaters	6 weeks	Nil	Left iris and posterior segment	Left eye posterior synechiae with iris neovascularization. Fundus: vitreous opacity, large scattered creamy choroidal infiltrates, intraretinal hemorrhages and perivascular sheathing	FFA : obliterated retinal capillaries, blocked fluorescence at deeper choroid, staining in more superficial lesion	No eye biopsy Renal biopsy: RCC

Table 1: Review of the reported cases of ocular metastasis from renal cell carcinoma (continued).

Authors	Case	Age	Sex	Chief complaint	Duration	RCC	Location of ocular mets	Ophthalmic examination	Imaging	Biopsy
	7	48	M	Right eye metamorphopsia	1 week	Nil	Right posterior segment	Pigmented mass at inferior border of optic disc with serous RD	USG : mass 14 x12mm across base, 6.4mm height	No eye biopsy Renal mass biopsy: RCC
	8	66	F	Left eye photopsia and blurred vision	1 week	Left nephrectomy 9 years earlier	Left posterior segment	Whitish bi-lobed choroidal mass 17 x 12mm superior arcade, RPE mottling periphery and serous RD	USG: mass with 3mm elevation, low internal reflectivity FFA : early and intense hyperfluorescence with pooling in subretinal space	No eye biopsy
	9	77	M	Right eye decreased vision	3 months	Nephrectomy 6 years earlier	Right posterior segment	Reddish-orange, amelonotic, lobulated mass inferotemporal with hemorrhagic RD	A-scan: low-to-moderate reflectivity tumour with 13mm elevation	Enucleated globe : Metastatic RCC
Pompeu ACL et al (2005)	10	59	M	Diplopia and mass right eye	3 months	Haematuria 1 year with flank pain	Right conjunctiva	Conjunctiva lesion causing proptosis	CT scan: retroocular mass inferior to optic nerve	Inferior rectus: Metastatic adenocarcinoma, renal origin
	11	72	M	Right eye lesion	-	Nil	Right inferior tarsal conjunctiva	6mm ulcerated lesion at tarsal conjunctiva	-	Conjunctiva: Clear cell carcinoma
Debraj et al (2007)	12	67	M	Left eye gradual painless blurred vision	3 months	Nephrectomy 14 months earlier	Left iris and posterior segment	Dilated feeder vessels. Left orange-red mass 2.8 x 1.5mm at nasal part of iris extending to ciliary body (CB) posteriorly with shallow exudative RD	B-scan : high reflectivity of nasal aspect CB, shallow RD	Iris mass: Large polygonal clear epithelial cells suggestive of RCC
	13	58	M	Left eye painful proptosis with blurred vision	6 months	Nil	Left orbit	8mm proptosis with hard, palpable mass superior aspect of orbit, chemosis and corneal exposure	CT scan: Diffuse irregular soft tissue mass involving superior, temporal and inferior parts of orbit	Orbital mass: Metastatic adenocarcinoma

Table 1: Review of the reported cases of ocular metastasis from renal cell carcinoma (continued).

Authors	Case	Age	Sex	Chief complaint	Duration	RCC	Location of ocular mets	Ophthalmic examination	Imaging	Biopsy
	14	23	F	Right gradual painless blurred vision and proptosis	3 months	Nephrectomy 7 months earlier	Right orbit	4mm non tender orbital mass with axial proptosis	CT scan: Soft tissue mass entire right orbit, both intracanal and extraconal with intracranial extension	-
Zachary C et al (2014)	15	79	M	Left eye floaters and photopsia	3 weeks	Nephrectomy 8 years earlier	Left posterior segment	Left eye dense vitreous haemorrhage (VH)	USG : intraocular cavitated mass 17mm in basal diameter x 11mm thick MRI orbit: oval-shaped enhancing solid mass	Fine needle aspiration biopsy: Malignant cells suggestive metastatic RCC
Komanski CB et al (2017)	16	73	M	Left eye redness and progressive blurring of vision	2 months	Nephrectomy 4 years earlier	Left posterior segment	Pigmented ciliochoroidal mass nasally, subsequently progress to exudative RD after plaque radiotherapy	B-scan: 15 x 12 x 7mm solid homogenous mass A-scan: medium internal reflectivity	Enucleation: Metastatic clear-cell RCC
Bellerive C et al (2017)	17	73	M	Right blurred vision	2months	History of RCC 25 years earlier, Nephrectomy	Right Posterior segment	Amelanotic choroidal lesion (19.9mm x 17.1mm in diameter, 9.5mm height), mild VH, exudative RD	USG: Dome-shaped lesion with collar button	Enucleated globe: Metastatic clear-cell renal origin

In short, diagnosing RCC metastasis can be extremely confusing. Patients with intraocular metastasis may remain undiagnosed unless they become symptomatic. A detailed history taking such as previous nephrectomy and specific or non-specific renal signs will be beneficial to aid in the diagnosis. All patients must be carefully examined and investigated, particularly when they present with a suspected ocular metastasis with no history of malignancy.

The main highlight of this case was till this date, we are still unable to identify and detect the location of primary tumour. Renal assessment by the nephrology team could not rule out the possibility of renal being primary tumour. There was absence of urinary symptoms and other signs to suggest a

concurrent renal pathology. All relevant tumour markers were negative and CT thorax, abdomen and pelvis showed no evidence of any primary tumour. A study by Ferry *et al.* (1974) revealed that the interval from ocular therapy to the detection of a primary tumour in the Figure 3: Arrow showing a well-defined heterogeneously enhancing right intracanal lesion, which appeared to arise from distal part of the right optic nerve. The rest of the right optic nerve appeared bulky. Kidney can be up to one year [3]. Therefore, even with no apparent source of primary tumour at time of assessment, a patient must be closely observed and followed up in the urology department to enable early detection should the tumour arise later.

CONCLUSION

This is a case of a rare disorder, made more confounding by its uncommon presentation. It appeared as a pathology in the eye and had no apparent signs and symptoms to suggest that the primary disease was in the kidney. Unfortunately, the uncommon presentation and the lack of renal symptoms had lulled the patient into complacency. By highlighting this case, we hope to bring awareness to this condition and improve its current dismal prognosis through early diagnosis.

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Case Report

CONJUNCTIVAL EMPHYSEMA– IS IT TRULY BENIGN?

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ABSTRACT

Conjunctival emphysema is a condition where the air enters the conjunctiva due to its laxity, mostly associated with fracture of the orbital wall. A 21-year-old male complained of bilateral eyelid swelling after a fist fight. He felt 'pops' over the left eye. He complained of reduced left vision and pain over the cheek. On examination, noted bilateral lids haematoma with reduced visual acuity. Air noted under the left conjunctiva. Intraocular pressure was 16 mm Hg OD and 21 mm Hg OS. Both fundi were normal. Facial radiographs showed air in the anterior soft tissues with evidence of left inferior orbital wall fracture. Patient was discharged with steroid eye drops, 1 antiglaucoma medication OS, cold compression for both eyelids and to avoid blowing the nose. One week post trauma, patient visual acuity, intraocular pressure was normal and the emphysema subsided spontaneously. Conjunctival emphysema is a self-limiting condition that resolves spontaneously within days to weeks. The common cause is trauma to the orbit, however it may occur by pulmonary barotrauma, operation, infection or spontaneously. Cautious observation is the main treatment necessary unless the underlying cause is an infected sinus, whereby prophylactic oral antibiotics are required. If the conjunctival emphysema worsens, it may lead to orbital emphysema. Intraorbital pressure may increase as air accumulates within the orbit and lead to loss of vision. In these cases, orbital decompression is needed. Conjunctival emphysema can lead to grave consequences if not evaluated carefully.

INTRODUCTION

Conjunctival emphysema is a condition whereby air is trapped in the loose connective tissue in the orbit. It is an uncommon condition and primarily associated with fracture of the orbital wall that allows air to enter the orbit. This air often ends up under the conjunctiva due to its laxity [1,2]. Conjunctival emphysema can cause severe complications [1]. For instance, it can cause loss of visual acuity, optic atrophy, raised intraocular pressure, diplopia and ocular surface disease [3]. However, it is usually benign and has an uneventful course. Therefore most cases can be managed conservatively, as shown in this case.

PRESENTATION OF CASE

A healthy 21-year-old male was brought to the emergency department for bilateral eyelid swelling after a fistfight. He felt several 'pops' over the left eye during the fistfight. He also complained of reduced left vision and pain over the left cheekbone. The best -corrected vision was 6/9 and 6/18 in the right and left eye respectively. Near vision was normal in both eyes; N6. On examination, there was no relative afferent pupillary defect. He had bilateral upper lids and left lower lids haematoma. Lagophthalmos was

observed in the left eye due to the bulge in the conjunctiva. Air was present under the left conjunctiva involving the superior temporal region (Figure 1). The left cornea had generalised punctate epithelial erosions. However, there was no evidence of conjunctival laceration, proptosis, enophthalmos or restriction of extraocular muscle movement. The intraocular pressure (IOP) was 16 mm Hg and 21 mm Hg in the right and left eye. Both fundi were normal, and the lenses were clear.

Skull X-ray AP view revealed air in the anterior soft tissues and left inferior orbital wall fracture, evidenced by fluid levels in both maxillary sinus (Figure 2). The patient was discharged with topical dexamethasone 0.1%, one antiglaucoma medication (Gutt Timolol 0.5%), intensive lubricants for the left eye, cold compression for both eyelids and was advised to avoid blowing the nose.

One week post-trauma, his visual acuity improved. The right BCVA was 6/9, while the left BCVA was 6/12. The intraocular pressure was 12mmHg in both eyes. The conjunctival emphysema had subsided spontaneously.

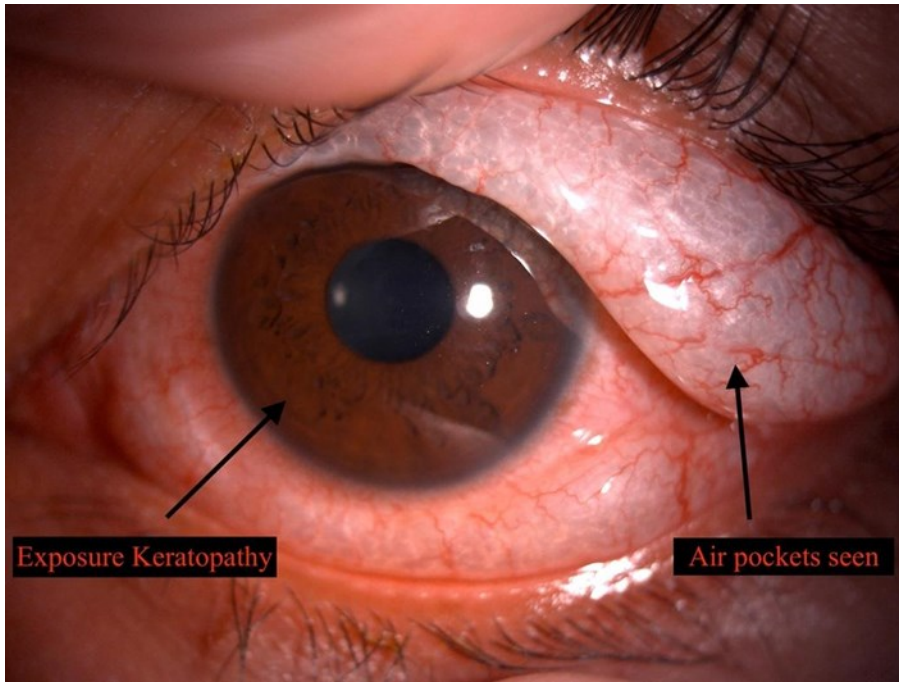


Figure 1: Anterior segment photograph: Left subconjunctival air pocket and exposure keratoplasty



Figure 2: Skull X-ray : bilateral maxillary air-fluid level

DISCUSSION

The commonest cause of conjunctival emphysema is trauma to the orbit. The prevalence of orbital emphysema due to blunt trauma to the orbit, face or head is about 63% [4]. Air enters the loose tissue planes of the orbit and subcutaneous soft tissues due to disruption of the periosteum of orbital walls. Presumably, in this case, there was a breach in the integrity of the inferior orbital wall that leads to probable communication between the maxillary sinus and the conjunctival planes [5]. Conjunctival emphysema may also occur in pulmonary barotrauma, eye surgeries, mechanical ventilation, infection or even spontaneously [6].

Ocular Trauma Score (OTS) was developed by the Ocular Trauma Classification Group to predict the visual outcome of patients in both open and closed globe eye injuries during their sixth-month follow-up [7]. In this case, the OTS score was 90; hence the estimated probability of visual acuity equal or better than 6/12 at sixth-month follow-up is 74%.

Conjunctival emphysema is usually a self-limiting condition that resolves spontaneously within days to weeks and requires no specific treatment [4,8]. Complication such as raised intraocular pressure is more commonly seen in orbital emphysema rather than in conjunctival emphysema [3,9]. A prolonged increase in intraocular pressure can lead to optic nerve damage [9]. Therefore, treatment should be instituted early.

In our case, due to the accumulation of air in the conjunctiva, the patient had mildly raised intraocular pressure and received short-term antiglaucoma medications. In addition, the patient also developed generalised exposure keratopathy due to lagophthalmos, which was treated with intensive lubricants.

The mainstay of treatment for conjunctival emphysema is cautious observation and proactively looking for complications with close follow-up initially. Treatment is usually conservative. The role of antibiotics was not clear unless there is an infected sinus or suspicion of infection for which treatment with oral antibiotics is required [1].

Option of drainage of trapped air in the subcutaneous tissue should be considered when there are signs of relative afferent pupillary defect, restricted ocular motility, sluggish pupillary reaction, disc oedema or decreased visual acuity. However, the clinician should bear in mind that this may subject the patient to risk of infection [2]. In this case, we did not opt for drainage of the trapped air as the patient did not have signs of compressive optic neuropathy due to the conjunctival emphysema.

Complication such as compressive optic neuropathy is indicated by the presence of relative afferent

pupillary defect, which was not present in this patient. Compressive optic neuropathy requires urgent surgical interventions such as lateral canthotomy, cantholysis or orbital decompression [10]. Patient was advised to avoid blowing his nose to prevent further complications. Blowing of the nose can cause increased intranasal pressure and perforation in lamina papyracea, allowing air to enter the orbit and may worsen the conjunctival emphysema [1].

A favourable outcome, such as in this case, is indicated by improvement of the visual acuity and reduction of the intraocular pressure in the affected eye.

CONCLUSION

Conjunctival emphysema is a relatively benign condition. However, it may lead to grave consequences if not properly evaluated and treated accordingly.

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Case Report

RETINOPATHY AND CHOROIDOPATHY IN HYPERTENSIVE DISORDERS OF PREGNANCY: A CASE SERIES

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ABSTRACT

Preeclampsia-eclampsia is an alarming situation in pregnancy that can lead to serious morbidity and even mortality. Abnormal placentation leads to systemic endothelial dysfunction, compromising the retinal and choroidal vasculature. We report two cases referred by the obstetrics team. Both complained of blurring of vision resulting from different types of hypertensive disorders of pregnancy. One patient with preeclampsia complicated by partial HELLP (hemolysis, elevated liver enzyme, low platelet) syndrome had bilateral chorioretinopathy changes. Another eclamptic patient had bilateral choroidopathy without retinopathy. Concurrent retinopathy in hypertensive choroidopathy tends to have unfavorable but reversible visual sequelae. Multidisciplinary approach is advocated in establishing the diagnosis and monitoring the visual recovery.

INTRODUCTION

Acute hypertensive attack in preeclampsia-eclampsia may lead to chorioretinopathy. Chorioretinopathy is more commonly seen in young adults and is postulated to be due to elasticity of the blood vessels. Pathological processes behind the clinical manifestations in hypertensive disorders in pregnancy are choroidal and retinal ischemia from abnormal placentation. Even the visual impairment is usually temporary, the quality of life of patients can be affected, especially in the postpartum period, whereby additional care needs to be given to the newborn.

CASE 1

A 28-year-old, Para 1, day two post spontaneous vaginal delivery at 38 weeks gestation, was referred to the ophthalmology team for bilateral blurring of vision. Her systolic blood pressure was high (190/60 mmHg) by repeated measurements with proteinuria. Blood investigations revealed normal hemoglobin and bilirubin level, low platelet count (100 g/dL) with deranged liver enzyme (aspartate transaminase: 45 U/L). The albumin level was low (22 g/L).

On ocular examination, right best corrected visual acuity (BCVA) vision was 6/18, and the left BCVA was

1/60. There was no relative afferent pupillary defect. Anterior segment examination was unremarkable for both eyes. Bilateral fundus examination showed arteriolar narrowing, multiple cotton wool spots seen in the posterior pole and peripapillary area with flame-shaped hemorrhages. There was bilateral serous retinal detachment seen inferiorly, more extensive in the left eye, involving the macula. There were patches of deep yellowish lesion seen at the temporal retina (Figure 1).

Optical coherence tomography (OCT) showed subretinal fluid involving the papillomacular bundle and temporal area with intact IS/OS junction. There was thickening and disorganization of neurosensory layer, splitting of the outer retinal layer and retention of the inner and outer segment (IS/OS) junction with subretinal fluid and pigment epithelial detachment over the foveal region of the left eye (Figure 2).

She was started on intravenous magnesium sulfate, human albumin infusion and anti-hypertensive medication. Her blood pressure normalized. One month later, BCVA was right was 6/6 and 6/12 in the right and left eye respectively. Bilateral serous retinal detachments completely resolved with pigment epithelial detachment over the left eye.

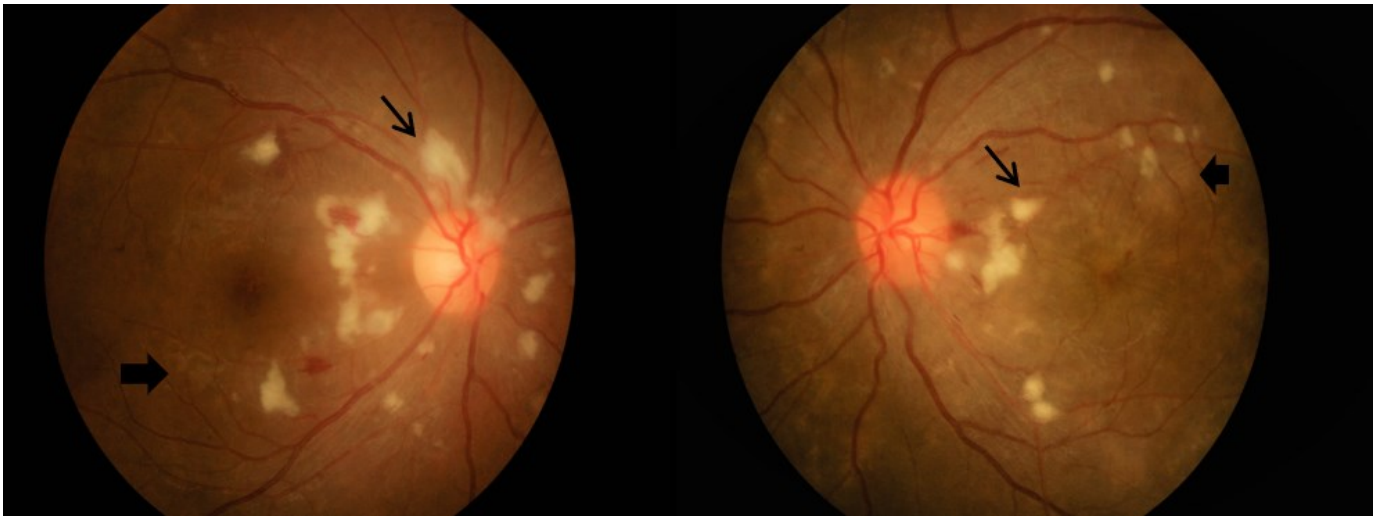


Figure 1: Multiple cotton wool spots (arrow), patches of deep yellowish lesion (block arrow) seen at temporal region.

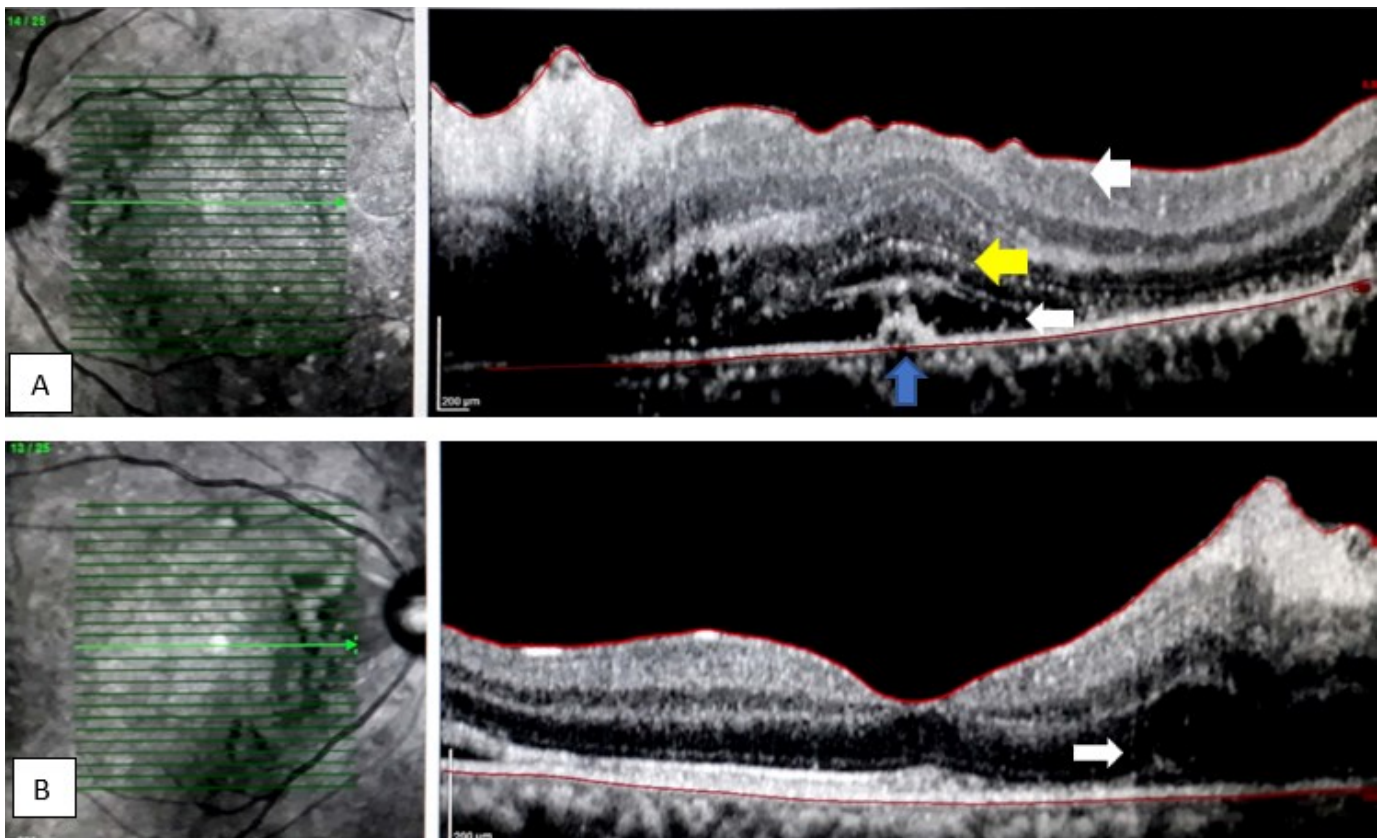


Figure 2: Optical coherence tomography of both eyes:

- A. Subretinal fluid (white arrow), thickening and disorganization of neurosensory layer (yellow arrow), pigment epithelial detachment (blue arrow) in the left eye.
- B. Minimal subretinal fluid (white arrow) in the right eye.

CASE 2

A 35-year-old, Para 4+2, day three post-emergency lower segment cesarean section for eclampsia complained of left blurring of vision since delivery. Blood pressure upon presentation was 196/119

mmHg, with proteinuria. Blood investigations were within normal limit. She was started on two types of antihypertensive medication by the obstetric team. Her blood pressure was under control. On examination, right BCVA was 6/9, and left was 6/12. There was no relative afferent pupillary

defect. The anterior segment examination of both eyes was unremarkable. Fundus examination showed bilateral serous retinal detachments involving the macula. There were deep yellowish patches at the peripapillary region seen in both eyes. No hypertensive retinopathy changes were seen (Figure 3).

Bilateral OCT of the macula showed subretinal fluid involving the macula, which was more severe in the left eye. The IS/OS junction were intact bilaterally. No pigment epithelial detachment was seen (Figure 4). One month later, the BCVA was 6/6 in both eyes. The serous retinal detachment completely resolved, as evidenced by a repeated OCT.

DISCUSSION

Hypertensive disorders in pregnancy are significant causes of morbidity, long-term dysfunction and mortality during pregnancy and postpartum period. Preeclampsia affects two to eight percent of pregnancies worldwide [1]. Preeclampsia-eclampsia is a disorder that develops during pregnancy which is postulated to be due to abnormal placentation. HELLP syndrome is an obstetric disorder that is characterized by hemolysis, elevated liver enzymes and low platelets. It is considered to be a severe form of preeclampsia [2]. The abnormal placentation leads to oxidative stress and angiogenic imbalance in the

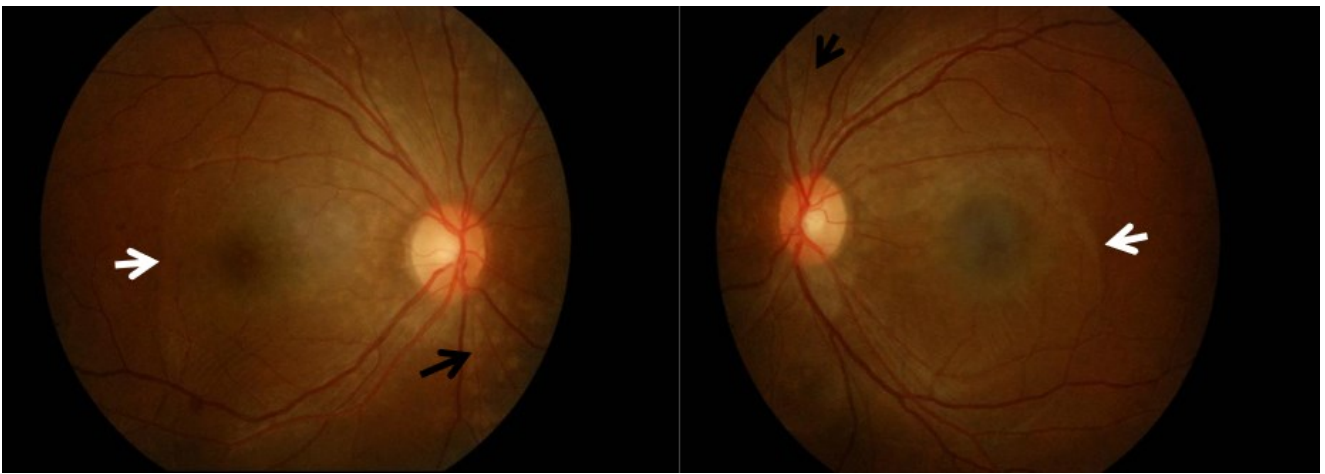


Figure 3: Edge of serous retinal detachments (white arrow), deep yellowish patches (black arrow).

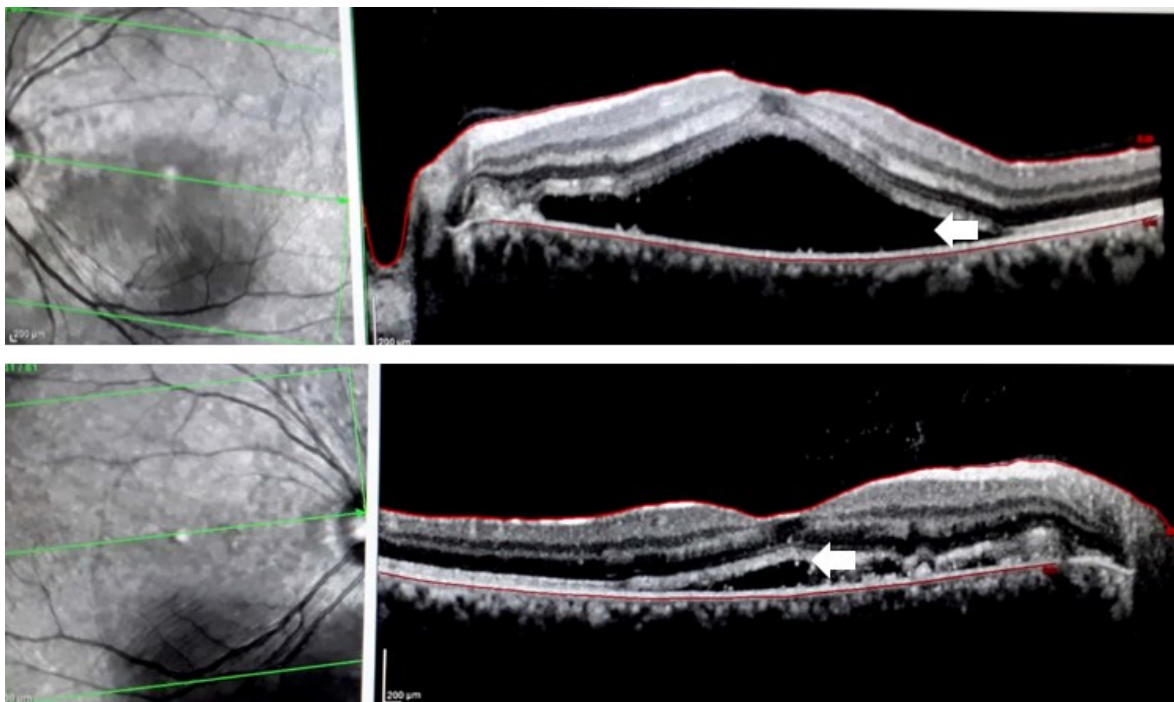


Figure 4: Bilateral subretinal fluid (white arrow)

maternal circulation [3]. There will be an excessive release of anti-angiogenic factors. As a result, there will be endothelial dysfunction and end-organ damage. Ocular involvement is seen in 25 to 50% of patients with preeclampsia-eclampsia, in which the most common finding is narrowing of the retinal vessels [4]. Serous retinal detachment is an uncommon but known cause of vision impairment in preeclampsia-eclampsia [5]. It is seen during antepartum or postpartum period. It is observed in less than one percent of patients with preeclampsia and approximately 10% of those with eclampsia [4]. Concurrent HELLP syndrome in preeclampsia-eclampsia carries approximately seven times higher risk of developing serous retinal detachment than patients without HELLP syndrome [6].

Choriocapillaris are more vulnerable to acute hypertensive attack than retinal vessels due to their anatomical arrangement and the lack of autoregulatory mechanism [7]. They have more direct blood flow from choroidal arteries to choroidal capillaries as they run at right angle between each other. In addition, choriocapillaris are regulated by sympathetic innervation, while retinal circulation has an autoregulatory mechanism to avoid damage in a hypertensive attack. These mechanisms suggest that retinopathy changes are more likely to be manifested in the higher blood pressure range in comparison to choroidopathy [8]. In both of our cases, the presenting blood pressure range was about the same. In the first case, the patient had concurrent partial HELLP syndrome which may contribute to the development of retinopathy which is manifested by arteriolar narrowing, cotton wool spots and retinal hemorrhages. In addition, concurrent retinopathy in hypertensive choroidopathy tends to have unfavorable but reversible visual sequelae [8]. This is shown in the first case as the presenting vision for the left eye was poor due to the presence of intraretinal edema, evidenced by thickening and disorganization of neurosensory layer by OCT.

Systemic endothelial dysfunction will initially affect the choroidal vasculature in which there will be fibrinoid necrosis of choroidal arterioles causing impairment of perfusion in the choriocapillaris, resulting in focal necrosis of retinal pigment epithelium [9]. Generalized choroidal ischemia will interrupt the pumping capability of retinal pigment epithelium leading to serous retinal detachment and pigment epithelial detachment that is frequently symmetrical. Apart from that, additional mechanisms such as hypoalbuminemia and microangiopathic hemolysis also contribute to the formation of serous detachment as demonstrated in the first case. Serous retinal detachment usually resolved within a few weeks after delivery with normalization of blood pressure and good visual recovery. In compromised choriocapillaris, overlying retinal pigment epithelial

ischemia will lead to the formation of Elschnig spots. Residual macular retinal pigment epithelial changes due to infarction of choriocapillaris may affect the visual outcome [10]. In the first case, repeated OCT one month after delivery showed retinal pigment epithelial detachment causing mild visual disturbance to the left eye.

CONCLUSION

Hypertensive chorioretinopathy is a rare but known complication of preeclampsia-eclampsia, which can result in significant visual morbidity, however visual prognosis is usually good. Concurrent retinopathy in hypertensive choroidopathy tends to have unfavorable but reversible visual sequelae as demonstrated in the first case. Blood pressure control and reassurance are the mainstays of therapy.

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Case Report

ISOLATED HOMONYMOUS HEMIANOPIA: A RARE PRESENTATION POSTERIOR CEREBRAL ARTERY INFARCT

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ABSTRACT

Ischemic stroke presents with various physical malfunctions. Visual disturbances are commonly related to limbs or facial weakness, on rare occasions could be the only presenting symptom. We report a 49-year-old man with uncontrolled co-morbidities, presented with sudden bilateral blurring of vision, specifically the loss of his peripheral field of vision. Ocular examination showed normal anterior and posterior segments in both eyes. Confrontation test showed right sided visual field defect, confirmed to be right homonymous hemianopia with automated Humphrey visual field analyser. Apart from visual field defect there were no other central nervous system signs and symptoms. Computed Tomography (CT) of brain revealed left posterior cerebral artery infarct. Visual symptoms may not always accompany other neurological manifestations of stroke but may present as isolated sign in rare occasions. Detailed history, examination and targeted investigation aid the diagnosis.

INTRODUCTION

Ischemic strokes reach around 150 000 every year in the United Kingdom alone, with the common associated etiology being atherosclerosis, small artery diseases and embolisms. About 20-25% of these numbers are posterior circulation infarct affecting structures such as the brainstem, cerebellum, midbrain, thalamus, and areas of the temporal and occipital cortex. These structures are supplied by the vertebrobasilar arterial system [1].

Posterior cerebral artery (PCA) is part of the posterior circulation. Infarction of this artery contributes to 5-10% of ischemic strokes [2]. They commonly present with symptoms such as hemisensory loss and hemibody pain which is usually burning in nature due to thalamic infarction [2]. In bilateral PCA infarct, often there is reduced visual-motor coordination. Whereas, the most common signs were found to be unilateral limb weakness (38%), gait ataxia (31%), unilateral limb ataxia (30%), dysarthria (28%), and nystagmus (24%). (3) Signs and symptoms may vary due to the location and severity of occlusion, and availability of collaterals [4].

Some other presentations of PCA infarct are visual field defects, visual dysfunction, and cognitive and behavioural dysfunction [4]. Posterior cerebral artery supplies the lower part of optic radiations while the upper part receives blood from the deep branches of

the middle cerebral artery (MCA). Therefore, in visual field defects, contralateral homonymous hemianopia (HH) with macular sparing can be caused by unilateral infarctions of the occipital lobe. In limited defects (unilateral superior or inferior optic radiation infarct), quadrantanopia results. Occlusion of the posterior choroidal artery too leads to visual field defects (hemianopia, quadrantanopia, sectoranopia), hemisensory deficit, and neuropsychological dysfunction (transcortical aphasia, memory disturbances). Bilateral occipital lobes infarction can give rise to cortical blindness and anosognosia [3,4].

Few more rare presentations have also been studied. Left large PCA stroke may cause visual agnosia which can be divided into apperceptive and associative, meanwhile right PCA stroke may cause prosopagnosia which is difficulty recognizing familiar faces. A pathological lesion in dominant occipital lobe and splenium of the corpus callosum leads to alexia often accompanied by right homonymous hemianopia. Infarction of the ventral occipital cortex with or without infracalcarine involvement causes achromatopsia which refers to difficulty perceiving colours [3,4].

Large left parietal or temporal lobe infarction causes aphasia and infarction of the hippocampus and parahippocampus leads to memory impairment.

Aggressive behaviours have been reported in PCA strokes as well. Other uncommon symptoms are hallucinations and palinopsia especially seen in lingual and fusiform gyri infarctions [4].

Syndromes related to PCA infarct include Balint syndrome and Anton syndrome [4]. Balint syndrome occurs when bilateral occipito-parietal border infarctions happens and it has a triad of optic ataxia, oculomotor apraxia and simultagnosia. Anton syndrome is when there is sudden onset bilateral occipital stroke, leading to cortical blindness.

We report a case of isolated right homonymous hemianopia in a patient with PCA territory infarct.

CASE REPORT

A 49-year-old man presented to the Ophthalmology clinic with the complaint of sudden bilateral blurring of vision for five days. He had diabetes mellitus, hypertension and dyslipidaemia however he defaulted medical follow up for 2 years. The patient noticed that he was unable to see words in the periphery of the pages he was reading. when driving he was unable to see vehicles on his his right side. He denied having floaters, flashes of light or scotoma. There was no metamorphopsia. His symptoms were persistent. He experienced no limb, body or facial weakness, neither was there headache, nausea and vomiting.

One week prior to the visual disturbances, the patient was admitted for myocardial infarction (Killip I) and was successfully thrombolysed upon admission.

Ocular examination revealed bilateral normal anterior and posterior segments with intraocular pressure of 14mmHg. His best corrected visual acuity in both eyes was 6/12 There was no relative afferent pupillary defect (RAPD). Other optic nerve function tests were normal too. Extraocular muscle movements were full. However, the confrontation test showed a right sided visual field defect, confirmed right homonymous hemianopia by Automated Humphrey Visual field analyser (Figure1). Power, sensation and coordination were normal. Cerebellar signs were negative. He did not have memory loss, neither cognitive nor behavioural changes. Higher cortical functions were normal too. Contrast-enhanced computed tomography of the brain was done in view of possible space-occupying lesion or cerebral infarction. As per suspicion, it revealed a left posterior cerebral artery infarct. The patient was then referred to the Medical team for the management of his co-morbidities and recent stroke.

DISCUSSION

Stroke related contralateral HH usually occurs together with other neurological manifestations especially when striate cortex, optic radiations, or lateral geniculate bodies (LGB) are involved [5]. Isolated HH is a rare incident with diagnostic difficulties. Interestingly, some patients are not aware of their visual field defects and are still able to drive around [6]. Few case reports have been published and a retrospective study concluded that usually HH is accompanied by other neurological signs and symptoms as mentioned earlier [5,6].

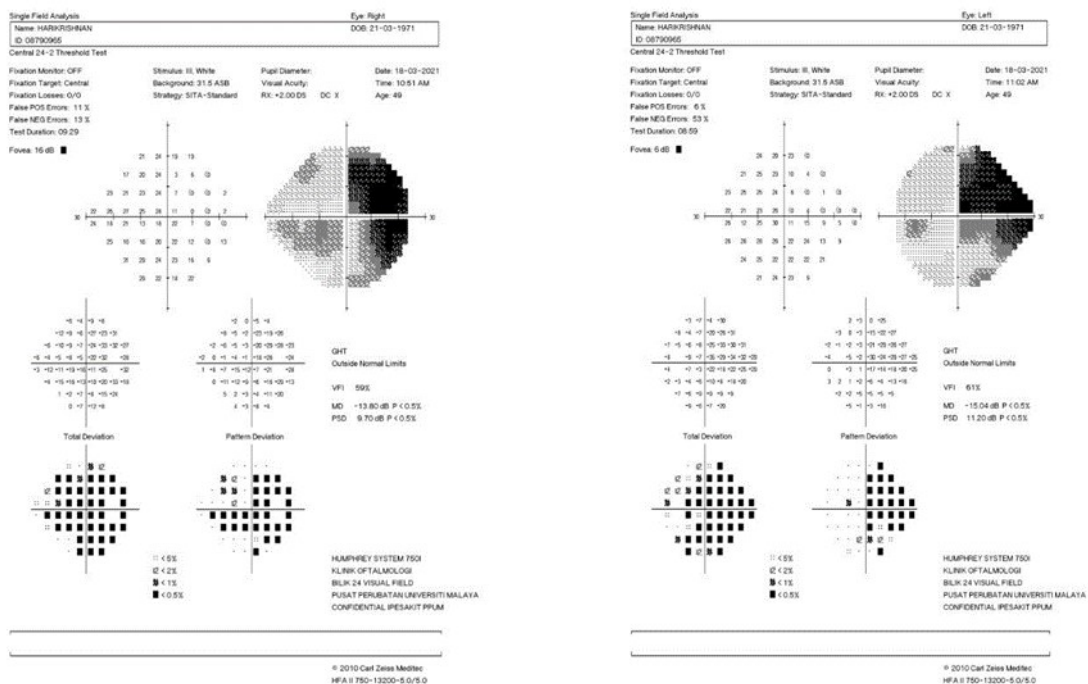


Figure 1: The Humphrey Visual Fields: incomplete right homonymous hemianopia.

Right HH in our patient most probably be caused by left posterior cerebral artery infarct. Further imaging, especially cerebral angiography or magnetic resonance angiography (MRA) would have been helpful to identify the specific branches and regions involved in the ischemic stroke, to justify the isolated HH. Isolated HH has been reported in association with lateral geniculate body infarction. Shibata K et al have reported a case with lateral posterior choroidal artery (LPChA) infarction which presented with isolated incomplete HH [5].

LPChA is a branch of PCA and assault to this artery usually leads to horizontal homonymous sectoranopia or wedge-shaped visual field defects. It arises from the initial part of the second segment of the PCA, immediately adjacent to the thalamogeniculate arteries. The choroid plexus of the lateral ventricle, pulvinar, posterior part of the dorsolateral nucleus, LGB, hippocampus, and mesial temporal lobe are supplied by this artery [6,7,8].

A study by Neau J-P (1996) found that isolated posterior choroidal artery infarction was estimated to be 1.5%, 10 patients out of 740 patients who had posterior circulation infarct [9]. Out of these, nine infarcts involved the LPChA and one was in both lateral and medial posterior choroidal artery. Isolated visual field defect without hemisensory and neuropsychological dysfunctions including transcortical aphasia and memory disturbances, has been associated with an LPChA infarct. Due to variable collaterals, symptoms and signs may vary (eg: incomplete HH) and sometimes be transient [5,6,7].

CONCLUSION

A variety of visual symptoms are associated with intracranial pathologies. However, on rare occasions visual symptoms may be the only manifested symptom mimicking a local pathology. Thus, detailed history, examination and selection of targeted investigation is essential to achieve the correct diagnosis. Anatomical variations must also be given important consideration as not to overlook certain unusual clinical presentations.

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Case Report

CALOTROPIS PROCERA LATEX INDUCED OCULAR TOXICITY

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calotropis procera;
corneal oedema;
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ABSTRACT

Calotropis procera belonging to *Asclepiadaceae* family and it is also known as Sodom apple, Akra tree or Madar shrub. Accidental exposure of thick latex from *Calotropis procera* can cause severe ocular toxicity. A 70-year-old Indian man presented with right painful blurring of vision associated with redness of one day duration. The symptoms started after the eye was splashed with latex from Akra tree (*Calotropis procera*). On ocular examination, his right eye visual acuity was counting finger. There was diffuse cornea oedema, descemet's folds and presence of epithelial defect inferiorly and continuous with conjunctival epithelial defect inferiorly up to the inferior fornix. There was generalized conjunctival injection. The right eye examination was unremarkable. Patient was treated with topical antibiotics and topical corticosteroids. The patient responded well to topical treatment. Complete resolution of the ocular signs and symptoms was seen after one week.

INTRODUCTION

The *Calotropis Procera* belongs to the *Asclepiadaceae* family, which grows in a wide variety of climates and soil, including sandy, alkaline, and dry soil in many parts of the world. A medium-branched, perennial shrub that grows up to 4-5 meters tall with milky latex throughout its branches. The flowers or garland of this plant are offered to Lord Siva as a form of worship. In rare cases, people have suffered ocular injuries as a result of accidental inoculation or contact with the latex of *Calotropis Procera* while plucking the flower or leaf stalk [1,2].

As a result of both the acidity and the potency of toxins in the latex, ocular manifestations may occur. Accidentally exposure is through inadvertent contact with the flowers or splashing of latex into the eyes while handling the plant.

We report a case of ocular toxicity after accidental exposure of the latex of *Calotropis Procera*, its effect on the corneal endothelium and the management.

CASE REPORT

A 70-year-old Indian man with underlying Diabetes Mellitus, Hypertension, and ischemic heart disease presented with right painful blurring of vision

associated with redness for one-day duration. The symptoms started after the eye was splashed with latex from the Akra tree (*Calotropis Procera*) (Figure 1). The incident occurred when the patient plucked a flower from the tree to be used during prayer. On ocular examination, his right vision was only counting fingers.

Upon presentation to the eye clinic, his ocular surface pH was 8.0. Copious irrigation was initiated until the pH was reduced to 7.0. There was diffuse corneal edema with Descemet folds and epithelial defect inferiorly measured 3.2 mm x 2.6 mm until the limbus (Figure 2), continuous with conjunctival epithelial defect up to the inferior fornix (Figure 3). There was generalized conjunctival injection. The intraocular pressure was 14mmHg. The anterior chamber was otherwise quiet and deep. The lens was mildly cataractous, more of nuclear sclerosis. The fundus was normal. The left eye examination was unremarkable.

He was prophylactically treated with gutt Chloramphenicol every four hours, Chloramphenicol ointment TDS. In view of cornea oedema he was also prescribed with gutt Hypertonic Saline 3% QID. After 24 hours the epithelial defect resolved and his visual acuity improved to 6/60. Gutt Dexamethasone

0.1% QID was added. At one week review visual acuity improved to 6/12 and there were complete resolution of the ocular signs (Figure 4).

DISCUSSION

Calotropis Procera is a plant mentioned in Ayurveda as a plant with important medicinal properties. It contains many biologically active chemicals such as cardenolides, tannins, steroids, glycosides, terpenoids, sugars, phenols, flavonoids, saponins, and glycosides. It has many pharmacological

effects such as antimicrobial, anthelmintic, anti-inflammatory, analgesic and antipyretic, anti-cancer, anti-angiogenic, immunological, antidiabetic, cardiovascular, hypolipidemic, gastroprotective, hepatic protective, renal protective, antidiarrheal, antioxidant, anticonvulsant, enhancement of wound healing, antifertility and smooth muscle relaxant effect [1]. There are also several alkaloids in Calotropis Procera latex, including Catotoxin, Caltropin, Calcilin, and Gigantin, which are toxic [1,2,3]. A number of studies have reported that accidental contact with Calotropis latex caused keratoconjunctivitis and



Figure 1: Plant of Calotropis procera

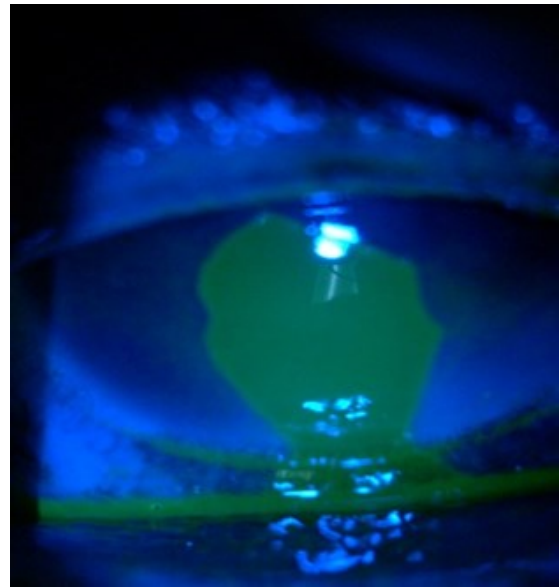


Figure 2: Right corneal epithelial defect, stained with fluorescein

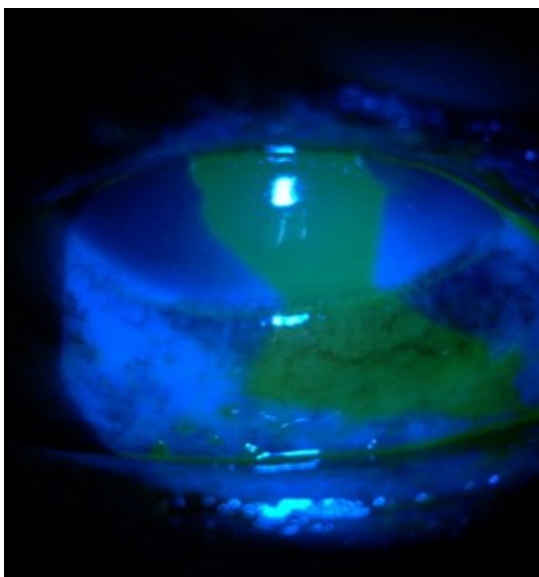


Figure 3: Right corneal and inferior conjunctival staining

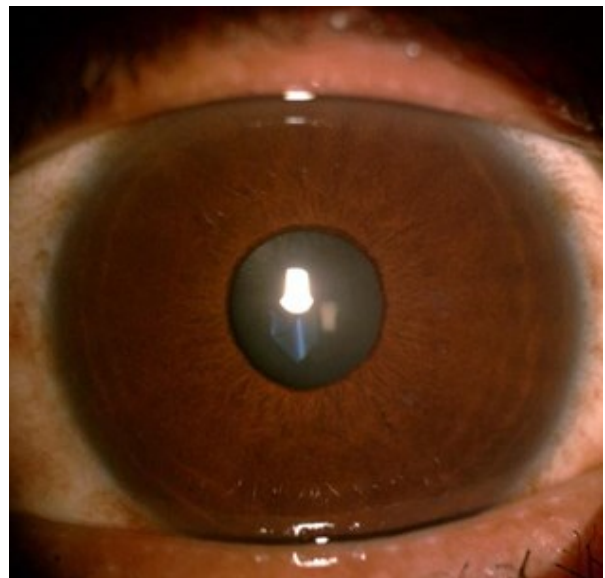


Figure 4: Anterior segment photography at one week showing resolved corneal oedema and epithelial defect.

corneal edema with vision loss (4,5,6).

Similar to our case, accidental contact of *Calotropis* latex mostly occurs while plucking flowers or leaves. Severe corneal edema with significant reduction of vision after inoculation of latex was reported in several studies [7,8,9]. In the acute stage, the patient will present with burning sensation, pain, photophobia, and staining of cornea and conjunctiva due to epithelial defects [10,11]. Painless presentation of the patient despite severe injury can be due to the analgesic property of the sap, or its inherent anesthetic property. It has been demonstrated that after injury, latex can penetrate intact corneas and permanently damage the endothelium, as shown by a decrease in the number of corneal endothelial cells and significant morphologic changes to the endothelial cells [9,12,13].

Specular microscopy can be used to monitor endothelial cell count. In specular microscopy, there will be low endothelial cell count with pleomorphism and polymegathism in the affected eye. According to Al-Mezaine et al., in their case there was permanent endothelial cell loss as well as morphological defects [5]. Based on specular microscopy, Basak et al found that 17 out of 23 eyes had less endothelial cell count (74%) than the normal eye. These findings also suggest that the cause of corneal edema is endothelial toxicity [9].

In our case, there is inferior conjunctival staining in the pattern of a triangle with the apex towards the inferior limbus and base towards the fornix. This finding is also reported by Col Shrikant Waiker et al [10]. The epithelial defect can occur when a latex falls into the eye it tracks down and settles down in the inferior fornix causing injury along its path. Clinically our patient showed full recovery of corneal edema, epithelial defect, and visual acuity within 1 week of treatment. It is most likely due to early copious eye irrigation followed by the topical medication including topical corticosteroid. The immediate eye irrigation reduced the amount of toxins and its contact with the eye.

There is no iridocyclitis and secondary glaucoma noted in our case. Tomar et al and Basak et al reported that there was toxic iridocyclitis due to *Calotropis* [8,9]. It can occur when the quantity of latex entering the eye is significant and/or when it was not immediately washed off, allowing the toxins to penetrate the cornea into the anterior chamber. The latex of *Calotropis Procera* has been found to contain histamine and prostaglandins which may lead to iridocyclitis [9]. The raised intraocular pressure could be secondary to iridocyclitis which was reported by Basak et al in their series [8].

CONCLUSION

Early recognition and timely intervention of ocular toxicity secondary to *Calotropis procera* latex is

essential to prevent sight threatening complications. Health education is crucial to preventing serious injuries related to *Calotropis* plucking, such as hand washing, wearing protective eyewear, and avoiding touching or rubbing the eye.

CONFLICTS OF INTEREST

No conflicts of interest.

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Case Report

INTRAVITREAL GANCICLOVIR IN THE MANAGEMENT OF HERPES SIMPLEX VIRUS-2 RELATED ACUTE RETINAL NECROSIS : A CASE REPORT

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ABSTRACT

Acute retinal necrosis (ARN) is a rare ocular disease, first reported in 1971. It is characterized by acute pan uveitis with rapidly progressive diffuse full thickness necrotizing retinitis and retinal periarteritis. Several treatment regimens have been advocated for ARN, from systemic oral or intravenous, with or without intravitreal antiviral. We report a case of an ARN secondary to HSV-2 infection treated with intravenous acyclovir and intravitreal ganciclovir.

Keywords:

acute retinal necrosis (ARN);
necrotizing retinitis;
intravenous acyclovir;
intravitreal ganciclovir

INTRODUCTION

Acute retinal necrosis (ARN) is a rare viral uveitis syndrome manifest as panuveitis with one or more foci of retinal necrosis with discrete borders, located in the peripheral retina and retinal periarteritis which rapidly progress [1]. It occurs as a result of reactivation of latent viral infection. The etiologies of ARN include various members of the herpes family such as varicella zoster virus (VZV), herpes simplex 1 and 2 (HSV-1, HSV-2), cytomegalovirus (CMV), and infrequently, Epstein-Barr virus (EBV). In elderly, the incidence of HSV-zz1 and VZV is more frequent, meanwhile in younger patients, HSV-2 is more common [2].

ARN may potentially lead to severe visual loss from devastating complications of retinal detachment if left untreated. Meanwhile, in some studies, visual prognosis is guarded even with treatment [3]. The aim of treatment includes immediate control of both viral multiplication and inflammation. Several treatments regimens have been advocated since there are reported successful outcomes with intravenous acyclovir alone or intravitreal injection of antiviral with and without concurrent systemic antiviral and corticosteroids [1]. Treatment with intravitreal injection of ganciclovir in ARN patients on systemic intravenous antiviral medication has been reported

satisfactorily in few studies [4]. In this case report, we describe an ARN case whom was on intravenous acyclovir with the addition of intravitreal injection of ganciclovir in controlling the viral load and reducing the ocular inflammation.

CASE PRESENTATION

A 17-year-old male patient presented with unilateral left panuveitis, dense vitritis and peripheral multifocal retinitis (Figure 1). He had a history of childhood chicken pox infection. His main complaint was blurring of left vision, progressively worsening for one week prior to presentation. He has left periorbital discomfort and photophobia. Otherwise, there were no floaters or flashes.

At the initial examination, his left best corrected visual acuity (BCVA) was only 1/60. No associated ocular involvement such as typical rash as in herpes zoster ophthalmicus (HZO) observed. Left anterior segment examination revealed granulomatous keratic precipitates, cells of 2+, intraocular pressure (IOP) of 17 mm Hg. Otherwise, there were no posterior synechiae, peripheral anterior synechiae of iris atrophy or iris nodule. Posterior segment

revealed dense vitritis with swollen disc. There was multifocal full thickness peripheral necrotizing retinitis associated with haemorrhages and arteriolar sheathing.

The right eye was exotropic with a vision of counting fingers without evidence of active inflammation. Patient had a history of red eye during childhood however parents did not seek any treatment and his vision subsequently became poor. There was evidence of previous ocular inflammation with posterior synechiae and cataractous lens. Otherwise, no anterior chamber cells keratic precipitates, iris nodules or iris atrophy. Fundus view was hazy and B scan revealed retinal detachment.

Left acute retinal necrosis was diagnosed. Left aqueous tap was done and aqueous fluid was sent for viral polymerase chain reaction (PCR) for HSV/VZV/CMV. Patient was also screened for systemic infectious disease such as human immunodeficiency virus (HIV), Hepatitis B and C. The results were however non-reactive. The patient was then started on intravenous (IV) Acyclovir 660 mg TDS (based

on his body weight) for 14 days with renal function monitoring.

After 48 hours of IV Acyclovir, anti-inflammatory dose oral prednisolone 0.5 mg per kg body weight daily was started. Polymerase chain reaction (PCR) from his aqueous sample came back as positive for HSV-2. In view of deterioration of his renal function and slow ocular improvement, he was then counseled for intravitreal ganciclovir 2 mg/0.1 ml injection.

Three days post intravitreal injection, his left BCVA improved to 6/20 with evidence of improving vitritis, retinitis and reduced haemorrhages (Figure 2). His kidney function slowly improved as well. He subsequently underwent second intravitreal ganciclovir 2 mg/0.1 ml injection (Figure 3).

On treatment day 12, he developed inferior retinal detachment secondary to confluent retinal breaks inferotemporally (Figure 4). However, his left visual acuity was maintained at 6/30 with pinhole 6/20. The anterior chamber still showed moderate inflammation although most of the keratic

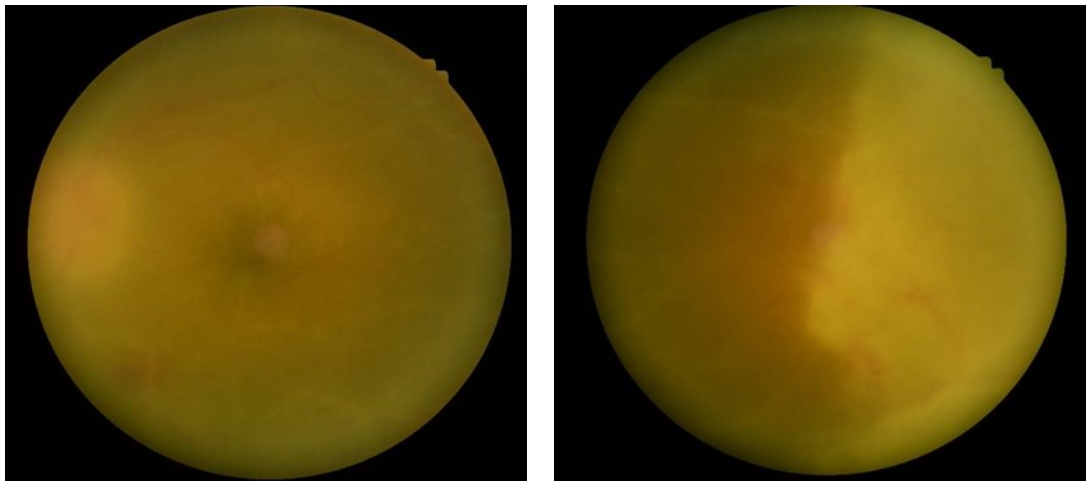


Figure 1: Left fundus showing hazy media due to severe vitritis, with peripheral retinal necrosis haemorrhages and swollen optic disc

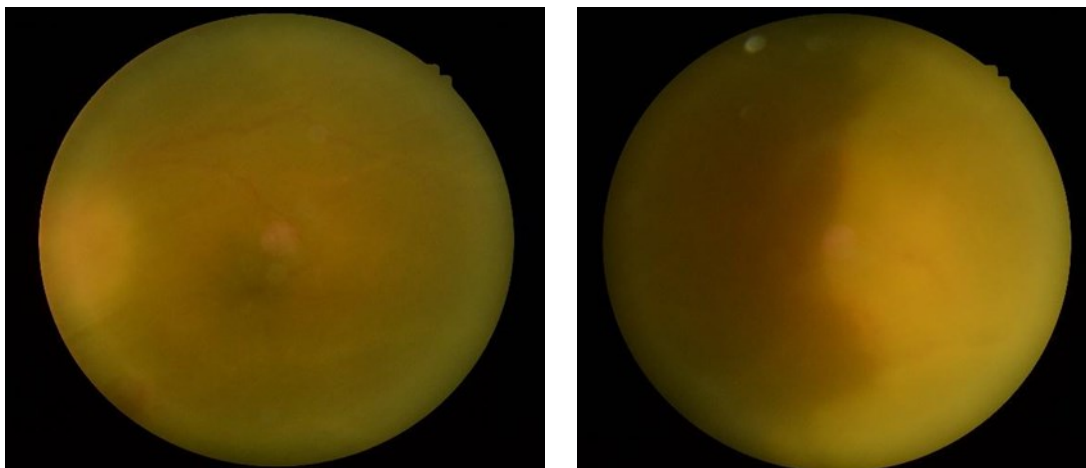


Figure 2: Left fundus showing improving vitritis, peripheral retinal necrosis, lesser retinal haemorrhages

precipitates had resolved. The location of the KP was mostly inferior. The patient then underwent left vitrectomy with endolaser and silicone oil tamponade.

DISCUSSION

The incidence of ARN is rare worldwide and even in Malaysia. However, due to its potential visual debilitating complications caused by ARN it warrants early clinical recognition and prompt treatment initiation to avoid serious ocular sequelae.

Based on diagnostic criteria proposed by the American Uveitis Society in 1994, ARN consists of single or multiple areas of distinct retinal necrosis, with rapid progression without antiherpetic treatment, and characteristic of extension of necrosis in circumferential pattern, presence of

occlusive vasculopathy especially arteriolar involvement, and presence of anterior chamber and vitreous inflammation [5].

Etiology of disease is due to reactivation of latent herpetic viral infection and herpes simplex virus (HSV) with varicella zoster virus (VZV) being the most common cause. Other members of the herpes virus family which is less often associated with ARN include cytomegalovirus (CMV) and Epstein-Barr virus (EBV) [2].

Although ARN can affect young and healthy individuals, nowadays it does affect both the immunocompetent and immunocompromised population. The immune status of the patient determines the clinical course and outcome of the disease. Thus, it is important to exclude preexisting immunocompromised states such as HIV infection.

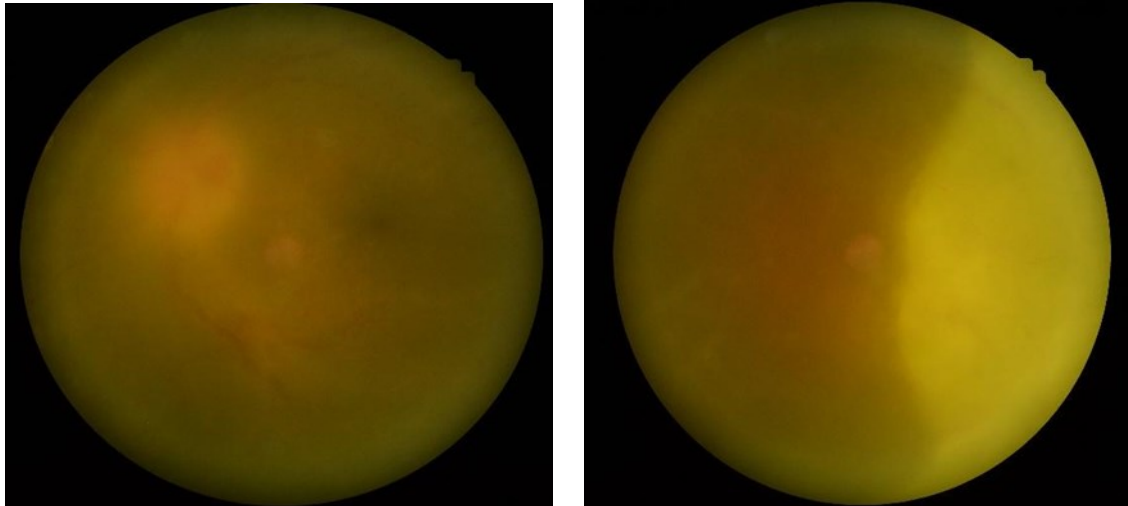


Figure 3: Left fundus after second intravitreal Ganciclovir

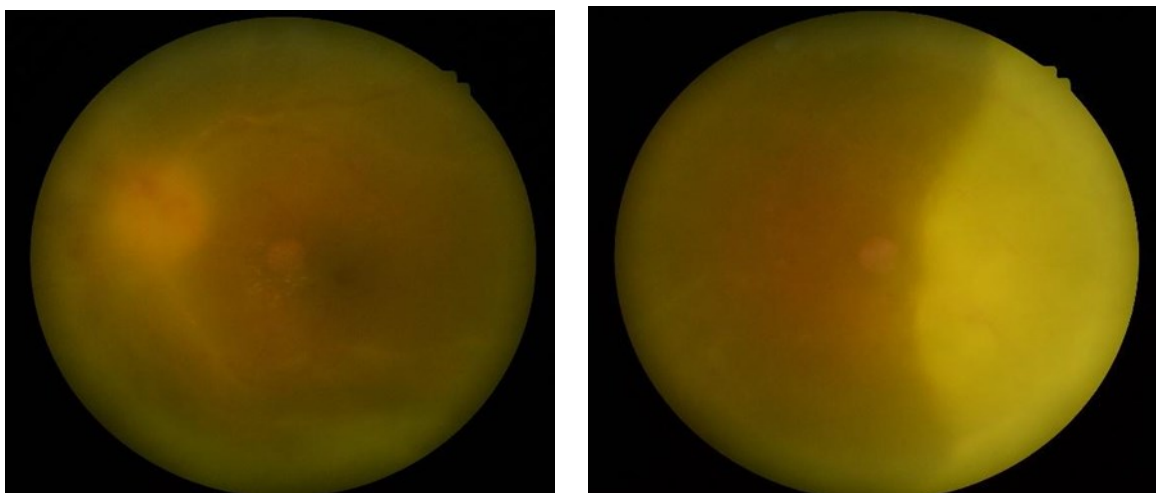


Figure 4: Left fundus after 12 days of treatment

The goal of ARN treatment includes reducing ocular viral load, halting the retinal necrosis area in order to avoid devastating complications such as retinal break which lead to sight threatening retinal detachment. Another goal is to minimize the severe inflammation and to prevent further collateral damage such as vascular occlusions besides protecting the fellow eye involvement. The systemic antiviral treatment commencement either orally or intravenously should not be delayed till laboratory results are ready.

Acyclovir and its prodrug valacyclovir are both potent viral DNA polymerase inhibitors and have been shown very effective in treating VZV and HSV viral infection. Acyclovir is a deoxyguanosine analogue with an acyclic side chain which lacks of 3'-hydroxyl group of natural nucleosides. It is preferentially attracted to the infected cells. Acyclovir is then monophosphorylated by virus-encoded thymidine kinase. Host cell thymidine kinase is less capable of converting acyclovir to its monophosphate derivative. Subsequently diphosphorylation and triphosphorylation are catalyzed by host cell enzymes, resulting in acyclovir triphosphate concentrations which are 40 to 100 times higher in HSV-infected cells than in uninfected cells. Acyclovir triphosphate thus prevents viral DNA synthesis by inhibiting the viral DNA polymerase [6,7].

In a study by Palay et al, the use of intravenous acyclovir in comparison to observational case series showed that the contralateral eyes of 87% of treated eyes remained quiet compared to 30% of the untreated patients [8]. Systemic monitoring is warranted once a patient is started with acyclovir. Side effects of acyclovir include neurotoxicity and nephrotoxicity due to a crystalline nephropathy. Other side effects include headache, rash, and gastrointestinal symptoms [6].

Valacyclovir is the L-valyl ester of acyclovir in which it is rapidly converted to acyclovir after oral administration by first-pass metabolism in the liver. Thus, it has higher bioavailability than intravenous acyclovir. Huynh et al reported that oral valacyclovir can reach a concentrations in the vitreous and achieve inhibitory ranges of HSV-1, HSV-2 and VZV [9]. However, valacyclovir commencement in particularly immunocompromised patients should be used judiciously as this group has higher risk for nephrotoxicity and thrombocytopenia – specifically for thrombotic thrombocytopenic purpura or hemolytic uremic syndrome (TTP/HUS) [7].

Intravitreal antiviral treatments have been advocated as an adjunct to the systemic ARN treatment [10]. Intravitreal Foscarnet or ganciclovir injection have been reported in some studies and it is administered either as a one-time treatment or as induction followed by maintenance treatments. Ophthalmologists may consider the intravitreal antiviral as an adjunct if the disease fails to respond to the standard of care treatment as the ARN can be caused by different members of the herpes virus family. There are also cases of patients with systemic treatments who do not tolerate the systemic antiviral drug and thus intravitreal antiviral injection may offer higher

therapeutic levels, which cannot be achieved by systemic antiviral. This is due to the human blood ocular barrier [11].

Foscarnet (trisodium phosphonoformate) is a pyrophosphate analog. The mechanism of action is it binds reversibly near the pyrophosphate-binding site of DNA polymerase (or reverse transcriptase) without requiring further modification [12]. After binding, the drug inhibits the cleavage of the pyrophosphate moiety from deoxynucleotide triphosphates, and halts DNA chain elongation. However, it has low bioavailability and is only available for intravenous and intravitreal usage.

Ganciclovir is a nucleoside analogue that differs from acyclovir as it has an extra hydroxymethyl group on the acyclic side chain. Ganciclovir is then phosphorylated by a virus-encoded enzyme, and further by cellular enzymes. Ganciclovir triphosphate is a competitive inhibitor of herpes viral DNA polymerases, which will terminate the DNA chain elongation. Ganciclovir triphosphate also inhibits activity against cellular DNA polymerases. Ganciclovir has some similar activity to acyclovir particularly against HSV-1, HSV-2, and VZV however, on contrary of acyclovir, it has greatest activity against CMV.

Meghpara et al reported that patients with moderate disease (25–50% retinal involvement) had favorable response with intravitreal injection of ganciclovir or foscarnet in ARN patient [4]. Kauffman et al reported the similar efficacy and result for both intravitreal ganciclovir or foscarnet. Both intravitreal antivirals had demonstrated significant and early resolution of ARN in the report. The report also suggested that intravitreal antivirals could be reserved for those patients who cannot tolerate the systemic side effects of antivirals [11]. Patel et al study on 8 years' case series of ARN revealed 29% of eyes had final BCVA better than 20/200 with intravitreal ganciclovir or foscarnet despite being on systemic antiviral [13]. Lee et al reported that IVT foscarnet was efficacious in ARN and can be used as the only treatment in patients with intolerance to systemic antivirals [14]. While Chau Tran et al case series of HSV-2 ARN showed that 41.7% patients had visual improvement of two or more lines with intravenous acyclovir or foscarnet +/- intravitreal ganciclovir +/- interferon [15].

Acute retinal necrosis can cause severe inflammatory response and may manifest as moderate to severe vitritis with significant retinal necrosis. The role of systemic corticosteroids is to decrease ocular inflammation in a controlled ocular viral load situation [12]. As in our case, it is usually started after 48 hours of antiviral treatment. The ocular inflammation may lead to occlusive vasculitis and/or arteritis secondary to infiltration of inflammatory cells. Although anticoagulants and aspirin have been advocated in some studies, its administration is less commonly used.

Prognosis for visual recovery is guarded with treatment and tends to be very poor without treatment. Complications are retinal holes and tears, retinal detachment, proliferative vitreoretinopathy, vitreous haemorrhage, epiretinal membrane and optic neuropathy.

CONCLUSION

Several treatment regimens have been advocated in many studies. However due to its rare incidence, the standard of care treatment is still based on the reported successful cases with systemic intravenous acyclovir. We report this case due to the rarity of the ARN incidence and few studies that report regarding the standard treatment of ARN either with systemic antiviral orally or intravenously with adjunct intravitreal antiviral. Further studies are needed to determine the potential efficacy of different types of antiviral in ARN patients. Meanwhile, few studies suggested intravitreal dexamethasone used in conjunction with intravitreal antiviral agents in the management of ARN. This might be useful in order to reduce the ocular viral load as well as to control the ocular inflammation that occurs concurrently [12].

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Case Report

SIXTH CRANIAL NERVE PALSY SECONDARY TO INDIRECT CAROTID CAVERNOUS FISTULA IN A PATIENT WITH RECENT COVID-19 VACCINATION

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ABSTRACT

Sixth cranial nerve palsy (SCNP) is a rare complication of carotid cavernous fistula (CCF), a malformation of vascular communication between the carotid artery and cavernous sinus. A 46-year-old female presented with diplopia. She also complained of intermittent headache, tinnitus and facial swelling 2 days after receiving COVID-19 Comirnaty (BNT162b2) vaccination. Visual acuity was 6/6 in both eyes. Extraocular muscle movements limitation was observed in levoversion, levelevation and levodepression. Diplopia worsens for near vision. Examination of the anterior segments, posterior segments and intraocular pressures were unremarkable. The cerebral angiogram revealed evidence of left indirect carotid- cavernous fistula, and embolization of the fistula was done. Two weeks post-procedure, diplopia resolved, and extraocular muscle was full. Neuroimaging is advisable in patients who develop SCNP with no significant vasculopathy risk factors as it helps to diagnose other life-threatening causes of the SCNP.

INTRODUCTION

Sixth cranial nerve palsy (SCNP), also known as abducens nerve palsy, is a common clinical presentation seen in ophthalmology practice. Being the second longest cranial nerve it is vulnerable to various pathologies such as microischemic diseases, trauma, inflammatory conditions, multiple sclerosis, vasculopathy, viral infection, meningitis, tumours, nasopharyngeal carcinoma and raised intracranial pressure. Increased intracranial pressure is often accompanied by symptoms such as headache, diplopia and swollen optic discs. About 10% of nasopharyngeal carcinoma develops SCNP and presents with nasal stuffiness and epistaxis. A rare cause of SCNP is carotid-cavernous fistula (CCF). In CCF, SCNP is due to its location which is adjacent to the internal carotid artery (ICA) in the cavernous sinus [1]. Isolated SCNP following COVID-19 vaccination has also been previously reported [2]. Neuroimaging is usually indicated to investigate the cause of SCNP unless there is an apparent underlying medical condition. This case illustrates the importance of performing neuroimaging in a patient who developed SCNP after receiving COVID-19 vaccination.

CASE PRESENTATION

A 46-year-old female presented with diplopia on left gaze. In addition to diplopia, she also had an intermittent headache, tinnitus, and facial swelling. However, there was no vision loss, fever, nausea, vomiting, unilateral weakness or seizure. She denied any history of trauma. She did not have other underlying medical conditions. She received her first dose of COVID-19 vaccination two days prior to the presentation. She received the Comirnaty (BNT162b2) vaccination developed by Pfizer and BioNTech. On examination, she has a right face turn. Her best corrected visual acuity was 6/6 in both eyes. Extraocular muscle movements, namely levoversion, levo elevation and levo depression were limited in the left gaze. Diplopia was worse at near vision. Ocular examination of the anterior segments, intraocular pressures and fundi were unremarkable. Her optic disc was not swollen, and there were no corkscrew vessels seen in the conjunctiva. The Hess chart showed left SCNP with overaction of the right medial rectus muscle. All her vital signs were stable. There were no other neurological deficits.

Magnetic resonance imaging (MRI) revealed possible left CCF (Figure 1). The subsequent cerebral angiogram performed confirmed the left indirect CCF (Figure 2). The patient was advised to patch the left eye to overcome the diplopia while awaiting repair of the fistula. She was also prescribed oral vitamin B1, B6 and B12

supplements. Embolisation of the fistula was done using a catheter and coils immediately after the diagnosis was confirmed (Figure 2). Two weeks after the embolisation procedure, the patient's diplopia resolved, and her extraocular muscle movement was full.

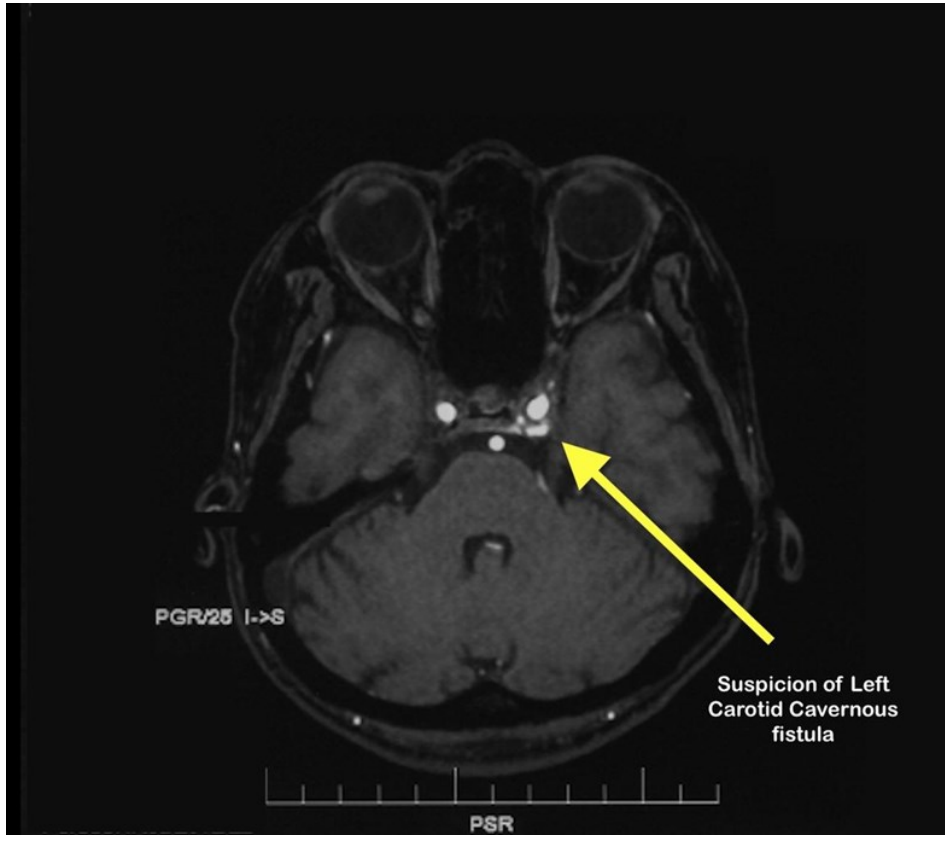


Figure 1: MRI brain showing axial cut at the level of cavernous sinus

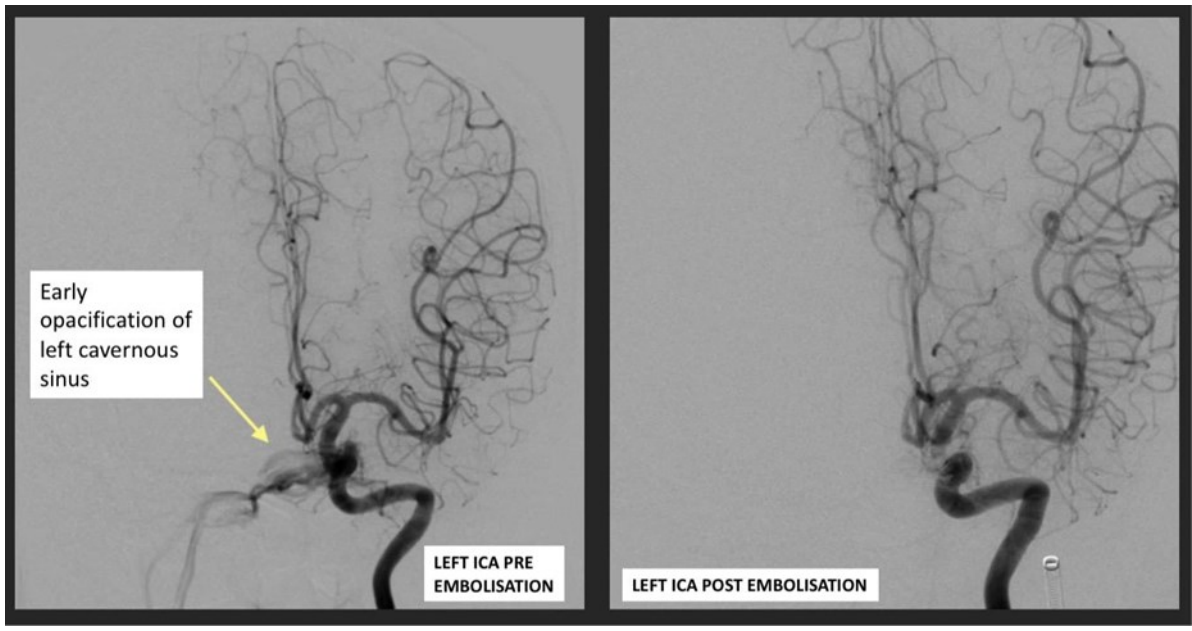


Figure 2: Cerebral angiography pre and post embolization

DISCUSSION

The common cause for SCNP are ischemic microvascular causes such as diabetes mellitus, hypertension, hyperlipidaemia and coronary artery diseases. The recovery is usually spontaneous within three to six months and improves with time. A retrospective study among patients with microvascular ischemic SCNP found that 86% of patients had complete recovery during their follow up. Urgent neuroimaging is usually deferred in such cases as the symptoms are self-limiting with established vasculopathic risk factors [3, 4].

In addition to the ischemic microvascular causes, any insult to the brainstem, subarachnoid space, cavernous sinus or along the course of the sixth cranial nerve may lead to SCNP. Intracranial pathology would be the primary suspicion among patients presenting with sudden onset SCNP. The sixth nerve arises from the nucleus located in the dorsal pons, ventral to the floor of the fourth ventricle at the level of facial colliculus. The nerve fibre emerges from the nucleus through the pontomedullary groove and travels through the subarachnoid space. It crosses the upper edge of the tip of the petrous part of the temporal bone towards the clivus called Dorello's canal. It enters the dura mater inferior to the posterior clinoid process. Therefore, the nerve is prone to stretching when there is an increase in the intracranial pressure. It enters the cavernous sinus inferotemporal to the ICA and the orbit through the superior orbital fissure within the annulus of Zinn to the lateral rectus muscle. Hence, in CCF, the sixth cranial nerve can be affected [5].

Carotid-cavernous fistula is a malformation of the vascular communication between ICA, external carotid artery and cavernous sinus in the brain. It can be classified as direct or indirect and further divided according to the Barrow Classification. Indirect CCF is usually spontaneous and caused by a dural rupture in the arterial wall. Indirect CCF also has an association with hypertension, advanced age and a female predilection. On the contrary, trauma is the leading cause of direct CCF. Clinical signs of indirect CCF are usually milder than direct CCF, which have a more dramatic presentation. The usual clinical presentations of CCF are eye redness, diplopia, tearing, ocular foreign body sensation, blurring of vision, proptosis, tinnitus and headache. Eye redness is often characterised by arterialisation of the conjunctival vessels due to backpressure from the cavernous sinus which leads to tortuous and dilated conjunctival vessels, known as corkscrew vessels. Nonetheless, our patient presented with diplopia, tinnitus, facial swelling and intermittent headache. In a retrospective study, the commonest ophthalmic sign in CCF is proptosis (78.7%). Ocular nerve paresis was reported in 61.7% of patients, out of which 10.64% accounts for sixth nerve palsy [6, 7].

Since our patient presented with SCNP two days after receiving the first dose of Comirnaty COVID - 19 vaccination, the possible association of the

SCNP to the vaccination could not be ruled out until we perform the neuroimaging investigation. There is a reported case of SCNP as a possible neurological sequelae post Comirnaty COVID-19 vaccination [2]. Unlike our patient, their patient's neuroimaging was normal. The reports from US Vaccine Adverse Event Reporting System states that SCNP is the most common motor palsy following vaccinations [8].

The Comirnaty (BNT162b2) developed by Pfizer and BioNTech is an mRNA vaccine that encodes the S-2P protein. The nucleoside-modified RNA vaccine encodes a prefusion stabilised state and membrane-anchored SARS-CoV-2 full-length spike protein, allowing the host immune system to detect the virus before it enters the host cell. (9) The theory behind post immunisation neurological sequelae of SCNP is still not established. However, it is hypothesised as an immune-mediated effect by host antibodies that cross-react with proteins present in peripheral myelin, causing demyelination [2].

Neuroimaging confirmation is required in CCF [7]. Digital subtraction angiography (DSA) also known as cerebral angiography is the gold standard for CCF neuroimaging. It is able to demonstrate the arterial supply, flow rate, and venous drainage to identify the type of CCF. It has an additional therapeutic value in planning for endovascular treatment. A standard computed tomographic (CT) scan and magnetic resonance imaging (MRI) will not be able to establish the findings of CCF. However, it may reveal orbital congestion with enlargement of the extraocular muscles and dilated superior orbital vein, which leads to suspicion of CCF. A non-invasive computed tomographic angiography (CTA) or MRA yields a better diagnostic value in neuroimaging of CCF in comparison to the standard CT scan and MRI [7]. When there is a suggestive history and clinical findings with no known underlying medical condition as in our patient, neuroimaging is a valuable diagnostic tool to identify the cause of sixth nerve palsy.

In our patient, the cerebral angiogram was performed, and it confirmed the presence of left indirect CCF, ipsilateral to the SCNP. Therefore, active management was recommended to the patient. There are various treatment options for CCF, such as conservative management, surgical management, for example, surgical trapping of the fistula and transvenous surgical packing and endovascular treatment. Endovascular techniques using coils, silk and liquid embolic material (such as Onyx) or both can successfully repair the fistula, restore normal orbital venous drainage and establish intradural arterial flow. Embolisation of fistula has a favourable outcome in indirect CCF with an ocular presentation. Most of the ocular complaints resolve after treatment. In our patient, endovascular techniques using coils were performed. A total of four coils were inserted. Coils are easy to use and it has an advantage in the coil's position adjustment after insertion to ensure

successful embolization [10].

The complications of embolisation are; worsening of ophthalmoplegia, internal carotid artery occlusion, stroke, forehead dysaesthesia and superior orbital nerve damage due to exposure of the superior ophthalmic vein. The complication of embolisation was reported as low as 1% to as high as 40% [10]. In this patient, diplopia resolved after two weeks of embolization of left carotid cavernous fistula, which supported the diagnosis of indirect CCF as the cause of the SCNP.

CONCLUSION

SCNP has many attributable pathologies which are usually benign. However, since the patient developed SCNP post COVID-19 vaccination, the possibility of SCNP as a neurological sequelae post vaccination should be considered. Urgent neuroimaging is advisable in such cases to aid the diagnosis of the underlying pathology causing the SCNP. Neuroimaging was crucial in our case to diagnose other life-threatening causes of SCNP such as CCF; which warrants immediate treatment. There are various treatment options to treat CCF. Nonetheless, embolisation of fistula using coils has one of the most favourable outcomes in CCF.

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Case Report

COMMON FEMORAL ARTERY MYCOTIC PSEUDOANEURYSM ASSOCIATED WITH INGUINAL ABSCESS IN INTRAVENOUS DRUG USER (IVDU): A CASE REPORT

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ABSTRACT

Mycotic aneurysms are defined as a localized, irreversible dilatation of an artery due to destruction of the vessel wall by infection; which can arise following an infection of a previously healthy artery wall, or through secondary infection of a preexisting aneurysm. Mycotic pseudoaneurysm of the common femoral artery as a consequence of inadvertent arterial self-injection in intravenous drug user (IVDU) remains a common presentation in areas where there are significant populations using intravenous heroin. This case describes an acute complication of self-injection in a 37-year-old intravenous drug user (IVDU) male presenting with a painful left inguinal swelling. Examination findings were consistent with common femoral artery aneurysm. Ultrasonography identified "yin-yang" sign with abnormal outpouching of left inguinal region compressing the left common femoral artery. Open left common femoral artery ligation was subsequently performed therapeutically with no complications. This case report illustrates the typical presentation of mycotic pseudoaneurysm of the common femoral artery and the significance of a widened knowledge of the complication of arterial self-injection in IVDU.

INTRODUCTION

Mycotic aneurysms are not exclusive of Staphylococcus Aureus (SA) bacteremia. Some other microorganisms may be implicated, such as Salmonella, Streptococcus pneumoniae, Mycobacterium tuberculosis and a long list of fungi as well as gram-negative and gram-positive bacteria that have been reported less frequently. However, since the introduction of antibiotics, the bacteriology of infected aneurysms has changed from Salmonella and Treponema species to SA and gram-negative bacilli [1]. Samarakoon et al reported that the majority of patients in Singapore were male (92.6%) and of Malay ethnicity (55.6%). Median age was 50 (range 31–62) years. Commonly abused drugs were buprenorphine (or Subutex; 59.3%) and midazolam (or Dormicum; 51.9%). Groin pain and swelling (100.0%), fever (66.7%) and presence of a pulsatile mass (51.9%) were the most common presenting symptoms [2]. Complications arising as a result of intravenous drug abuse have traditionally posed a unique challenge to vascular surgeons. Due to its easy accessibility, the femoral artery is the most commonly abused injection site for drug users [3,4].

CASE PRESENTATION

A 37-year-old male who presented to the accident &

emergency department (A&E) with a ten-day history of painful, gradually increasing left inguinal swelling noticed after self-needle injection. He has been using vascular access on bilateral inguinal region since the past three months due to inability to get venous access peripherally. One day after the onset, he noticed a minimal bleeding and started to have pain on pressure, however the bleeding stopped spontaneously (Figure 1). He also gave a history of fever. He had underlying Hepatitis C since 2012, and was not on any follow-ups or treatment. Patient was an active smoker with 7 to 8 sticks per day. He started to take heroine since 21 years of age for 3 to 4 years but stopped for more than 10 years as he was on Methadone therapy. However he resumed his habits of IVDU in the past 3 months.

During admission, he was afebrile with stable vital signs. Left inguinal region examination revealed a 4x4 cm erythematous tender pulsatile expansile mass at the left infra-inguinal region with hemopurulent discharge. Right inguinal region examination revealed multiple puncture marks with bruises. All pulses of bilateral lower limbs were palpable.

Blood investigations revealed leucocytosis and deranged liver enzymes. Left bedside femoral artery



Figure 1: Pre-operative swelling at left inguinal region

Doppler revealed biphasic; while popliteal artery, dorsalis pedis artery and posterior tibialis artery were monophasic. Ultrasonography (Figure 2) reveals abnormal outpouching sac measuring 4.5 cm x 3.0 cm (AP x W x CC) with evidence of “yin-yang” sign in which it showed narrow aneurysmal neck originating from the left common femoral artery. These findings were in keeping with left common femoral artery pseudoaneurysm.

Patient was started on intravenous (IV) Ceftriaxone. Consent was obtained for inguinal exploration. A left external iliac artery ligation and wound debridement of mycotic aneurysm was done. Left horizontal incision was made just above the inguinal region. Then by approaching retroperitoneally, external iliac artery was identified. Left epigastric artery was ligated. External iliac artery was identified and ligated proximally and distally. Then left superficial femoral artery was identified and ligated. Lastly, left saphenous vein was also ligated. Wound at the inguinal region and unhealthy tissues were debrided. There was left common femoral artery aneurysm with the size of 3 x 4 cm with multiple collaterals. Aneurysmectomy was done and bleeding from the collaterals secured. Abdominal wound closed in layers. Skin was closed with monofilament polyamide (Dafilon 4/0). Bactigrass dressing applied at the wound bed. Aneurysmectomy tissue was sent for culture and sensitivity which Staphylococcus aureus growth was identified. The patient completed IV Rocephine 2g for 1 week. Blood culture and sensitivity showed no growth.

He recovered well with no complications. He had no lower limb ischaemia and walked home after 7 days in hospital. Wound dressing was done daily at a nearby healthcare clinic. During the follow-up, the wound was noted to have minimal slough and granulating well (Figure 2). He was given further follow up to review his wound.

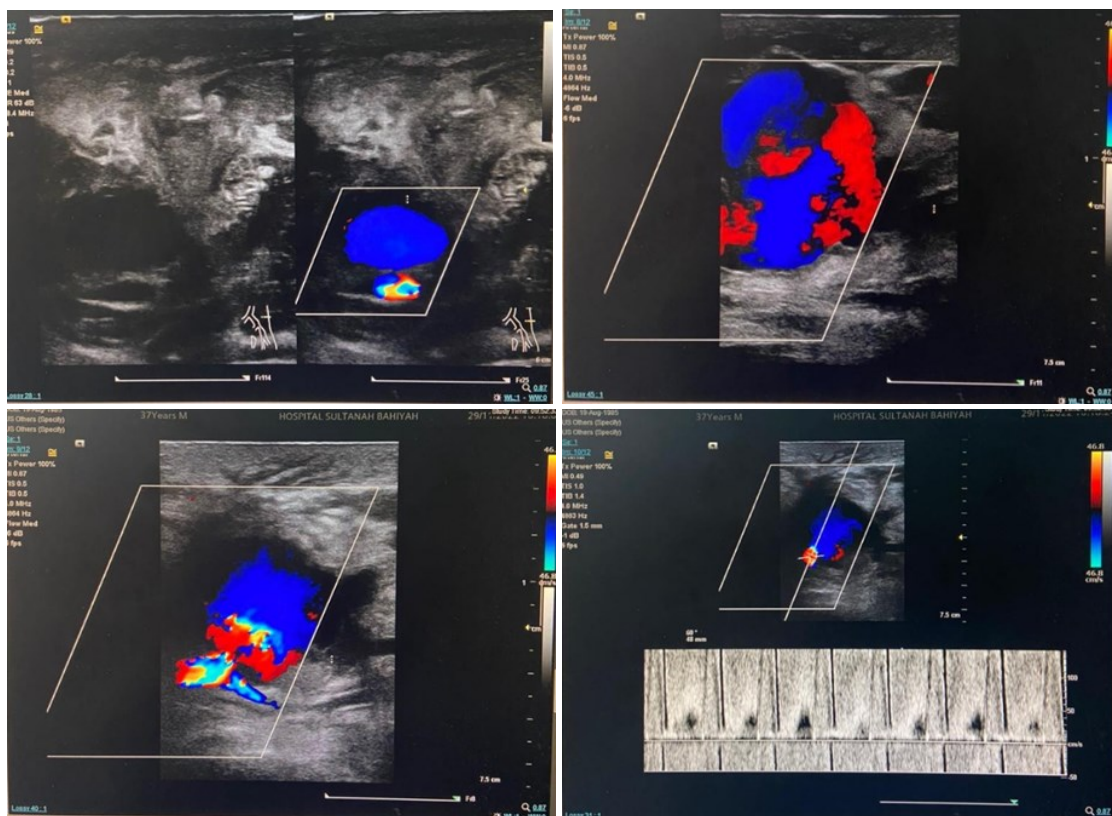


Figure 2: Ultrasonography: “yin-yang” sign indicating bidirectional flow due to swirling of blood within the pseudoaneurysm as the portion that is moving toward the transducer is red and the portion that is moving away from the transducer is blue [5]. Note the surrounding subcutaneous oedema.

DISCUSSION

The femoral artery is the most common site for an infected pseudoaneurysm in IVDUs due to its easily accessible location. Pseudoaneurysms occur in this group due to the inadvertent arterial injection of illicit drugs, resulting in periarterial extravasation and haematoma formation. Subsequent contamination of this haematoma can cause erosion and eventual rupture of the vessel wall, and pseudoaneurysm formation. If left untreated, potential sequelae include sepsis, haemorrhage, digital embolisation, limb loss and even death due to exsanguination or septicaemia [6]. In this patient, an active IVDU who relapsed since the past 3 months after more than 10 years on Methadone therapy utilizes femoral artery to inject drugs as he was unable to access veins peripherally.

The classic clinical presentation of a femoral artery pseudoaneurysm is that of a painful, pulsatile, enlarged mass with systemic symptoms such as fever, hemorrhage or thrombosis [7,8,9]. Diagnosis can be made on the basis of clinical grounds and is generally uncomplicated. Appropriate early administration of antibiotic therapy is essential. If arterial imaging is considered necessary, CT angiography is the modality of choice as it allows assessment of the retroperitoneum and allows exclusion of a significant proximal extension of sepsis.

Surgical management involves arterial ligation, drainage of sepsis and debridement of non-viable tissue. The evidence available suggests that arterial ligation is safe, although in a small proportion of patients, limbs may be lost with this strategy. From the limited data presented in the literature with regard to endovascular techniques, these strategies may have a role, although as yet, they remain undefined [2,6].

CONCLUSION

To conclude, this was 37-year-old male who presented with painful left inguinal swelling and was diagnosed with common femoral artery mycotic pseudoaneurysm associated with inguinal abscess. Groin pain and swelling in an IVDU should prompt a high index of suspicion for the presence of a pseudoaneurysm. It is of paramount importance to be able to clinically differentiate a femoral pseudoaneurysm from a groin abscess. Previous studies have shown that an erroneous diagnosis can lead to massive haemorrhage especially if surgical drainage is attempted for a presumed groin abscess [10]. For this reason, thorough history-taking and physical examination are essential for any patient presenting with groin swelling, especially with previous history of intravenous drug abuse.

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I would like to thank the patient for his consent to allow us to publish his medical information in this manuscript.

CONSENT

I have obtained verbal consent from the patient.

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Case Report

THRESHOLD RETINOPATHY OF PREMATURE IN CYTOMEGALOVIRUS- INFECTED INFANT: A CASE REPORT

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peripheral retinal photocoagulation

ABSTRACT

The relationship between the development of retinopathy of prematurity (ROP) and cytomegalovirus (CMV) infection is not well understood. We report a case of Type I threshold ROP in a CMV-infected premature infant. A female infant born via normal delivery at 30 weeks gestational age with a birth weight of 1.65 kg was diagnosed with bilateral stage 3 ROP zone 2 with plus disease. She was treated with peripheral retinal photocoagulation 48 hours after diagnosis. As this patient appear not to have strong enough cause for a threshold ROP further investigations were performed to exclude other risk factors that could contribute to severe ROP. Laboratory reports revealed CMV antigens in the infant's urine and CMV immunoglobulin G(IgG) in the mother's blood. Antiviral treatment was not initiated, as the infant had no other systemic manifestations. Subsequently, the ROP regressed after laser treatment. This case supports a few other reports associating CMV-infected infants with severe ROP. Thus, suspicion of CMV infection or CMV-infected mothers should alert clinicians of the possibility of severe ROP development in premature infants. Concurrent CMV infection in premature infants or mothers may be associated with the development of severe ROP.

INTRODUCTION

Retinopathy of prematurity (ROP) is a proliferative retinopathy that primarily affects premature and low-birth-weight (LBW) infants. Other risk factors for ROP have also been identified, including oxygen supplementation, sepsis, intraventricular haemorrhage, anaemia, use of surfactants, and assisted conception. Human cytomegalovirus (CMV) infections are one of the potential risk factors for ROP that have been described, but reports are scarce. While most CMV infections are asymptomatic, in immunosuppressed patients and infants, particularly premature infants, severe illness may occur and lead to blindness, hearing loss, defects in the central nervous system and growth restriction [1]. The relationship between CMV infection and ROP in premature infants is however not clearly understood. This case report describes the development of a Type 1 threshold ROP in a CMV-infected infant.

CASE PRESENTATION

We report a case of a 32 weeks gestational age (GA) female infant weighing 1.65 kg, born via normal delivery after premature prelabour rupture of membrane (PPROM). Following delivery, the infant received 56 hours of supplemented oxygenation via

continuous positive airway pressure (CPAP), with the highest oxygen concentration of 30% followed by 15 days of intermittent oxygenation via a nasal cannula. Subsequently, the infant was able to saturate in room air. The patient also had Grade 1 intraventricular haemorrhage (IVH) diagnosed at birth. She was monitored in the neonatal intensive care unit (NICU) till she reached a target weight.

The infant was seen for ROP screening at 34 weeks gestational age (GA). Fundus examination of the right eye revealed arteriolar tortuosity and venous dilatation at the posterior pole in all quadrants, presence of ridges with neovascular tufts from 4 to 11 clock hours and pre-retinal haemorrhage at 7 o'clock in zone II. However, vascularization had already occurred up to zone III at 12 to 1 clock hours. (Figure 1). The left fundus showed similar findings of dilated tortuous vessels in all quadrants with ridges and neovascular tufts from 1 to 8 clock hours as well as pre-retinal haemorrhage at 2 o'clock in zone II. Similarly, retinal vascularization occurred up to zone III at 10 to 12 clock-hour (Figure 2). There was no iris vessel engorgement, the pupil dilated well with mydriatic agent. The vitreous was clear, no retinal detachment seen. The anterior segment findings were normal.

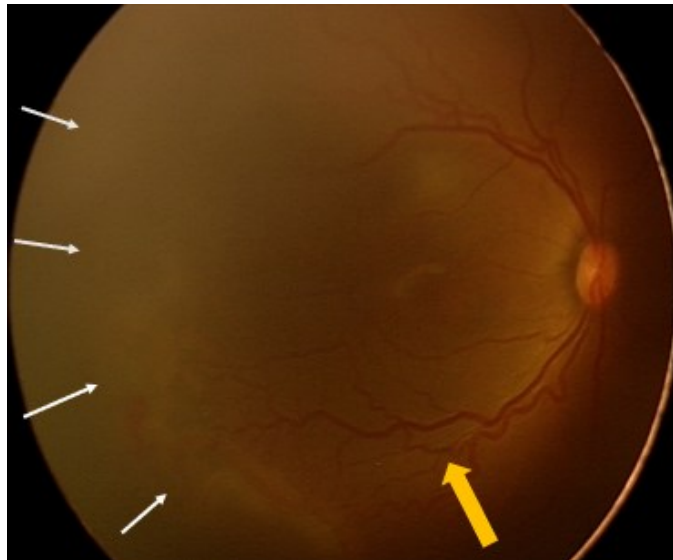


Figure 1: Right fundus showing dilated tortuous vessels in the posterior pole in all quadrants (yellow arrow), presence of ridges with neovascular tufts from 4 to 11 clock hours(white arrows)



Figure 2: The left Fundus: dilated tortuous vessels in all quadrants with ridge and neovascular tufts.

Based on the findings a diagnosis of Bilateral stage 3 ROP zone II with plus disease, a Type 1 threshold disease was made. The diagnosis was based on the International Classification of Retinopathy of Prematurity 2005 and Early Treatment for Retinopathy of Prematurity (ETROP) [2,3]. Peripheral retinal photocoagulation therapy via laser indirect ophthalmoscopy (LIO) was successfully performed 48 hours after the diagnosis.

Low birth weight, prematurity, oxygen supplementation, grade 1 intraventricular haemorrhage, and neonatal jaundice were identified as risk factors contributing to the development of ROP in this case. However, we observed that these risk factors were not strong enough to cause a threshold ROP. This prompted the investigation to rule out any other potential risk factors. The patient was screened for CMV, as this virus was reported to cause worsening of ROP in the past [4]. The results revealed that CMV virus particles were detected in the urine via

polymerase chain reaction (PCR); however, no CMV antibodies were detected in the blood. The cerebrospinal fluid (CSF) samples and placental histopathology were also negative for CMV. The mother was tested as well as she could be the source of infection. The mother tested positive for CMV immunoglobulin G (IgG) but negative for immunoglobulin M (IgM) and viral PCR. Auditory assessment and cranial ultrasonography done to look for other CMV infection sequelae were normal.

Antiviral treatment was not considered in this patient as there was no evidence of chorioretinitis or other organ involvement. In addition, the investigations were carried four weeks after birth. Diagnosis of congenital CMV is made within two–three weeks of age, beyond this period, breastmilk transmission is still possible because the mother breastfed the child.

Ten days after the peripheral laser photocoagulation, the ROP showed regression, as evidenced by the flattened ridge, resolved pre-retinal haemorrhage, and less vascular tortuosity (Figure 3). Early laser treatment is a crucial factor in regression of the lesion. The infant was under regular ophthalmology follow-up for ROP monitoring and paediatric follow-up for growth assessment.

DISCUSSION

Is cytomegalovirus infection related to severity of ROP? Little is known about their relationship, even though it is well known that each independently causes significant mortality and morbidity in premature infants. In the past, threshold ROP was defined by the CRYO-ROP study group as the degree of ROP severity which indicates the need for treatment. However, later randomised trial on early stages of ROP by Early Treatment for Retinopathy of Prematurity group (ETROP) demonstrated better outcomes if ROP were treated earlier than the threshold stage. Prethreshold ROP can be divided into two types: Type 1 which is high risk, and Type 2, low risk ROP. Based on this study, treatment is recommended to reduce unfavourable outcomes in type 1 prethreshold ROP rather than to wait for threshold ROP to occur [3]. The risks of developing more severe types of ROP are higher with lower gestational age and lower birth weight [5].

Immature infants have the most significant risk of acquiring an early and symptomatic CMV infection, which can be transmitted via antenatal transfer, intrapartum, or breastfeeding [1]. CMV infection in the eye commonly manifests as chorioretinitis. Optic atrophy, macular scarring, or cortical damage are sequelae that may lead to blindness. In addition, CMV causes mental retardation and hearing loss.

In this case, we observed that other risk factors that led to the development of threshold ROP were low. Even though categorised under LBW group according to the World Health Organization (WHO) classification and late preterm group [6], the child was not under the extreme group of both classes. Even though oxygen supplementation via a ventilator was administered, the duration was short. A multivariate analysis reported that children on longer ventilation of more than 28 days have a 4.07 times higher risk of developing Stage 3 to 4 ROP than those with lesser ventilator exposure [7]. This infant had Grade 1 intraventricular haemorrhage (IVH) diagnosed at early birth; however, higher grades of IVH are more at risk of developing ROP of stage 3 or worse [8]. Poor association was found between neonatal jaundice and ROP development [9].

Tagami et al. described a case of severe symptomatic congenital cytomegalovirus, which presented as posterior vessel dilatation, demarcation line at zone III, and arteriovenous anastomosis without chorioretinitis features similar to this case. However, they considered CMV-related retinopathy as the primary diagnosis and ROP secondary to foetal growth restriction as the differential diagnosis. After completing a systemic Valganciclovir course, the lesions regressed, leaving behind the macula and peripapillary chorioretinal atrophy [10]. In contrast, another study comparing the sequelae of CMV-infected premature infants reported no significant difference in ROP development in CMV-infected infants compared to uninfected infants [11].

We postulated that in our case, CMV infection may contribute to the acceleration of ROP, even without systemic manifestations. The pathophysiology of the development of retinopathy is not clear; however, the CMV virus was hypothesised to cause anti-migratory and anti-angiogenic effects, affecting vasculogenesis and cause loss of pericyte

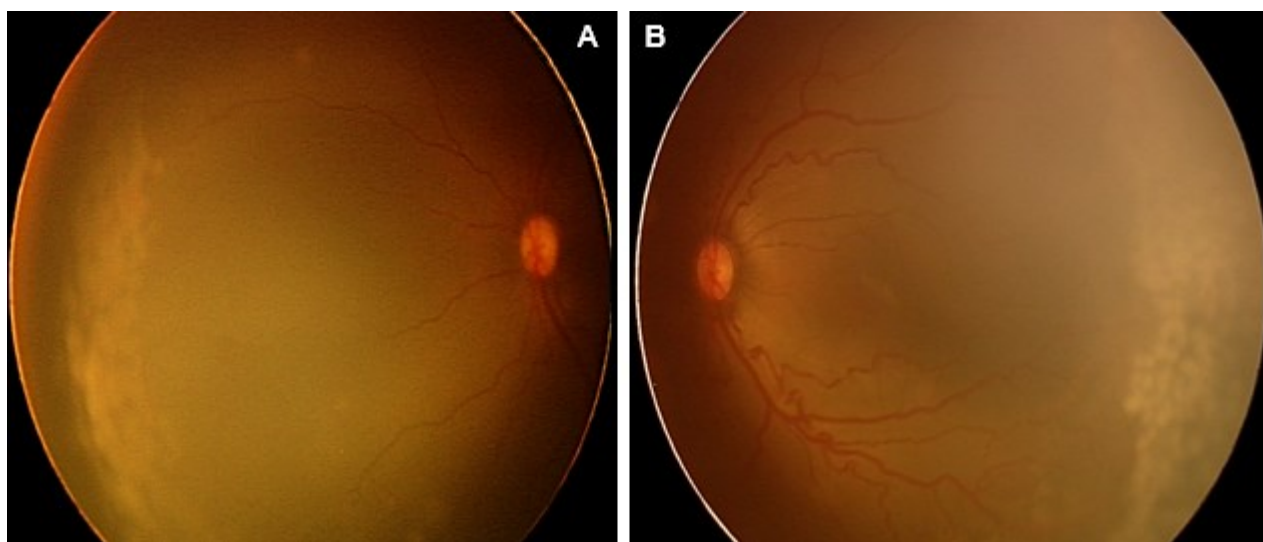


Figure 3: A) Right fundus and B) Left fundus ten days after peripheral retinal photocoagulation, showing ROP regression, evidenced by flattened ridge, resolved pre-retinal haemorrhages, and less vascular tortuosity.

at proximal sites within the retinal vasculature [12,13]. In our case, laser treatment was effective and sufficient even without antiviral therapy for underlying CMV infection. Routine screening of CMV virus might be helpful if similar scenarios are encountered. This would be beneficial not only for ocular diagnosis but also for detecting other occult systemic involvement of CMV infection. The suspicion of CMV infection or CMV-infected mothers should alert clinicians to the possibility of severe ROP development in premature infants. Further studies are needed to explore and support these findings.

CONCLUSION

Concurrent CMV infection in the infant or mothers may be associated with development of severe ROP in premature infants. We report this case in the hope to create awareness and aid in early diagnosis and subsequent management of similar cases.

CONFLICT OF INTEREST

The author(s) declare no potential conflicts of interest concerning the research, authorship, and publication of this article. This case has been presented as e-poster in Asian Pacific Vitreo-Retinal Surgery (APVRS) Scientific Meeting 2022

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Case Report

SURPRISE INCIDENTAL FINDING OF RETINOBLASTOMA DURING RETINOPATHY OF PREMATURITY SCREENING: A CASE REPORT

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ABSTRACT

Retinoblastoma is one of the most common childhood malignancy and 3rd most common intraocular malignancy after uveal malignant melanoma and metastatic carcinoma. Retinoblastoma is most frequent in children less than 5 years old. Incidental retinoblastoma in neonates is rare. We presented a case of retinoblastoma in preterm patient during retinopathy of prematurity (ROP) screening. A premature baby was referred for ROP screening. The patient's gestational age at birth was 30 weeks 6 days and a birthweight of 1540g. He was under supplemental oxygen in intensive care unit. Dilated fundus examination of the left eye showed a central macular lesion approximately 2mm in diameter with a prominent feeding vessel infero-temporally. Patient underwent laser photocoagulation therapy to retinoblastoma tumor foci as well as barricade laser. Follow up examinations showed the tumor increasing in size with more prominent feeding vessel infero-temporally. Currently plan for systemic chemotherapy.

INTRODUCTION

Retinoblastoma is a most common childhood malignancy that arises from the retina. As an intraocular tumor, the tumor is rare but highly malignant, which may cause significant visual morbidity and death if left untreated. Most common presentations of retinoblastoma are leukocoria and strabismus which are usually noticed by the parents. In embryonic or fetal development, these kinds of cancer develop from immature tissues due to disruptions of cell proliferation and growth [1]. Mutations of the retinoblastoma gene RB1, which is usually inherited, are one type of defect that can result in such an early disturbance and thus begin cancer developing. In this case report, we discuss the issue of retinoblastoma in preterm patients as well as the challenges in managing the disease [1].

CASE REPORT

A male neonate born preterm, at 30 weeks 6 days gestational age with birth weight of 1540g was admitted to the neonatal ICU. Patient was under supplemental oxygen administration. The patient was referred for ROP screening. On examination, the anterior segments were normal. left fundus examination revealed a central elevated macular lesion of approximately 2 mm in diameter with an

inferotemporal feeding vessel (Figure 2). The right fundus finding was unremarkable (Figure 1). Magnetic Resonance Imaging of Brain and Orbit, revealed a subretinal mass in the posterior pole involving the macula in the left eye. Scleral involvement was evident in T1 signals.

The provisional diagnosis was retinoblastoma. There is no family history of retinoblastoma. The family members were counselled regarding this condition and treatment options with laser photo ablation were discussed in depth with them. A laser photoablation was performed. After 2 weeks, examination showed regression of tumor size (Figure 3). Repeat laser therapy was given. However follow up examinations showed progression of the tumor with more prominent feeding vessel inferotemporally. Patient was planned for chemotherapy.

DISCUSSION

Retinoblastoma remains the most common childhood malignancy that arises in the retina and represents 1%-3% of all childhood malignancies and 4%-29% of solid neonatal carcinoma, excluding hematological neoplasms and nonmalignant teratomas [1]. In spite of its rarity, it is an extremely

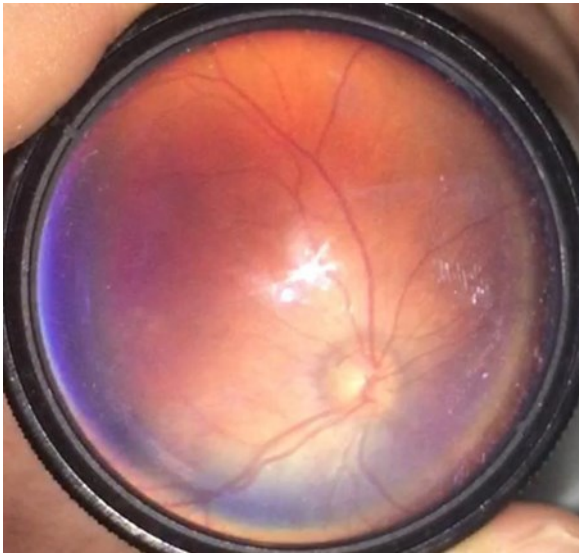


Figure 1: Right normal fundus

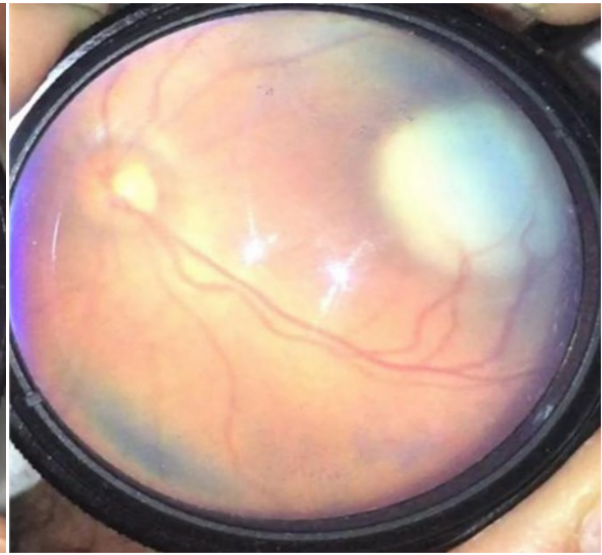


Figure 2: Left fundus: Central macular lesion with feeder vessels

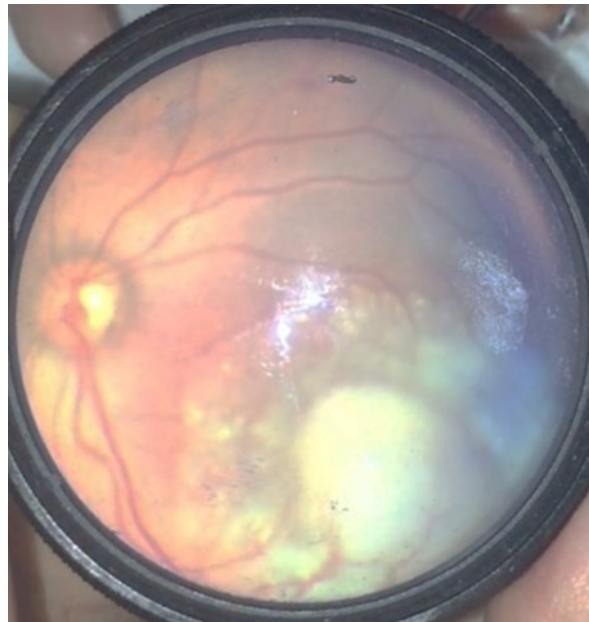


Figure 3: Left fundus: post laser ablation with less feeder vessels

malignant intraocular tumor that causes significant visual disability and even death if left undetected. Two-thirds are diagnosed before 2 years of age, overall 95% of cases occur before the age of 5 years. There are between 7000 and 8000 new cases of retinoblastoma per year worldwide with an incidence of 1 in 16,000-18,000 births per year. The incidence is 3.5 per million children under the age of 15 and 11.8 per million children under the age of 5 on an annual basis. There are an estimated 3000 to 4000 deaths annually due to retinoblastoma. The possibility in preterm and small for date neonates is more than 1 in 16,600 live birth [2].

The age of presentation of our case is 30 weeks 6 days gestational age, which is way below the average age. However, no genetic study was

done in this case to further confirm the genetic correlation.

Retinoblastoma can be either heritable and associated with a germline mutation of the RB1 gene, or non-heritable. The clinical presentation varies according to the stage of the disease and the presence of one or several tumors in unilateral or bilateral eyes, with symmetrical or asymmetrical lesions. The tumor can present as an endophytic form, in which the tumor extends into the vitreous and exophytic form, associated with retinal detachment and subretinal infiltration or a mixed form, comprising vitreous involvement and retinal detachment [3].

Problems faced in treatment of retinoblastoma depend on presentation. In order to determine the

best treatment for each child, factors such as tumor laterality, the size and location of tumors, metastasis risk, subretinal and vitreous seeds, as well as the tumor relationship to nearby structures are considered. There are several criteria that determine whether small tumors are amenable to local ablative treatment. These criteria include tumour position greater than 3 mm from the fovea, greater than 1.5 mm from the optic disc, and smaller than 3 mm in height and diameter. Laser photocoagulation or cryotherapy can be used for ablation therapy, which results in 86% of tumors regressing [4].

The laser treatment may be repeated every 3 - 4 weeks, until signs of inactivity and complete tumor regression are evident. A clinically inactive tumor can be identified by indirect funduscopy showing calcified, inactive tumor, as well as abnormalities such as subretinal fluid, subretinal seeds, or vitreous seeds. Intravenous chemotherapy is used for advanced tumors that can't be ablated locally (chemo reduction) [5]. Study by Chen M in Beijing, China suggested that primary Intra-arterial chemotherapy (IAC) treatment of retinoblastoma in infants less than 3 months old may be a feasible and promising treatment option [6].

CONCLUSION

Neonatal retinoblastoma is rare and presents a management challenge, in particular when there are added factors such as prematurity and small for gestational age. In light of the success of present treatment protocols, there is an increasing interest in examining local administration of chemotherapy, such as intra-arterial and subconjunctival chemotherapy, in order to improve tumor control in advanced tumors and minimize toxic systemic chemotherapy. Preliminary results have shown that super selective ophthalmic artery chemotherapy can successfully treat retinoblastoma tumors, including those requiring surgical removal, in a high level. A combination of therapies targeting hypoxia, angiogenesis, and cellular metabolism is effective in tumor control and should be evaluated and tested further in retinoblastoma.

CONFLICTS OF INTEREST

No conflicts of interest

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Case Report

COMBINATION OF INTRAVITREAL ANTI VASCULAR ENDOTHELIAL GROWTH FACTOR AND FULL FLUENCE VERTEPORFIN PHOTODYNAMIC THERAPY IN THE MANAGEMENT OF CHOROIDAL HAEMANGIOMA WITH EXUDATIVE RETINAL DETACHMENT: A CASE REPORT

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ABSTRACT

This case report is to review the successful treatment outcome of intravitreal anti vascular endothelial growth factor (anti VEGF) and photodynamic therapy (PDT) with verteporfin for a case of circumscribed choroidal haemangioma associated with exudative retinal detachment (RD). A 48-year-old man presented with a 2-weeks history of decreased right vision. On examination, right visual acuity was 3/60 with evidence of right circumscribed choroidal haemangioma complicated with exudative retinal detachment. He underwent two sessions of verteporfin PDT and twice intravitreal injection of anti VEGF, Ranibizumab. There was resolution of subretinal fluid over a period of 18 months and his visual acuity stabilized at 6/9. Hence, intravitreal anti VEGF and verteporfin PDT are safe and effective therapeutic options for circumscribed choroidal haemangioma associated with exudative retinal detachment (RD).

INTRODUCTION

Choroidal haemangioma is a rare benign vascular tumor with a peak incidence in middle-aged adults although it may be present since birth [1]. Most patients are asymptomatic depending on the location of the tumor. The visual symptoms commonly arise as a result of subretinal fluid, cystoid macular edema, retinal pigment epithelium changes, subretinal fibrosis and retinoschisis caused by the tumor. Visual symptoms may include progressive worsening of vision, metamorphopsia, floaters, and even visual field defects.

Choroidal haemangioma, a benign vascular hamartoma can be divided into circumscribed or diffuse type [2]. The circumscribed choroidal hemangioma is an isolated, unilateral and is not associated with systemic associations. On the contrary, the diffuse type is frequently associated with phakomatoses like Sturge-Weber syndrome [1,3]. Diagnosis is made clinically based on the fundus characteristics of the tumor. It is an orange-reddish colored mass with indistinct margins that blend with the surrounding choroidal tissue. It is usually solitary and located at the posterior pole. Most cases are unilateral although bilateral cases have been reported. Its thickness is usually 6 mm or less with

some areas of increased pigmentation which can resemble a choroidal melanoma. The base of the tumor can occasionally be pigmented, as a result of compressed choroid.

Ancillary testing such as B scan ultrasound, fundus autofluorescence (FAF), fundus fluorescein angiography (FFA), indocyanine green angiography (ICG), and optical coherence tomography (OCT) are helpful modalities in establishing the diagnosis. Subsequently, once the diagnosis has been made, referral to a medical retinal specialist is warranted.

Various treatment modalities have been advocated. The options available are intravitreal anti-VEGF injections, laser photocoagulation, transpupillary thermotherapy (TTT), photodynamic therapy (PDT), plaque brachytherapy, external beam radiotherapy, proton beam therapy, and stereotactic radiosurgery. Treatment is only indicated in sight threatening cases such as the tumor location at the posterior pole or sub retinal or intra retinal fluid extending to macula. The aim of the treatment is to improve and preserve the visual acuity.

In this article, we report a successful outcome of intravitreal anti VEGF and verteporfin photodynamic

therapy (PDT) in the treatment of the circumscribed choroidal haemangioma associated with exudative retinal detachment.

CASE PRESENTATION

A 48-year-old man presented with complaining of decreased visual acuity over his right eye for the past 2 weeks. He was referred to the Medical Retina Unit, Ophthalmology Department of Shah Alam Hospital to seek a second opinion for choroidal lesion in the right eye. His general and systemic examination was unremarkable. There was no evidence of a cutaneous hemangioma elsewhere noted.

On ocular examination, his best corrected visual acuity 6/6 and 6/9 in the right and left eye respectively. Both anterior segments were unremarkable. The fundus of the right eye revealed a reddish-orange, dome shaped choroidal lesion, measuring about 3-disc diameter, located nasal to

optic disc (Figure 1). Minimal pigmentary changes were noted overlying the tumor, with surrounding sub retinal fluid and neurosensory serous retinal detachment, extending from the tumor to the macular area. The left eye fundus was otherwise normal.

In order to exclude the other differential diagnosis such as choroidal metastasis, further blood investigations were carried out. Renal profile (RP), liver function test (LFT), thyroid function tests (TFT) and serologic tests for tumor markers (CA 19-9, CEA, PSA) were normal. Ultrasound liver was unremarkable and Magnetic Resonance Imaging (MRI) Brain and Orbit was performed and confirmed that the mass was confined within the posterior segment arising from the choroid of the right eye.

On further ocular investigation, optical coherence tomography (OCT) of macula demonstrated presence of sub retinal and intra retinal fluid (Figure 2). A fundus autofluorescence (FAF)

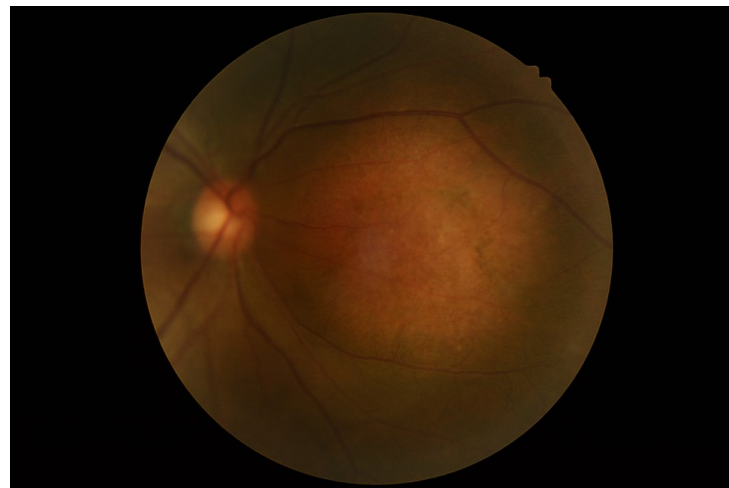


Figure 1: Right eye: choroidal mass nasally with exudative retinal detachment

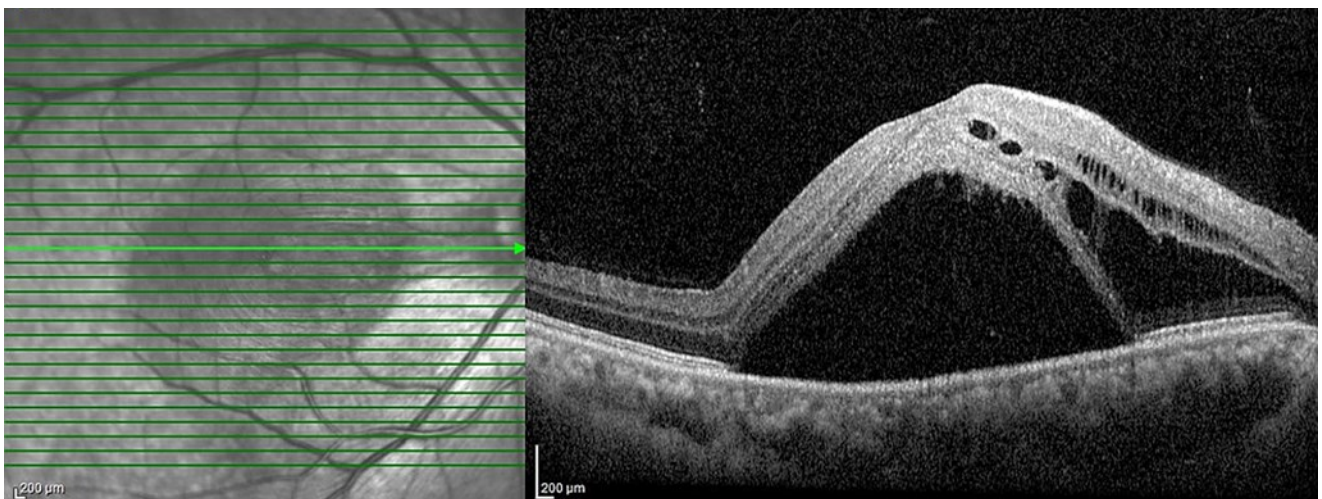


Figure 2: Right macula OCT of the right eye showing subretinal and intraretinal fluid involving fovea.

showed a patchy area of hyper autofluorescence overlying the lesion (Figure 3). B-scan ultrasonography showed a solid dome-shaped choroidal lesion with height of 4.32 mm and high internal reflectivity (Figure 4). He was diagnosed as right eye circumscribed choroidal haemangioma with exudative retinal detachment.

Management options were discussed with the patient. He was given intravitreal anti VEGF *Ranibizumab* and subsequently full fluence verteporfin photodynamic therapy (PDT). At his follow-up visit 6 weeks after verteporfin PDT, his visual acuity improved to 6/9 OD. There was resolution of sub retinal and intra retinal fluid at the fovea as well as serous detachment of the sensory retina (Figure 5) and as evidenced by B-scan ultra-

sonography with the reduction of the tumor height to 2.53mm (Figure 6).

Unfortunately, patient presented 8 months later with deterioration of his right eye vision and his visual acuity was 2/60 OD. There was presence of sub retinal and intra retinal fluid at fovea (Figure 7) with increasing height of choroidal haemangioma to 4.21 mm (Figure 8). He subsequently underwent intravitreal anti VEGF (*Ranibizumab*) prior to the second full fluence verteporfin PDT. At 6 weeks after the second verteporfin PDT, his right vision improved to 6/9 with complete resolution of sub retinal and intra retinal fluid at fovea (Figure 9) and regression of tumor height to 2.45 mm (Figure 10). He was subsequently followed up every 3 months.

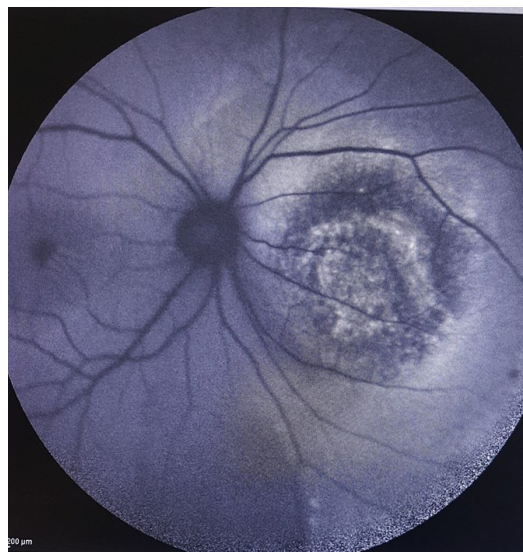


Figure 3: Right fundus: Fundus autofluorescence (FAF) of the choroidal mass showing patchy area of hyper autofluorescence.

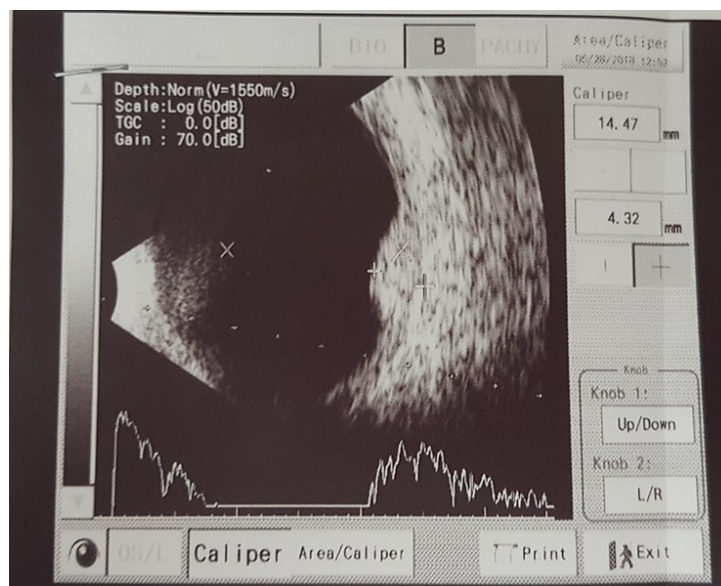


Figure 4: B scan of the right eye: dome shaped mass with high internal reflectivity

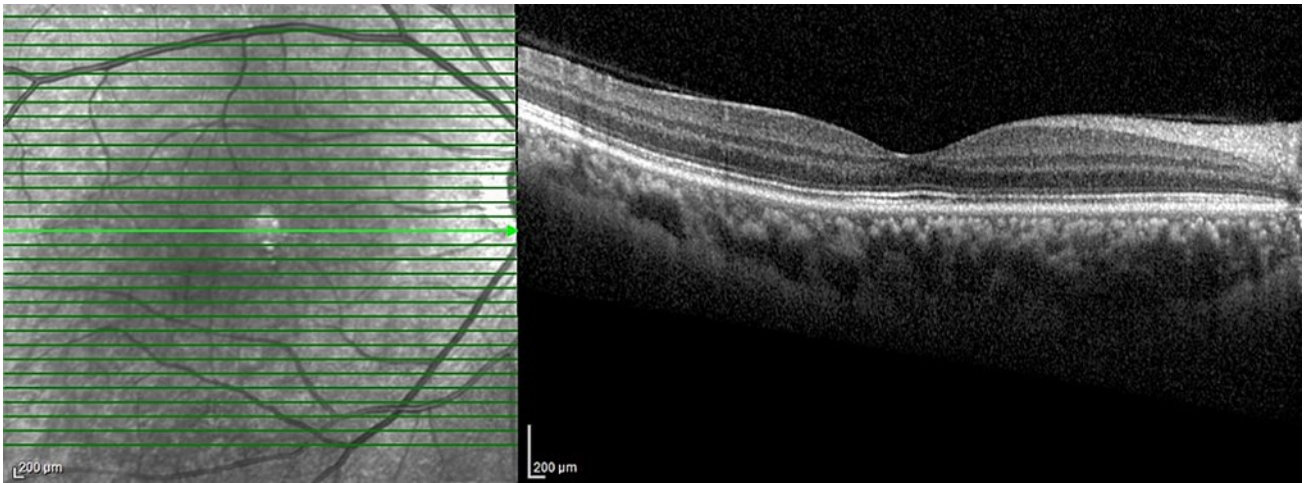


Figure 5: Macular OCT showing resolution of sub retinal and intra retinal fluid.

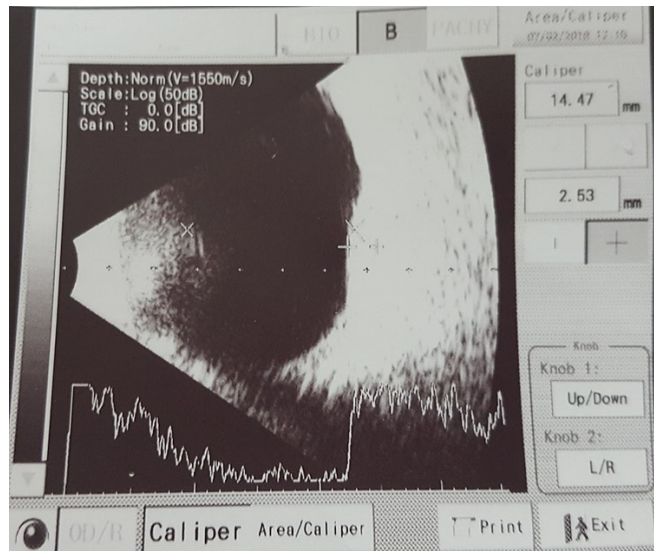


Figure 6: B-scan of the right eye: Reduction in size of the choroidal mass with and resolution of exudative retinal detachment.

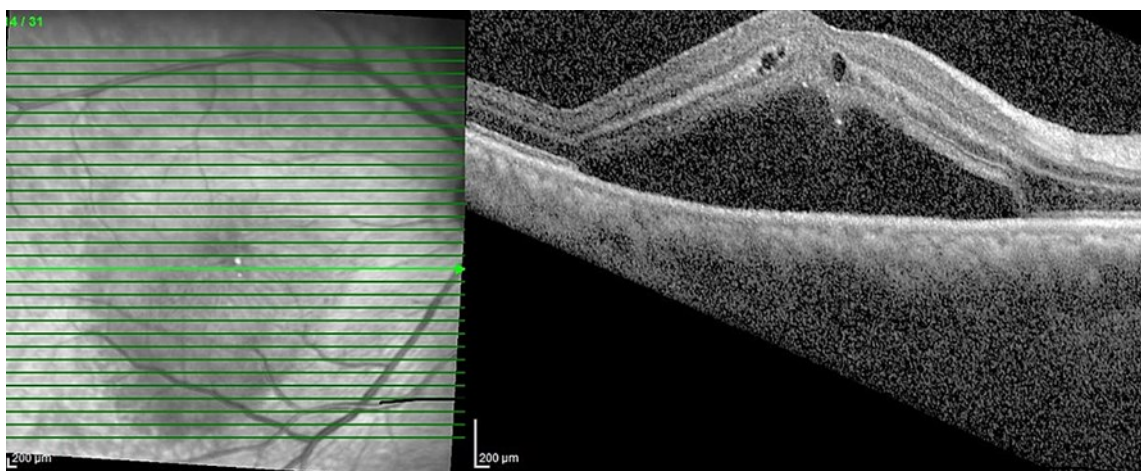


Figure 7: Macular OCT prior to the second verteporfin PDT demonstrating increased sub retinal fluid with overlying small intra retinal fluid.

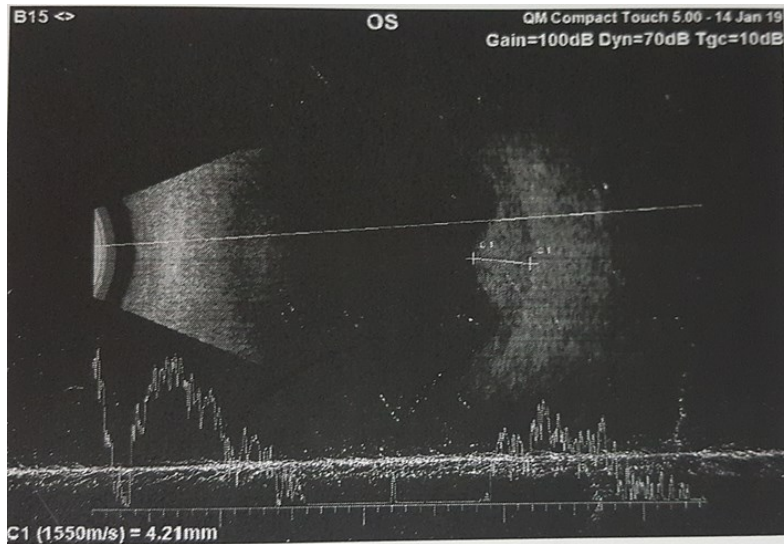


Figure 8: B-scan of the right eye prior to the second verteporfin PDT showing increased choroidal mass thickness

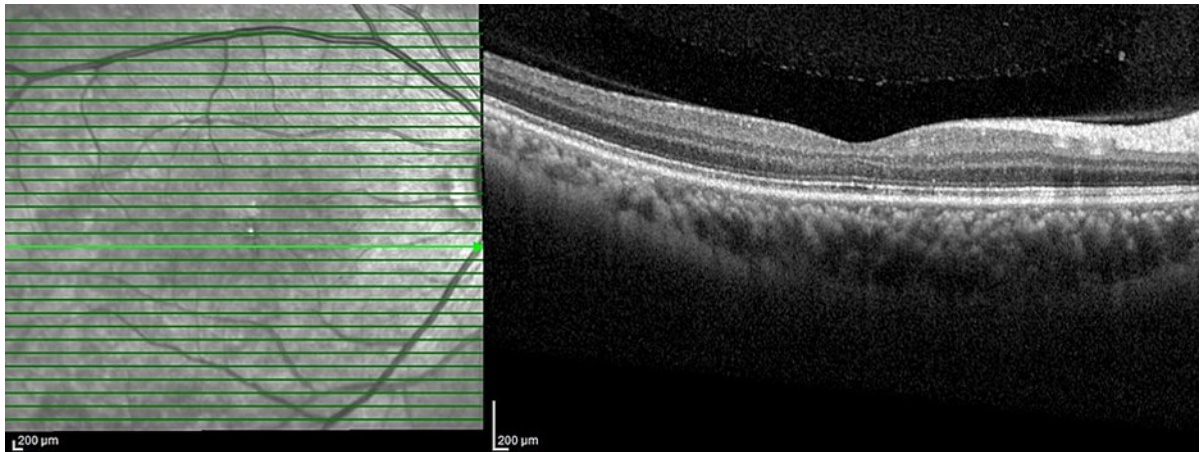


Figure 9: Macula OCT after the second verteporfin PDT showing resolution of the fluid at fovea

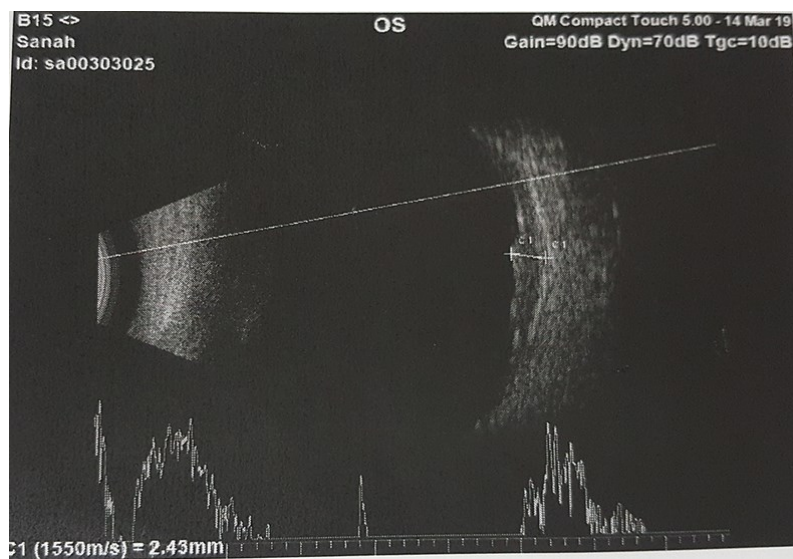


Figure 10: B-scan of the right eye after the second verteporfin PDT showing a decrease in the choroidal mass thickness.

His ocular condition was currently stable with no evidence of recurrent sub retinal fluid or exudative retinal detachment at his follow-up visit 18 months later. The recent B-scan ultrasonography showed the tumor height maintained at 2.64 mm. His vision stabilized at 6/9 OD.

DISCUSSION

Photodynamic therapy (PDT) with verteporfin (Visudyne) is an excellent treatment modality in treating various retinal and choroidal lesions such as choroidal neovascularization in age related macular degeneration, pathological myopia, presumed ocular histoplasmosis syndrome, and even in idiopathic causes cases. Photodynamic therapy selectively occlude the choroidal neovascularization and minimize the damage to the healthy neurosensory retinal layers and Bruch's membrane layer. Currently, PDT has been advocated as one of treatment options for subretinal vascularization and exudative lesion such as choroidal haemangioma [1,4]. Photodynamic therapy is proven a safe, fast and indisputably easily performed outpatient procedure which can be done under topical anaesthesia. The procedure is started with administration of intravenous verteporfin, a photochemical sensitizer. It is then followed by a targeted low power and long duration infrared laser beam application. Laser beam will activate verteporfin and free radicals formation will then occur, which subsequently leads to the closure of the leaking blood vessels and resorption of fluid [2,5].

There are two mechanism of action of PDT in causing intraocular tumor regression. First, the photochemical sensitizer is attached to low density lipoproteins in the tumor cells endothelium and subsequently destroys the tumor cells by cytotoxic activity. Second mechanism is via the promotion of intraluminal photo thrombosis in the vessels supplying the tumor. Finally, the tumor size will regress and resorption of subretinal fluid will occur [2,6].

Excellent outcomes have been reported in several studies with complete tumor regression with rapid resorption of subretinal fluid, and favorable visual outcomes. Barbazetto et al reported successful treatment of choroidal haemangioma with PDT [2]. Singh et al report revealed that verteporfin PDT is a safe modality in the choroidal hemangioma treatment as verteporfin targets a specific tumor destruction location, thus sparing the overlying healthy retina and retinal vasculature will be left unharmed [7].

The advantage of PDT is that it causes regression of the haemangioma through the photochemical effect rather than thermal effect, thus minimizing the damage to the retina and nerve fiber bundles in contrast to the other treatment modalities such as argon photocoagulation or transpupillary thermotherapy (TTT) [8]. This is a very important point to consider especially in cases of tumor abutting the

optic nerve where loss of optic nerve fibers can result in considerable loss of peripheral field.

The successful outcome with complete resolution of subretinal fluid and regression of choroidal hemangioma size in our case suggest that verteporfin PDT may be beneficial and as an option to consider in the treatment of choroidal haemangioma along with the other treatment modalities available. Several published reports also revealed that PDT with verteporfin can be used as a therapeutic option for exudative retinal detachment associated with circumscribed choroidal haemangioma with good visual outcome [2,9].

Barbazetto et al suggested verteporfin PDT was a favorable primary treatment for circumscribed choroidal haemangioma complicated by exudative detachment involving macula. Study by Jurklies et al showed that verteporfin PDT was safe and efficacious for the treatment of subfoveal choroidal haemangioma [9]. The verteporfin applied in both studies were using 6 mg/m² body surface area concentration and light dose of diode laser at 100 J/cm² of 692 nm wavelength. The mean performed treatment sessions was 2.15 (range 1-5) in Jurklies et al study meanwhile in Barbazetto et al administered 2 sessions in 2 isolated cases of circumscribed choroidal haemangioma and retreatment up to 4 sessions in a case of subfoveal choroidal haemangioma with persistent tumor height in order to achieve completely flattened tumour [2,9].

Shields et al reported that the verteporfin PDT usage in the management of choroidal haemangioma significantly resulted in a better visual outcome compared to the era before PDT treatment. The report showed that the mean patients' final visual acuity improved to 20/400 compared to 20/63 in the 458 eyes of circumscribed choroidal haemangioma. Pre-PDT era treatment included argon laser photocoagulation, transpupillary thermotherapy (TTT), plaque radiotherapy, external beam radiotherapy, enucleation and observation. They also noted the difference in size of the tumor regression in the verteporfin PDT treated patients as compared with eyes treated by other treatment modalities, as evidence by the reduced mean tumor thickness of verteporfin PDT treated patients was 2.49 mm as compared with 2.95 mm in patients treated in the pre-PDT era (P < 0.001) [10].

Anti-vascular endothelial growth factor (Anti VEGF) agents have been used in multiple ophthalmic pathologies. Anti VEGF has the ability to reduce vascular permeability and is thus very effective for resolution of sub retinal and intra retinal fluid. Han Kim et al reported the PDT effectiveness and safety with the synergistic response of anti VEGF with repeated PDT, and potential reduction of PDT treatments by adding anti VEGF to the treatment [11]. Sagong et al reported the reduction of subretinal fluid following the use of anti VEGF prior to PDT, and subsequently maximized the effect of PDT [12]. Furthermore, no serious side effects of verteporfin PDT were observed in our case and

other studies [2,8,9]. In comparison, other treatment modalities such as radiation therapy can cause serious side effects. Radiation therapy includes plaque brachytherapy and external beam radiotherapy can result in radiation retinopathy, optic neuropathy, macula ischemia, and subretinal fibrosis. Meanwhile the other treatment option such as laser photocoagulation can result in retinal scarring and retinal pigmented epithelium (RPE) atrophy which may jeopardize the vision due to the side effect of scotoma. Laser photocoagulation is also not a suitable treatment modality for sub foveal lesions. Some reports revealed that the recurrence of sub- retinal fluid was common in this laser group, and up to 40% of patients later required additional treatment [13].

Khetan et al reported the similar visual outcomes between PDT and TTT, although PDT was more favorable in subfoveal lesions due to its safety profile. However, patients in the TTT group required more treatment sessions in contrast to PDT although TTT was a cheaper treatment option compared to these two [8].

CONCLUSION

Intravitreal anti VEGF and verteporfin PDT are effective treatment options to consider while treating sight threatening choroidal haemangioma associated with exudative retinal detachment threatening or involving macula. Intravitreal anti VEGF prior to verteporfin PDT is beneficial to reduce the exudation caused by the tumor and will enhance the efficacy of verteporfin PDT. Photodynamic dynamic treatment is useful in the regression of tumor size, even complete resolution of tumor has been observed in few studies. Tumor recurrence is also rare after verteporfin PDT together with intravitreal anti VEGF. However, this patient will still require lifelong follow up for possible tumor recurrences in the future.

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Case Report

A CASE OF DOUBLE TROUBLE: OCULAR SYPHILIS IN A PATIENT WITH HUMAN IMMUNODEFICIENCY VIRUS INFECTION

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ABSTRACT

Syphilis has always been known as “the great mimicker” as it can have a plethora of clinical presentations. Ocular manifestations occur in the secondary and tertiary stages of syphilis, however it may occur at any stage of the disease. The resurgence of syphilis has resulted in an increased number of cases. Syphilis is an important facilitator of human immunodeficiency virus (HIV) with reported coinfection rates of 50-70 %. The ocular syphilis in patients with HIV co-infection has both diagnostic and management challenges as HIV alters the clinical presentations. We report a case of HIV infection who “defaulted” highly active antiretroviral therapy (HAART) for 1 year due to COVID-19 pandemic. He presented with bilateral blurring of vision secondary to syphilis pan-uveitis.

INTRODUCTION

The incidence of syphilis has increased markedly over the last decade, particularly among men who have sex with men (MSM). Ocular involvement is a potentially devastating clinical manifestation of syphilis. Human immunodeficiency virus (HIV) infection appears to increase the risk of ocular syphilis [1]. Because of the lack of pathognomonic features for ocular syphilis and its ability to occur in both immunocompetent and immunosuppressed individuals, high index of suspicion is required for prompt diagnosis and treatment. Thus MSMs and HIV-infected patients presenting with blurring of vision, ocular syphilis should be highly suspected [2]. We share a case of ocular syphilis in a HIV positive young adult male.

CASE REPORT

A 31-year-old male presented with bilateral acute progressive visual loss worse in the left eye over the past 2 weeks. There was no associated pain or redness. He had intermittent floaters with no flashes a few months prior. He reported to only being able to make out shadows in the left eye and blurry figures in the right eye. He had on and off fever with no chills or rigors for the past 2 to 3 months and had been taking

over the counter medications for the symptoms.

He had no headache, photophobia, neck stiffness, diplopia, nausea, vomiting, or limbs weakness. He had no cough or chest pain. He denied history of penile ulcer or discharge or rashes, however he had mouth ulcer a week prior which had healed. There was no history of loss of weight or appetite. He had used intravenous methamphetamines for the past 10 years and was undergoing rehab at a rehab center at the time of presentation, and was free of the drug for 8 months. He denied using other illicit drugs or alcohol. He was however an active smoker. He also admitted to having unprotected sex with several men (MSM) in the past 10 years, although he had been in a monogamous relationship for the last 1 year.

He is HIV positive, diagnosed in December 2019, just prior the COVID-19 pandemic. Previously he was being followed-up at a clinic in Selangor and was receiving highly active antiretroviral therapy (HAART) for one year. However his follow and treatment was interrupted by the pandemic and he was out of HAART for the last one year.

On physical examination, his vital signs were normal. Right best corrected visual acuity (BCVA) was 6/24,

and only able to perceive light in the left eye. The right anterior segment was unremarkable. The left anterior segment revealed keratic precipitates, cells of 2+, and mild flare (Figure 1). In both eyes, there was no evidence of posterior synechiae and the pupils were round and reactive. There was left relative afferent pupillary defect. The fundus view was hazy due to severe vitritis, visualisation of retina or any retina/chorioretinal detail was poor. There were vague views of both discs which appeared hyperaemic (Figure 2A, 2B).

Laboratory investigation revealed mild increase in total WBC, $12.02 \times 10^9/\mu\text{L}$. HIV Ag/AB (CIMIA) was reactive with Particle Agglutination (PA) was positive for HIV-1. The CD4+ cell count was 428 cells/mm³, HIV viral load 40111 copies/mm³, CD4/CD8 ratio was 0.27. A rapid plasma reagin (RPR) for syphilis screening was

reactive with a titer of 1:512. Venereal disease research laboratory (VDRL) was reactive with titre 1:512, Treponema Pallidum Agglutination Test TPPA/TPHA was also Positive. Serology test done for Toxoplasma and Hepatitis B and C were negative. Tracheal aspirate was negative for AFB. Mantoux test showed no induration.

Cerebrospinal fluid (CSF) analysis demonstrated 0 red blood cells/ μL , 3.6 white blood cells/ μL , 3.4 mg/dL glucose, and 301 mg/dL protein. No microorganisms were seen by Gram stain. The CSF VDRL and bacterial culture were negative. Serum and CSF cryptococcal antigen tests were also negative. Chest X-ray showed no evidence of pulmonary tuberculosis. Brain CT did not show any evidence suggestive of neurosyphilis. A diagnosis of right posterior uveitis and left panuveitis secondary to syphilis infection with HIV co-infection was made.

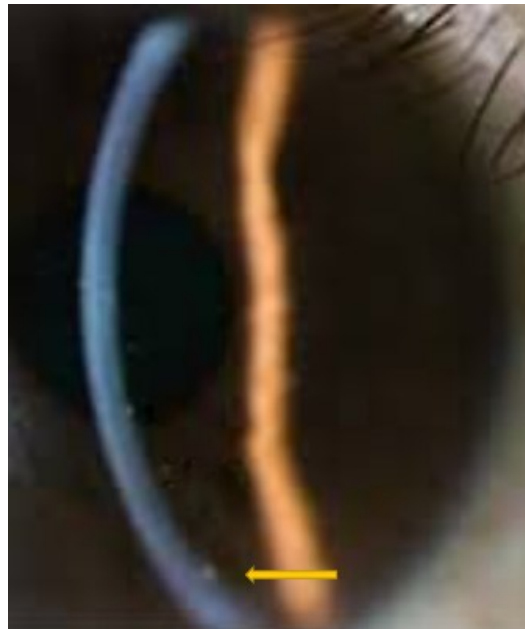


Figure 1: Left anterior uveitis with keratic precipitates (KPs)

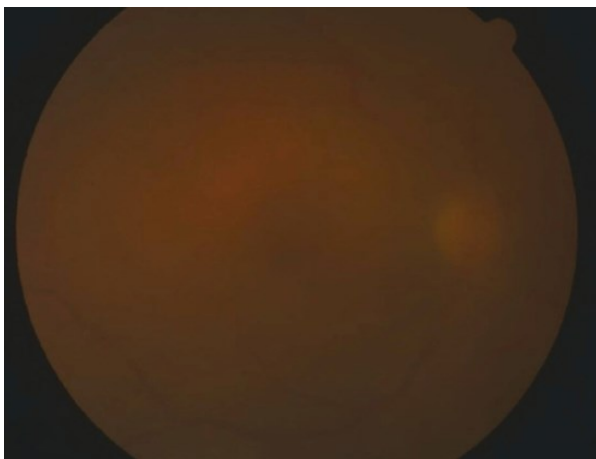


Figure 2A: Right fundus: Hazy view

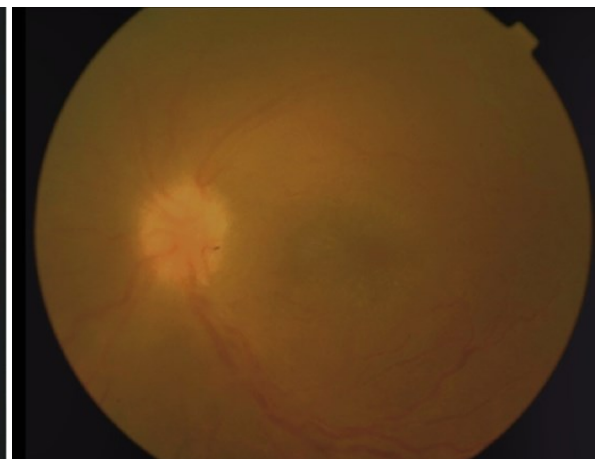


Figure 2B : Left Fundus: Hazy view due to severe vitritis with vague appearance of swollen and hyperaemic disc.

The patient was informed of the diagnosis of syphilis infection with ocular involvement. He was immediately started on Procaine penicillin 2.4 million units IM once daily plus Probenecid 500mg 4 times per day, both for 14 days. He also received gutt Dexamethasone 0.1% 2-hourly and gutt Atropin% TDS to both eyes. It was recommended that his partner undergoes evaluation for HIV and syphilis. Patient voluntarily agree to continue his HAART treatment and follow up. At an ophthalmology clinic visit two weeks later, the patient's right BCVA improved to 6/12, however his left vision remained perception to light most probably related to optic nerve dysfunction.

DISCUSSION

Syphilis is a sexually transmitted infection caused by a spirochete bacterium, *Treponema pallidum*. *Treponema pallidum* has the ability to infect multiple organs leading to multiple clinical manifestations with devastating consequences if left untreated [1].

The incidence of primary and secondary syphilis has increased markedly over the last decade, from 2.1 per 100,000 people in 2000 to 4.5 per 100,000 in 2011 [3,4]. The epidemic has disproportionately affected the MSM population, while rates in women and men who have sex with women have steadily decreased. The Centers for Disease Control and Prevention (CDC) estimated that, in 2011, 72% of all primary and secondary syphilis cases occurred in MSM, which increased from just 7% in 2000 [5,6]. The epidemic in this population, including in Malaysia, is exacerbated by high rates of coexisting HIV infection and risky sexual and drug behaviours [6,7].

In a study of MSM presenting to sexually transmitted disease clinics, a significantly higher proportion of HIV-infected individuals had coexisting primary or secondary syphilis compared with those who were HIV-negative (10.1% versus 2.6%) [6]. Some studies suggest that syphilis facilitates HIV transmission by increasing expression of its CCR5 receptors or inducing expression of the HIV-1 gene in human monocytes [8]. The natural history of syphilis leading to unusual and more aggressive clinical manifestations as well as earlier neurologic involvement is altered by HIV infection [9].

Panuveitis is the most common ocular syphilis manifestation. It can occur at any stage of infection and may be the only clinical manifestation of infection as seen in our case [10]. Clinically, patients may present with eye pain and reduced vision, central scotomas, and unilateral or bilateral [11]. As syphilis comprises less than 1-2% of all cases of uveitis, delays in diagnosis are common. The diagnosis is often not considered until a patient has failed to respond to corticosteroid therapy [9].

Ocular syphilis in the setting of untreated HIV is more frequently bilateral as illustrated by our case,

as his HAART therapy was interrupted by the pandemic for almost a year [12]. Ocular syphilis however does not require immunosuppression to occur; it is therefore important to consider the diagnosis in HIV-infected patients with visual complaints regardless of CD4+ cell count.

When ocular syphilis is suspected, lumbar puncture should be performed with CSF analysis in addition to serum serologic tests. Lumbar puncture also serves to confirm the diagnosis of neurosyphilis [12]. A positive CSF VDRL is highly specific for neurosyphilis, although lacks sensitivity [6]. CSF examination may also reveal a lymphocytic pleocytosis or elevated protein; however, such findings may also be seen in HIV-infected patients without syphilis. Given the potential reduced sensitivity of serologic tests for syphilis in HIV-infected patients, any clinical suspicion for syphilis not supported by serologic findings warrants an attempt to visualize spirochetes microscopically [8].

Therapy for ocular syphilis is the same as for other forms of neurosyphilis. Current Guideline, first-line therapy is intravenous aqueous crystalline penicillin G 18-24 MU per day administered as 3 to 4 MU every 4 hours or continuous infusion for 10- 14 days. Alternatively, Procaine Penicillin 2.4 MU administered intramuscularly once daily plus Probenecid 500mg orally 4 times per day, both for 10-14 days [10,13]. Treatment failure in cases of ocular syphilis may occur. Therefore, patient was counselled regarding the importance of compliance to treatment and follow up as timely diagnosis and treatment are essential for good outcomes.

CONCLUSION

Re-emergence of syphilis has resulted in the rise of ocular syphilis. A high index of suspicion is needed to diagnose and treat these cases. Panuveitis is the most common ocular manifestation. Ocular syphilis is treated as neurosyphilis even when there are no CSF and CT Brain evidence of the infection. It is recognised that MSMs are at a higher risk for syphilis and thus more prone to have ocular syphilis.

CONFLICT OF INTEREST

The authors of this paper declare that they have no financial or nonfinancial conflict of interests.

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Case Report

UNILATERAL HERPES ZOSTER UVEITIS FOLLOWING CATARACT SURGERY ON CONTRALATERAL EYE

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ABSTRACT

We reported a case of unilateral herpes zoster (HZ) uveitis after cataract surgery on contralateral eye. A 73-year-old gentleman with a history of bilateral herpes zoster (HZ) ophthalmicus 30 years prior underwent an uneventful left eye cataract surgery. Preoperatively, there was no clinical evidence of recurrent herpetic eye infection in both eyes. Postoperatively he was covered with oral aciclovir prophylactic dose and routine post-op topical steroid and antibiotic. Seven weeks after the left cataract surgery, he presented with right eye acute redness and blurred vision. His right vision dropped to 6/21 with acute anterior uveitis and reduced corneal sensation. He was diagnosed with right HZ anterior uveitis which was later supported by positive PCR viral study from his aqueous humour. He responded well to topical steroid and oral aciclovir (800mg 5x/day) on a ten-week tapering dose. We postulated that the patient developed bilateral HZ uveitis due to surgical stress, but the inflammation of the operated eye was suppressed by topical steroid, which was meant to reduce post-operative inflammation. Another hypothesis for contralateral infection (Von Szily theory) is that the activated herpesvirus from the operated eye may travel via neural pathway to the opposite nerve. We can conclude that despite perioperative prophylaxis of oral aciclovir and long quiescent period, reactivation of HZ infection can happen in either the operated or fellow eye after cataract surgery. Timely treatment with topical steroid and oral aciclovir shall resolve the reactivation.

INTRODUCTION

Herpes zoster (HZ) disease is a reactivation of dormant varicella zoster virus (VZV) after a primary infection. Symptomatic VZV reactivation usually causes unilateral localised vesicular rash according to the dermatomal distribution. The disease involves the ophthalmic division of trigeminal nerve that may manifest as HZ ophthalmicus, conjunctivitis, keratitis, anterior uveitis, iridocyclitis and retinitis. Recurrence is one of the common complications in HZ eye diseases with unclear mechanism. Ocular surgery is one of the risk factors for the development of recurrent HZ eye diseases. Here we presented a case of Herpes Zoster uveitis after an uneventful cataract surgery in the contralateral eye in a 73-years-old gentleman.

CASE PRESENTATION

A 73 year-old gentleman presented with three days history of right eye redness, progressive blurring of vision and eye pain. He had recent left uneventful cataract surgery seven weeks prior with good refractive result. Besides, he had a background

history of treated bilateral herpes zoster disease involving face and trunk with herpes zoster ophthalmicus (HZO) 30 years ago, which recovered well without any significant sequelae or recurrence.

Prior to his left cataract surgery, there was no clinical evidence of previous or recurrent herpetic eye infection noted. In view of his previous history of HZO, a prophylactic course of oral aciclovir was started three days prior surgery. The surgery was uneventful and postoperatively the oral Aciclovir was continued for another one week along with routine topical Ciprofloxacin 0.3% and topical Dexamethasone 0.1%. Upon follow up at the first and fourth weeks of the postoperative period, the operated eye showed good recovery.

However, seven weeks after the left eye surgery, the patient presented with new complaints of redness, pain and blurring of vision of five days on the contralateral right eye. Examination of the right eye showed diminished vision from the baseline of 6/6 to 6/21. The cornea sensation was diminished compared to the left eye. The cornea was mildly

oedematous with pigmented keratic precipitates. There was presence of sectoral iris atrophy from 10 to 11 clock hour, mid-dilated pupil and grade 3+ anterior chamber cells (Figure 1A & 1B). No obvious fibrin, posterior synechiae, hypopyon or iris nodule seen. The vitreous was clear without inflammatory cells while the retina and choroid were normal. Otherwise, the left eye which was the post-operative eye showed unremarkable findings (Figure 2). The intraocular pressure was normal bilaterally. Skin examination was normal without obvious skin rash observed on the nose, face or body. The history of HZO and the current presentation of acute anterior uveitis, prompted us to investigate the cause of uveitis with routine uveitic work-up and virology study of aqueous humour of the right eye. Aqueous humour sample was acquired via anterior chamber tapping and detected VZV virus. All other systemic uveitic workup were normal.

The patient was treated as right HZ anterior uveitis with oral aciclovir 800mg 5 times per day for 10 weeks in tapering dose along with topical Dexamethasone 0.1%. Upon follow up, the patient responded well to treatment as evidenced by improvement of visual acuity to 6/9, clear cornea, resolved anterior chamber cells and resolved keratic precipitates (Figure 3).

DISCUSSION

Varicella zoster virus is a human herpesvirus that causes varicella and herpes zoster. Varicella is a result of primary infection, commonly in childhood. The VZV then established latency in sensory dorsal root ganglia and its reactivation leads to herpes zoster which is likely in immunosuppressed patients, malignancy, stress and older age group

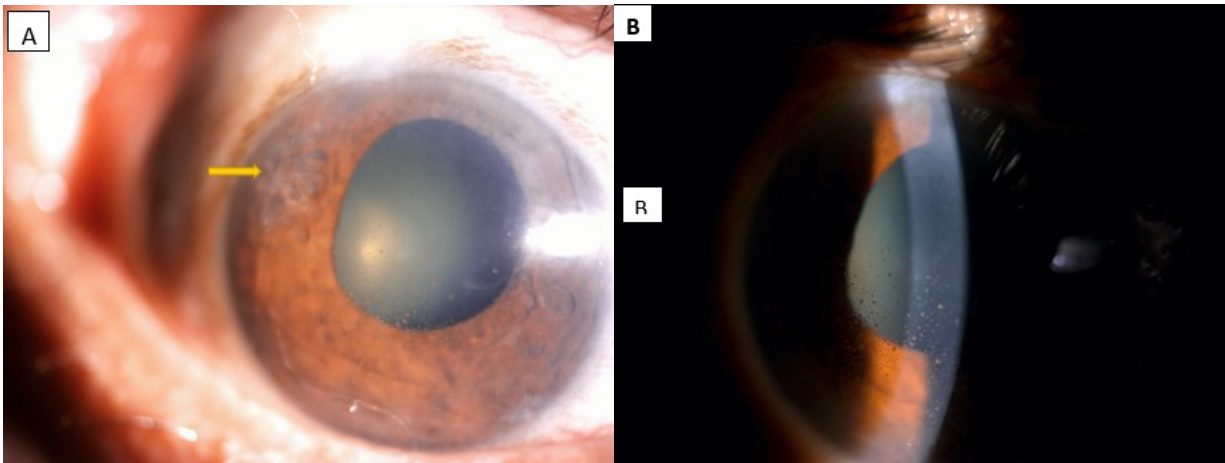


Figure 1: A) Right anterior segment showing cornea mildly oedematous with pigmented keratic precipitates and sectoral iris atrophy (yellow arrow), mid-dilated pupil and grade 3+ anterior chamber cells

Figure 1: B) Right anterior segment slit-lamp bio-microscopy showing pigmented keratic precipitates

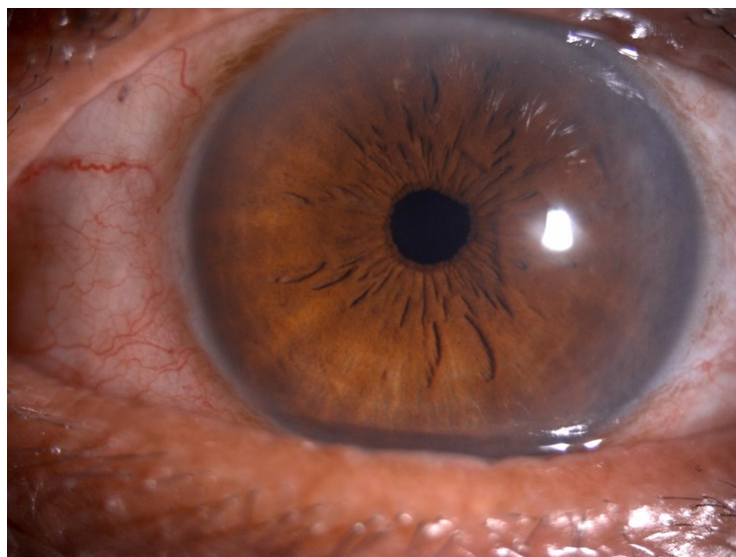


Figure 2: The left eye which was the post-operative eye showed no evidence of anterior uveitis



Figure 3: Right anterior segment showing clear cornea, resolved anterior chamber cells and resolved keratic precipitates

people. Symptomatic VZV reactivation usually manifested unilaterally [1]. Bilateral involvements may present as well but were rarely reported. Herpes Zoster eye diseases present with different manifestations including HZO, conjunctivitis, keratitis and uveitis. The diseases may manifest into chronic or recurrent episodes of inflammation in different parts of the ocular tissues. One of the predisposing factor for recurrence is cataract surgery, as supported by previous studies. Lucy et al reported that nearly 40% recurrence of HZ eye infection post-cataract surgery occur commonly within 2 years after the surgery [1]. Meanwhile, He et al reported 25% recurrence post-cataract surgery and they also observed higher rate of complications in patient with past HZ infection which includes persistent epithelial defect, cornea neovascularization and cystoid macular oedema [2]. However, these events of recurrence were described to occur in the same eye, in contrast with contralateral eye as presented in this case.

It is a common practice to give prophylaxis oral aciclovir perioperatively for intraocular surgery to reduce the risk of reactivation of HZ infection, based on a questionnaire conducted at The United Kingdom in 2013. However there is no clear consensus for this practice in cataract surgery [3]. The evidence that prophylaxis with aciclovir prevent recurrence of herpetic virus infection was adopted from Herpetic Eye Disease Study (HEDS). This study showed that there was 45% reduction in recurrence of ocular herpes simplex virus (HSV) infection when aciclovir prophylaxis was given over one year period compared with placebo [4]. In this case, prophylaxis aciclovir was given perioperatively. However, despite the prophylaxis and long quiescent period of past HZ infection, the HZ anterior uveitis occurred. It could be explained by

the hypothesis that the reactivation of Herpesviruses is also determined partially by the virulence of the original colonizing strain and the host immunity, apart from systemic stress, immunosuppression, old age, or surgically induced local trauma [5].

Another focus of discussion in this case is the rarity of contralateral HZ reactivation after the fellow eye ocular surgery. Since the patient was given topical dexamethasone postoperatively on the left eye, one may hypothesise that the inflammation on the left eye (in case if it was bilateral HZ reactivation) was suppressed by topical steroid which was initially intended to suppress the postoperative inflammation. Although steroid is known to cause reactivation of herpesviruses, it acts in a dose-dependent manner [6]. Anti-inflammatory effect is seen mostly with lower doses and short duration while immunosuppressive effect seen at vice versa. Even though so, bilateral HZ itself is a rare and atypical presentation. Our knowledge regarding this is still limited. Some authors proposed that the mechanism of bilateral infection is due to high viral load infecting multiple dorsal sensory ganglia on bilateral side, which then lead to bilateral disease [7, 8].

Another possible hypothesis is based on the Von Szily model, which explained that local stress of the operated eye causes reactivation of the virus in the same eye's sensory ganglion causing the virus to spread along parasympathetic fibres of oculomotor nerve to the ipsilateral ciliary ganglion, then to Edinger Westphal nucleus, to suprachiasmatic area of hypothalamus and crossing to contralateral optic tract, optic nerve and retina.[9] This model was explained for herpes simplex virus-1, but has been adapted for HZO which is called Von Szily reaction

(VSR). However necrotising changes in retina has to take place to fit in the VSR's criteria. One example was reported by Nakanishi et al, which is a case of contralateral acute retinal necrosis (ARN) after HZO the other eye [10].

In this case, the patient had a bilateral HZO in the past without evidence of previous intraocular herpetic infection like keratitis or uveitis. We authors would like to entertain another possibility that the patient developed recurrent bilateral HZO this time after the surgical stress, but without any dermatomal rash. Salowi et al reported a case of left keratouveitis following an HZO on the right eye, similarly postulated to be bilateral but with insufficient dermal findings on the left side [11]. Another similar occurrence of contralateral eye involvement was reported by Walland et al, which is a case of presumed ophthalmic zoster after 1 day of contralateral cataract extraction, with the development of vesicular rashes on the forehead. They concluded that either the disease is bilateral, or contralateral HZO with extensive erythema which poses a challenge in the diagnosis [12].

CONCLUSION

In conclusion, despite perioperative prophylaxis of oral aciclovir and a long quiescence period from the previous infection, reactivation of HZ infection can still occur in either the operated or fellow eye after cataract surgery. Even though there is likelihood for diagnostic challenge, timely treatment with topical steroid and oral aciclovir shall resolve the reactivation.

CONFLICT OF INTEREST

The author(s) declare no potential conflicts of interest concerning the research, authorship, and publication of this article. This case has been presented as e-poster in Asian Pacific Vitreo-Retinal Surgery (APVRS) Scientific Meeting 2021.

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