

Zika on Board

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The Olympics and Paralympic games bring joy to millions of people worldwide. This year it was held in Rio de Janeiro, Brazil amidst the Zika virus epidemic. On 1 February 2016, six months leading to the Olympics, the excitement was dampened by the World Health Organization declaration of the unprecedented vector-borne Zika virus (ZIKV) infection as a public health emergency of international concern [1]. At that point in time, people in Malaysia also felt the heat but had the consolation that the epidemic occurred across the Atlantic on the other side of the world. On 27 August 2016, Singapore reported the first local confirmed case of ZIKV infection in the city-state [2]. It was only a matter of time that Malaysia reported its first confirmed case of ZIKV infection on 2 September 2016 [3]. A 58-year old woman from Klang, Selangor was diagnosed as the first ZIKV case, who had earlier visited her daughter in Singapore who was infected by the ZIKV. As of 22 September 2016, the number of confirmed ZIKV cases in Malaysia has mounted to six with both Polynesia and Micronesia strains [4]. The occurrence of the disease in our continent brings to light how rapidly globalization and free movement of population across geographical borders can accelerate the arbovirus threat across the globe.

The ZIKV is spread through the bite of infected female *Aedes* mosquitoes and evidence has shown it can also spread via sexual and blood transmission [5]. Most of the cases are asymptomatic or subclinical while the symptomatic cases are self-limiting. Other manifestations include neurological (Guillain-Barré syndrome and meningoencephalitis) and autoimmune (thrombocytopenic purpura and leukopenia) complications. More alarming is the association of the virus with infants born with microcephaly as a result of pregnant mothers infected

with ZIKV with the risk of microcephaly ranges between 1-13% [6, 7], though the direct causal relationship is still under investigation.

In line with the international response, Malaysia has intensified the surveillance and management activities to control its ZIKV epidemic. These include clinical surveillance, laboratory surveillance, microcephaly and Guillain-Barre Syndrome case detection as well as preparedness and response at all ports of entry [8]. The public health delivery system in Malaysia has improved tremendously over the years following lessons learned from the emerging and re-emerging infectious diseases that affected the country over the recent years. Apart from those commendable measures; in light of this ZIKV outbreak, there are looming questions even though may appear elementary are nevertheless pertinent which the healthcare fraternity should address. Where do we go from here? What more do we need to know and do to help us manage and control this outbreak more efficiently and effectively? These questions would certainly pose a challenge to our public health especially when this arbovirus shares the same transmission vector with dengue and chikungunya i.e., *Aedes* mosquito where the authorities in Malaysia are still struggling to achieve a satisfactory control level in the country.

What shall we do? We need a paradigm shift. We need to look at the re-emergence of ZIKV in a bigger perspective and manage it accordingly. Thus, instead of reacting merely to the notified ZIKV cases, we need to start strategizing how the transmission dynamics of the arbovirus family can be altered; this possibly means to look out of the box for the solutions. The conventional measures for prevention and control should also be complemented with two other elements

which are often neglected and underestimated in most outbreak response i.e., effective communication and social mobilization [9]. We must actively engage in communication with the public to hasten the containment by using all available forms of social medium. With tons of information about the virus in the media, the message should emphasize more on health education; empowering community on the case reports, transmission routes and infection complications rather than general statements on impact and world reaction towards ZIKV [10]. Only then social mobilization, which is commonly underutilized, may help mitigate the social and economic impact during an outbreak. An informed public understands the limitation and the need for the community. Only then we will appreciate the ripple effects - they will bring the community on board, educate the community to actively participate in the outbreak management, and share the responsibility as well as the outcome. Even when the community is faced with great anxiety, an informed public would be able to understand and support any move or decision made by the authorities concerned.

Of late, the controversy which surrounded ZIKV in Malaysia involved the ethical issue in dealing with termination of pregnancy in women with possible ZIKV-related fetal brain abnormalities. This was following a statement made by the Mufti of the Federal Territory, saying that Muslim women could abort their pregnancies if they were infected by the Zika virus to avoid the adverse effect on the lives of their families or the baby itself [11]. In Malaysia, the current law does not provide for abortion for pregnant mothers infected with Zika unless the pregnancy poses a threat to the mother's life [12]. The recent Centres for Disease Control guideline does not include pregnancy termination as an option in managing suspected or confirmed Zika infection. It advocates monitoring the pregnancy with serial fetal ultrasounds in suspected or inconclusive cases and retest for ZIKV when ultrasound suggests abnormalities consistent with Zika infection and fall short in mentioning the alternative path of termination of pregnancy [13]. On the other hand, World Health Organization guideline mentions subtly on the discontinuation of pregnancy as a possible next step in the management of pregnancies with the likelihood of foetal brain abnormalities and states that

women who wish to discontinue their pregnancy should receive accurate information about their options to the full extent of the law [14]. The failure to include guidelines on the option of safe, legal termination of pregnancy in Zika-response strategies is not only an issue of reproductive rights but also an issue of reproductive justice [15]. At the time of writing, it is learned that the Ministry of Health of Malaysia will hold a discussion on the matter with the National Fatwa Council regarding termination of pregnancy for women infected by the Zika virus in order to reach a consensus. Irrespective of the outcome of the *fatwa*, we are in the opinion that whether a woman who wishes to carry her pregnancy to term or discontinue the pregnancy should be offered appropriate counselling so that she, together with her partner, will be able to make a fully informed choice on the next step of action.

Despite being a re-emerging disease, there is still much evidence required to effectively manage and control the ZIKV outbreak. The disease behaviour remains dynamic, and a concerted effort by the health authorities and policy makers in implementing the appropriate dynamic alignment to meet the challenges is imperative. It also requires heightened public awareness of personal responsibility which is of paramount importance. The public health preventive strategies remain the cornerstone in the control of this mosquito-borne disease.

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Herd Immunity or Heard Not of Immunity?

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INTRODUCTION

The Lancet published this early report by Andrew Wakefield et al on February 28th, 1998; “12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain.... Onset of behavioural symptoms was associated, by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children” [1].

This article flipped the concrete evidence-based success story of vaccination into an emotionally charged and debatable topic of the century. It was only after a decade of much larger studies which failed to replicate their findings that it became evident that there was no association between Measles, Mumps and Rubella (MMR) vaccination and autism. While it is well known that scientific investigations can be wrong but what is unacceptable here is the fraudulent research practice, in this case, the presentation of wrong data, and the lead author’s overwhelming undeclared conflict of interest. The aftermath could not be more devastating, Lancet withdrew the paper fully and the loss of his license to practice medicine in the UK in 2010.

THE WIDER IMPLICATION

The MMR-Autism link saga to the medical world meant that more research, time and money were poured to refute the study and also to expose the fraud but the repercussions however were not only confined to the medical profession. The greatest damage was the appalling tangential increase in vaccine refusal among parents worldwide which fuelled the measles outbreak

across the United Kingdom (UK), United States and Canada in the year 2008 and 2009. UK for example, saw a drop in vaccination rates from 87.4 percent to 79.9 percent in the year 2000-01 and 2003-04 respectively and not surprisingly, a dramatic increase in measles cases in the UK in the year 2007-08, which was equal to the combined total measles notifications for the past decade [2].

As the news coverage on the controversy intensified, and coupled with advancement of technology in the social media network, the public perception on vaccination has suddenly changed, the most successful health revolution in the 20th century is now at stake. Seemingly increasing public distrust and confusion over the safety of vaccination were echoed and mischievously elaborated geographically, reaching out to most of the third world countries including Malaysia causing the dreaded domino effect of declining immunisation rates in many countries including our own.

THE BLIGHT ON OUR SUCCESS

We began our free national immunisation programme for Diphtheria, Pertussis and Tetanus in 1958, the vaccination for Tuberculosis, Polio and Measles were gradually added into the immunization schedule between the years 1960 to 1980s. Malaysia has done very well since, based on the latest Millenium Development Goal (MDG) report in 2015, we have reached almost full coverage for one-year-old intake of the Measles, Mumps and Rubella (MMR) vaccine. The rate of intake of this vaccine was initially 70.1% in 1990, with massive improvement to 94.3% (2008) and 95.2% in 2013 [19], validated by a recent study in 2016 from a rural clinic in Sabah at 98.5% [29].

Lurking behind this success however is the rising trend of parents refusing to vaccinate their children. We now notice an increase in the number of vaccine refusal from 470 cases in 2013 to 648 in the following year and 1292 in 2015. Among the states in Malaysia, Kedah state recorded the highest number of vaccine rejection cases with steady rise from 239 cases in 2014 to 318 cases a year later.

Why is this happening? Data from the state of Kedah health statistics suggested that the major cause for the refusal was the concern regarding the vaccine contents and their religious permissibility (*halal*). This is supported by a cross-sectional study in 2013 done in Perak that showed the main reasons for parental immunisation refusal were preference to alternative treatment (75%), assumption that vaccines have no effect (37.5%) and apprehension on the vaccine contents (25%), other reasons included not being informed regarding vaccination from health practitioners, information from family members and media, religious influence, personal belief and long waiting time in the clinic [18]. In this study the refusal rate was 8 per 10,000 children per year and immunisation defaulter rate was 30 in 10,000 children per year. Vaccine refusal could also be caused by deferral which could be due to either ill infants or parents missing the schedule or appointments [17].

The number of vaccine preventable diseases has also showed steady increment for the past few years, in tandem with the decrement of immunisation rates. Measles cases in Malaysia has quadrupled from 195 cases in 2013 (6.6 cases per million population) to 794 cases up till September 2016 (34.7 per million population). This is certainly a blight on our success and it pushes us off track from the MDG target of global measles elimination by 2015.

APPREHENSION OF VACCINE CONTENT

Certain chemicals are present as ingredients in the vaccines to ensure safety and effectiveness of the final products. These substances naturally exist in the environment and only become toxic if they reach or exceed a certain threshold.

Among chemicals used in vaccine preparation include thimerosal (mercury), which is an organic compound containing ethylmercury. Its primary role is

to prevent bacterial and fungal contamination and has been used as vaccine preservative since 1930's [30].

Virtually all vaccines are now mercury-free; and even if present its potential harmful effect is almost negligible as the chemical content in the vaccine is extremely low.

Aluminium is another compound used in vaccine preparation. It acts as an adjuvant to enhance the immune response to the vaccine antigen [30]. Exposure to aluminium from vaccines is well below the current minimum risk level of 2.0 mg/kg per day [30]. Interestingly, the content of aluminium is higher in breast milk compared to vaccines [31] as well in certain medications such as antacids [31].

However, another reason of apprehension that is being used as bone of contention by anti-vaccination campaigners is the permissibility (*halal*) of the vaccine contents.

THE ISLAMIC VIEWPOINT

The objectives of Islamic law (*maqasid shariah*) are the preservation of five fundamental elements in a person; religion, life, lineage, intellect and property. Correspondingly, the maxim of Islamic law (*Qawaid al Fiqh*) adheres to the principle of avoiding harm, thus taking steps towards maintenance of health and this includes vaccine administrations to prevent serious and life-threatening illnesses among children are in accordance to these principles.

As stated earlier, the main religious consternation regarding vaccination among Muslims parents revolves around the issue of permissibility (*halal*) of the vaccine contents. In this regard, many scholars in Islamic Jurisprudence have in fact issued clear ruling (fatwa) regarding the permissibility of most vaccines used as part of national immunisation programmes worldwide, including Bacillus Calmette-Guerin (BCG), Hepatitis B, Diphtheria, Tetanus, Pertussis and Rubella vaccines [20-24].

Differences of opinion however does exist among the scholars regarding vaccines that have substances derived from pork, which are forbidden (*haram*) in Islam, being used during their manufacturing process. As an example, for the production of oral polio and rotavirus vaccines, trypsin enzyme of porcine origin is used during production to

dissociate the virus from cultured cells, but it is later removed through the process of microfiltration. The use of this substance however has led the Malaysian Fatwa Committee National Council of Islamic Religious Affairs in 2008 to issue a ruling that the use of Rotavirus vaccine is forbidden, other religious considerations by the council include the availability of an alternative trypsin source and the absence of an urgent state (*darurah*) for its use. But other opinion does exist which can be considered to be more in tune with the spirit of Islam that discourages complexity in performance of religious duties, the ruling from the European Council of Fatwa & Research in 2003 led by Yusuf al-Qardhawi. He concluded that the use of oral polio vaccine was permissible based on the following reasons; the negligible amount of trypsin used in the vaccine preparation, the fact that trypsin is filtered and thus not detectable in the final vaccine, and finally what is forbidden (*haram*) is made permissible in the state of necessity. As a result of this ruling, many Muslim countries such as Saudi Arabia, Bahrain, Yemen, Qatar, Iraq, Morocco, Sudan and Pakistan [20] have incorporated Rotavirus vaccine that uses porcine trypsin in their national immunisation programmes.

THE WAY FORWARD

This requires efforts by all relevant stakeholders, government and non-government, to reverse the trend we see locally as well as worldwide. One great stride forward was the WHO approved Global Vaccine Action Plan, a framework to prevent millions of deaths by 2020 through more equitable access to existing vaccines for all peoples in all communities [30]. The aims here are to strengthen routine immunisation to meet vaccination coverage target, accelerate control of vaccine-preventable diseases as well spur research for development of new and improved vaccines [30].

Healthcare providers are undoubtedly the front liners in educating the parents and clarifying any doubts which may prohibit vaccine adherence among them. We know that counseling parents with clear information about the risks and benefits of vaccines, and taking advantage of clinical consultation visits for explanation of immunisation are among the most effective strategies suggested to achieve this [31]. In Malaysia, forums and educational talks to the general

public are actively organised by the Malaysian Ministry of Health and other non-governmental organisations to reach for these parents at all levels and localities. Besides that, social media is also very effective and is a borderless educational platform to reach the community.

Finally, the history of vaccination had been a great success story of the last century, Measles vaccination alone has been estimated to have helped save 17.1 million lives in the year 2000 [27]. Lack of knowledge on the issue compounded with contradictory information in social media have led to the disruption of herd immunity that previously had been the gate keeper in protecting our children from vaccine-preventable disease. We must do all we can to ensure it remains a success.

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Medical Education in Malaysia: The Evolving Curriculum (Part 1)

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THE TRADITIONAL CURRICULUM

Medical education in Malaysia has evolved in the past 50 years since independence. This paper highlights the various stages of curriculum development that were made to meet the needs of the developing country.

Malaya was under British rule between the 18th and the 20th Centuries. British Malaya as it was then known comprised of the Peninsular States and the Straits Settlements of Penang, Malacca and Singapore. Western medicine was introduced to the then Malaya in Singapore, with the setting up of the first medical school in 1907. It was called the Government Medical School and later became known as the King George VII College of Medicine in Singapore. In 1910 the first batch of seven male Medical graduates received their Licentiate in Medicine and Surgery (LMS) [1].

In 1949, the University of Malaya was established, based in Singapore, with a branch set up in Kuala Lumpur in 1959. In 1961, both governments of Singapore and Malaya agreed and passed legislation in Parliament to make the Kuala Lumpur Campus an autonomous body known as the University of Malaya; with its own medical school and teaching hospital. Thus in 1962, the government approved the setting up of the University of Malaya Medical Faculty, together with its teaching hospital, in the Klang Valley. The Faculty became fully functional in 1964 with the first intake of 64 medical students. After the hospital was built, the whole complex was named the “University of Malaya Medical Centre (UMMC)”, with facilities for undergraduate medical teaching, hospital services, the nursing school and other ancillary services put in place [2].

Professor Thumboo John Danaraj who was then Professor of Medicine in the Medical Faculty at

the University of Singapore, was appointed as Founding Dean of the Medical Faculty, University of Malaya in Kuala Lumpur [3]. With his appointment, the process of “head hunting” and appointment of academic staff began together with the selection of potential students for the first academic session.

It was mandatory that the Faculty get relevant and competent professionals to start the ball rolling. These medical academicians came from different parts of the globe, including Sri Lanka, Canada, Singapore and the UK (Figure 1).



Figure 1 The founding teachers: Faculty of Medicine, University of Malaya, 1965 (Courtesy of the late Prof. TJ Danaraj).

With these academicians on board, the toiling of planning and designing of the medical curriculum started since the first batch of medical students was scheduled to enter the medical school in 1964.

Globally, the medical curriculum followed the traditional didactic teaching of basic sciences comprising of anatomy, physiology and biochemistry

in the first year of undergraduate medical course. In the second year, the subjects of pathology, pharmacology, medical microbiology and parasitology were introduced. This was interspersed with topics on communicable diseases and principles of social and preventive medicine (SPM). The thrust of the undergraduate curriculum then was in the various aspects of issues related to social and preventive medicine. This was deemed to be important because the newly formed Malaysia, for the most part, was still mostly rural.

Professor Danaraj, having had experience as an academician in Singapore, felt that the didactic teaching of “dry” basic science subjects may not be perceived as interesting and relevant by the medical students. Thus, early on in the undergraduate medical curriculum, he introduced the clinical correlation classes (CCC) with clinical cases brought to the auditorium to demonstrate the physical signs and correlate them with basic science topics that were learnt during the previous week (Figure 2). This made the preclinical students understand the importance of basic medical science subjects in order to be able to explain the symptoms and the development of physical signs when disease occurs.



Figure 2 Clinical Auditorium, University of Malaya Medical Faculty. Clinical integration with patients starts in year 1 (CCC) (1967) [Courtesy of the late Prof. TJ Danaraj].

This was perhaps the earliest change in the curriculum to facilitate the teachers to think about possibilities of making basic science “dry topics” more interesting to the students. This gradual introduction of clinical medicine into basic science “preclinical years” and *vice versa* in the clinical years was perhaps the beginning of integrated teaching and the evolution of the undergraduate medical curriculum in Malaysia in the late 1980’s.

The clinical years begin from years 3 to 5 with rotations in general medicine, surgery, paediatrics orthopedics and obstetrics and gynaecology. In the clinical years, the integration of basic sciences in the form of clinico-pathological case (CPCs) discussions in the final year, sets the stage for future developments in the undergraduate curriculum. The clinical postings and the CPCs were meant to expose the students to develop their critical and analytical thinking skills during their clinical clerkships. Thus, learning to make reasonable diagnoses based on patho-physiological processes that had occurred, with minimal investigative procedures. This was meant to prepare them for their general medical service as medical officers in the rural areas, and also providing them with the basics for future career development.

NATIONAL STRATEGIES TO IMPROVE HEALTH CARE FOR THE POPULATION

Let us now look at the needs of the country then, and how the medical schools were tasked by the Government to contribute towards improving the health services in the then rural Malaysian society.

During the British Administration of the then Malaya, the legacy left behind by the British was a network of health services that extended to the really remote parts of Peninsular Malaya [4], as depicted in Figure 3.

When Malaya had her independence in 1957, the health programs were somewhat coordinated although there was a gross deficiency of doctors to run the district hospitals and the general hospitals. Healthcare then was provided at best by the hospital assistants (now known as medical assistants, MA).

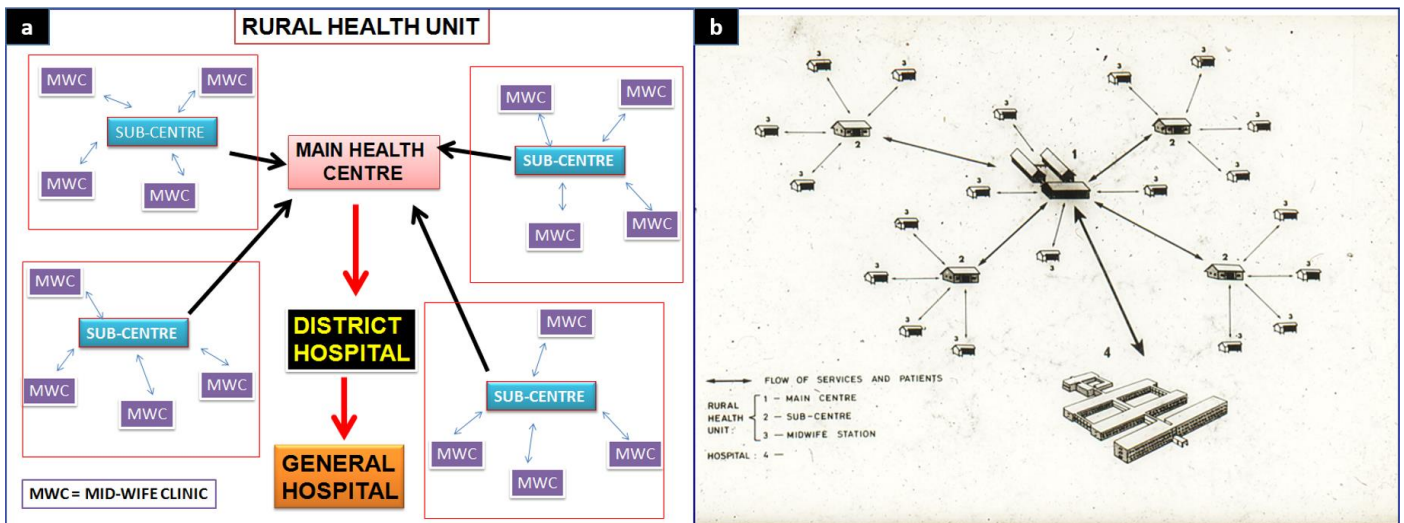


Figure 3 Network of Government run Health Care Services (Legacy from the British Rule of Malaya). a) Rural health unit. b) Replica of the original photo (Courtesy of the late Prof. TJ Danaraj).

During this period the teaching of medicine closely followed the British medical education system that was practiced in the UK. In those early days, the teaching of medicine was by apprenticeship with some knowledge of basic sciences to explain the symptoms.

Then came the didactic (traditional); and scientific discipline model. This preceptor-ship had advantages especially when there was as yet no formal structured curriculum mapping. To this day, clinical mentoring and preceptor-ship is practiced to some extent in the clinical ward rounds with bedside teaching. The concept of mentoring and development of clinical acumen was very apt in clinical practice; both during the undergraduate days and continues in the world of medical academia to this day. This is an art that is slowly dying with the advent of investigative medical practices.

While doctors have to know how to use modern investigative tools, clinical acumen is still required, to be able to make reasonable diagnosis and institute treatment; to be able to determine what investigations are appropriate and when referrals are necessary. This is so because government-sponsored medical graduates face compulsory service that may be in rural areas where there is scarce advanced investigative tools to aid them in making the diagnosis.

In the 1990's with the inevitable trend of producing more specialists, it was deemed necessary for the Ministry of Health to ensure that there will be enough primary care providers and general physicians who would approach patients in a holistic manner.

This was tasked to the universities to take the lead to develop programs to train medical officers as generalists and family and primary care physicians.

Medical schools in Malaysia, in developing their medical curriculum, need to address these issues and tailor-make the curriculum to suit the healthcare needs of the country.

To be continued in Part 2: The Blended Curriculum

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Self-perceived Anxiety Symptoms and its Associated Factors among Type 2 Diabetic Patients in Rural Communities of Malaysia

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Received

3rd February 2016

Received in revised form

10th August 2016

Accepted

16th August 2016

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ABSTRACT

Introduction: Little is known about anxiety symptoms among diabetic patients, especially among those who are living in rural areas in Malaysia. Thus, the aim of this paper is to investigate the prevalence of anxiety among diabetic patients and factors associated with anxiety in rural communities in Malaysia. **Methods:** A cross-sectional study involving 464 diabetes mellitus patients in rural health districts and outpatient clinics in Malaysia was conducted. Each participant was interviewed using the Hospital Anxiety and Depression Scale. **Results:** Respondents consisted of 193 (41.6%) males and 271 (58.4%) females. The mean age of participants was 59.65 ± 10.16 years and the mean duration of diabetes mellitus was 6.9 ± 6.3 years. Results indicate that 15% of the participants have anxiety symptoms. Multiple logistic regression analysis revealed that patients with history of ischemic heart disease and depression and those who were underweight have higher anxiety scores with adjusted OR 5.06 (95% CI 1.79 to 14.27), 27.71 (95% CI 14.23 to 53.98) and 14.6 (95% CI 2.49 to 84.82), respectively. **Conclusions:** This study suggests that although the prevalence of anxiety among diabetics is low, primary care physician should be trained to identify high risk patients and to manage their condition in order to improve the clinical outcome.

KEYWORDS: Anxiety, rural, type 2 diabetes mellitus, cross-sectional

INTRODUCTION

The co-morbidity of physical and mental illness, particularly depression and anxiety has been widely studied [1-4]. Chronic illnesses such as cancer, diabetes and hypertension have been affiliated with higher prevalence of mood disorders [2, 5, 6]. The existence of both physical and mental illnesses simultaneously, provide special challenges to patients in terms of poor disease management, higher health-care costs, more days of missed work and mortality [7-10].

Diabetes mellitus is one of the major leading causes of mortality in the world. According to the WHO report on non-communicable diseases, it is projected to be the 7th leading cause of death in 2030 [11]. About 382 million people worldwide have been diagnosed with diabetes, with an estimate of 5.0 million people having died from the consequences of high blood sugar

[12]. In Malaysia, approximately 15.2% (2.6 million) adults aged 18 years and above suffer from diabetes [13].

The majority of diabetic adults have at least one co-morbid chronic disease. Among all, depression and anxiety have been shown to be associated with hyperglycemia, and diabetic patients are almost twice as likely to suffer from anxiety and depression as compared to the general population [14]. In another study conducted on 119 patients receiving treatment for diabetes or hypertension at primary health care clinics in the Western Cape, patients reported experiencing anxiety symptoms such as feeling extremely tense, trembling, nervousness, shakiness and restlessness [15].

Studies on the prevalence of anxiety among diabetic patients in non-western countries are limited compared to the industrially developed countries.

Huang et al. reported that the 1-year prevalence rate of anxiety disorders among diabetic patients in the year 2000 was 128.76 per 1000, and the cumulative prevalence increased to 289.89 per 1000 by the year 2004. The prevalence rate was higher than the general population throughout the observation period. Factors like age 55 years and above, female sex and a low income were associated with higher prevalence of anxiety [16].

Most studies on mental disturbances involving diabetic patients have focused on depression and very few provided information on the prevalence of anxiety disorders among diabetics. Furthermore, most of these studies were conducted in Western countries or in urban areas. Therefore, this study aimed to investigate the prevalence of anxiety symptoms among diabetic patients and the associated factors in rural communities in Malaysia.

METHODS

This cross-sectional study was conducted among patients with type 2 diabetes mellitus in outpatient clinics within rural health districts in Malaysia between January to June 2015. Prior ethics approval was obtained from the Universiti Teknologi MARA (UiTM) ethics committee. The sample size was calculated using OpenEpi software (<http://www.openepi.com/OE2.3/men u/openEpiMenu.htm>) based on the prevalence rate of 30.5% from the study by Kaur et al. [17] (alpha at 0.05 and power at 80%), and the required sample size was 326. Taking into consideration an attrition rate of 20% and incomplete information, the final sample size was selected as 500.

Consecutive patients attending 10 outpatient clinics were screened for eligibility to participate. The purpose of the study and the procedures involved were explained to potential respondents. Eligible respondents who volunteered to participate were approached for written consent. The inclusion criteria were patients aged 30 years and above with known history of type 2 diabetes mellitus. Patients who refused to participate, with known diagnosis of depression, anxiety or other psychiatric illnesses were excluded.

The socio-demographic data, age, gender, ethnicity, religion, marital status, educational level, occupation, household income, smoking status were

recorded. Detailed medical history (hypertension, diabetes mellitus, hypercholesterolemia, ischemic heart disease, stroke, respiratory disease, psychiatric diseases, latest blood pressure reading, glycosylated hemoglobin (HbA1c), weight, height and current medication were extracted from the medical records.

The validated Malay version of Hospital Anxiety and Depression Scale (HADS) questionnaire was used to assess anxiety and depression through face-to-face interview [18]. The questionnaire is a 14 item instrument with two subscales providing separate measures of anxiety and depression (possible ranges from 0 to 21; higher scores on this scale denote more anxious and depressive symptoms). Anxiety and depression were assessed as separate components, each with seven items that were rated from 0 ('no, not at all') to 3 ('yes, definitely'); following which the scores were totaled for each component. A score of 8 and above of the depression subscale or the anxiety subscale of the HADS were considered depressed or anxious respectively.

Statistical Analysis

Data were entered manually into Statistical Package for Social Sciences version 18 (SPSS Inc, IBM, Chicago, IL, USA) and cleaned before analyses. Both descriptive and inferential were used. Univariate statistics were derived for continuous and categorical variables. Bivariate and multivariate analyses were used to measure the strength of association between the variables and identify predictors for the outcome of interest. All test were two-tailed with significance defined as $p < 0.05$. Odds ratios along with 95% confidence levels were derived where appropriate.

RESULTS

Out of the 500 participants recruited, 464 completed the questionnaires (response rate of 92.8%). The baseline characteristics of respondents are shown in Table 1. Respondents consisted of 464 diabetic patients, of which 193 (41.6%) were males and 271 (58.4%) were females. The mean age was 59.65 ± 10.16 years and the mean BMI was 27.7 ± 5.6 kg/m². The mean duration of diabetes mellitus was 6.9 ± 6.3 years. The majority of respondents were Malays (64.2%), followed by Chinese (20.1%) and Indians (15.7%). The mean HADS anxiety

and HADS depression scores were 4.14 ± 3.26 and 4.13 ± 3.35 respectively. The prevalence of anxiety as defined by anxiety items score of above 8 was 14.9% (95% CI 12, 18). Only 18.9 % had HbA1c < 6.5%.

Table 1 Distribution of participants by sociodemographic and clinical information

Characteristics	n	(%)	Mean (SD)
Age (years)			59.65 (10.16)
Gender			
Male	193	41.6	
Female	271	58.4	
Ethnicity			
Malay	298	64.2	
Chinese	93	20.1	
Indian	73	15.7	
Employment			
Employed	130	28	
Others	334	72	
Hypertension			
Yes	353	76	
No	111	24	
High cholesterol			
Yes	198	42.7	
No	266	57.3	
Ischemic heart disease			
Yes	198	42.7	
No	266	57.3	
Psychiatric illness in family			
Yes	4	0.9	
No	460	99.1	
Anxious			
Yes	73	15.7	
No	391	84.3	
Depression score			4.13 (3.3)
BMI (kg/m ²)			
Underweight (< 18.5)	8	1.7	27.7 (5.6)
Normal (18.5 - 24.9)	150	32.3	
Overweight & Obese (≥ 25)	306	66	
HbA1C			
$\geq 6.5\%$	305	81.1	
< 6.5 %	71	18.9	

Table 2 exhibits the factors associated with anxiety among diabetic patients. Patients who were unemployed had higher prevalence of anxiety compared to those who were employed ($p = 0.033$). Higher prevalence of anxiety were also observed among patients with ischemic heart disease (IHD) ($p = 0.002$) and depression ($p < 0.001$). The prevalence of anxiety was higher among underweight patients compared to patients with normal or over-weight ($p = 0.002$).

Table 2 Prevalence of anxiety according to socio-demographic and other variables

Characteristics	Anxiety n (%)	No Anxiety n (%)	χ^2	p
Age (years)				
< 70	53 (13.8)	332 (86.2)	2.179	0.140
≥ 70	16 (20.3)	63 (79.7)		
Gender				
Male	24 (12.4)	169 (87.6)	1.548	0.213
Female	45 (16.6)	226 (83.4)		
Ethnicity				
Malay	38 (12.8)	260 (87.2)	3.469	0.176
Chinese	19 (20.4)	74 (79.6)		
Indian	12 (16.4)	61 (83.6)		
Employment				
Employed	12 (9.2)	118 (90.8)	4.538	0.033
Unemployed	57 (17.1)	277 (82.9)		
Hypertension				
Yes	53 (15)	300 (85)	0.024	0.877
No	16 (14.4)	95 (85.6)		
High cholesterol				
Yes	34 (17.2)	164 (82.8)	1.445	0.229
No	35 (13.2)	231 (86.8)		
Ischemic heart disease				
Yes	34 (17.2)	164 (82.8)	9.399	0.002
No	35 (13.2)	231 (86.8)		
Depressed				
Yes	45 (61.6)	28 (38.4)	149.71	0.000
No	24 (6.1)	367 (93.9)		
BMI				
Underweight (<18.5)	5 (62.5)	3 (37.5)	12.512	0.002
Normal (18.5-24.9)	27 (18)	123 (82)		
Overweight & Obese (≥ 25)	37 (12.1)	269 (87.9)		
HbA1C				
$\geq 6.5\%$	34 (11.1)	271 (88.9)	1.030	0.310
< 6.5 %	11 (15.5)	60 (84.5)		

Table 3 shows the factors associated with anxiety among diabetes mellitus patients. Using simple logistic regression, patients who were unemployed, with history of ischemic heart disease (IHD), depression and underweight were found to have higher anxiety scores with OR 2.02 (95% CI 1.05 - 3.91), 3.35 (95% CI 1.49 - 7.57), 24.58 (95% CI 3.13 - 46.00) and 10.21 (95% CI 2.38 to 43.76) respectively. However, using multiple logistic regression, only patients with history of IHD, depression and underweight were found to have higher anxiety scores with adjusted OR 5.06 (95% CI 1.79 - 14.27), 27.71 (95% CI 14.23 - 53.98) and 14.6 (95% CI 2.49 - 84.82) respectively.

Table 3 Factors associated with anxiety among diabetic patients

Variable	B (SE)	Simple logistic regression			Multiple logistic regression		
		p	OR	95% CI	Adj. Beta (SE)	p	Adj. OR (95% CI)
Employment							
Employed	Ref						
Unemployed	0.705 (0.336)	0.036	2.023	1.047 - 3.910	-	-	-
Ischemic heart disease							
No	Ref						
Yes	1.210 (0.415)	0.004	3.354	1.487 - 7.566	1.620 (0.53)	0.002	5.06 (1.79 - 14.27)
Depressed							
No	Ref						
Yes	3.2020 (0.320)	0.000	24.576	3.129 - 46.00	3.322 (0.34)	0.000	27.71 (14.23 - 53.98)
BMI (kg/m ²)							
≥ 18.5	Ref						
< 18.5	2.323 (0.743)	0.002	10.208	2.381 - 43.76	2.678 (0.899)	0.003	14.6 (2.498 - 84.82)

DISCUSSION

This study is among the few to use outpatient data to determine the prevalence of anxiety and related factors among diabetic patients in Malaysia, in particular, among the rural population. The results showed that the prevalence of anxiety was 14.9%. Our finding was consistent with the prevalence study by Huang et al [16], who reported that the 1-year prevalence rate was higher in patients with combined anxiety disorders and diabetes 12.9%. The findings are similar to those from other studies using the HADS questionnaire in patients with diabetes and showing that 32% of the patients exceed the HADS threshold cut-off score of 'mild to severe' anxiety [19]. However, it should be noted that there were differences in the instruments and methodology used in these previous studies compared to this study. Another study by Kaur et al [17] also showed a higher prevalence of anxiety (30.5%) among type II diabetic outpatients in Klang Valley. However, this aforementioned study was done using a different instrument, DASS (Depression, Anxiety and Stress Scale), and involved patients from urban areas.

Our study revealed that unemployment, depression, IHD, and being underweight were significant factors associated with anxiety. These findings were consistent with other studies which also showed that unemployment [16, 17], depression [16, 20], IHD and BMI [21] have significant association with anxiety among diabetics. The result revealed unemployment as one of the predictors of anxiety symptoms. According to Erikson's psychosocial stages of life, a healthy personality and emotional development during adulthood is required of a person to contribute a meaningful life to their family and community. Otherwise, a feeling of low self-esteem and

instability during unemployment could lead to anxiety and self-doubt [22]. Unemployment influences a person's mental health. Work can improve the quality of mental and physical activities of individual in terms of use of skills, decision making, interpersonal contact and social status [23]. Thus, it is believed that working men and women are psychologically healthier than the unemployed. However, this finding needs further research.

Another significant factor that was associated with anxiety was depression. Many studies had demonstrated the association between depression and diabetes mellitus [14, 17, 20, 21, 24], which further deteriorates the patient's quality of life, causing greater distress and risk of suicide [24]. The symptoms of depression such as mood disturbances, anhedonia, insomnia, anxiety i.e. fear of the future, worries, avoidance or compulsion, may help initially to suggest for psychiatric conditions.

Anxiety symptoms are common in patients with major depression [25]. People who worry about diabetes and its adverse effects, may negatively impact disease management and glycemic control. Patients may start to create more intensive insulin regimes which increase the frequency of hypoglycemia [26]. Furthermore, frequent worries or fears may intrude into the patient's focus or concentration, which may later develop into diabetic complications. Long term complications such as retinopathy and nephropathy can affect daily life, such as poor work performance, personal relationships and recreational activities. Thus, the emotional health of patients with diabetes should be critically examined in order to achieve optimal health and quality of life outcomes.

With regards to medical illness, IHD was found to be significantly associated with anxiety. This reflects the fact that the likelihood of anxiety increases among patients who have complications. Several studies have suggested that chronic anxiety is associated with increased incidence of coronary heart disease (CHD) [27-29]. Anxious patients are more likely to have unhealthy behavior such as smoking, overeating, and insufficient physical activities [30]. Barger & Sydeman [27] found that generalized anxiety disorder independently predicted increased CHD risk, particularly for major risk factors such as smoking and hypertension. A meta-analysis by Roest and colleagues [29], found an association between anxiety and incidence of CHD with a 26% increase in risk. Anxiety was also specifically associated with cardiac mortality, with anxious persons having a 48% increased risk of cardiac death. Further research is needed to investigate if the psychological treatment of anxiety such as cognitive behavior therapy has beneficial impact on the incidence of cardiac disease.

With regards to BMI, past research have shown an inverse relationship between BMI and anxiety [31]. Underweight patients have been reported to have high levels of anxiety at 62.5% compared to overweight patients at only 12.1%. [32]. It was found that underweight people had a higher incident rate of anxiety compared to their other counterparts, if factors such as physical health, physical activity, social support, duration of education and financial factors were controlled. Therefore, those who are underweight and have a negative well-being have a greater risk of anxiety and depression.

Limitations of the Study

Since this is a cross-sectional study, the cause and effect relationship cannot be established. The HADS questionnaire is only a screening tool and is not diagnostic for specific psychiatric disorders.

CONCLUSIONS

This study revealed that the prevalence of anxiety symptoms was relatively high among rural diabetic patients. Unemployment, past history of IHD, being depressed and underweight are predictors of anxiety symptoms. Primary care physicians should be trained to

identify high risk patients in order to manage the condition better in order to improve the clinical outcomes.

Conflict of Interest

Authors declare none.

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