

Public Perception on the Risk of Diabetes Mellitus and the use of Mulberry Leaf Extract in Normalizing Blood Glucose Level

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Abstract

This study was carried out to collect the status of public awareness and perception about risk of diabetes mellitus and usage of the Mulberry leaf extract for hyperglycaemic condition. This study's involvement of human participants was in accordance with INTI International University's ethical standard and ethical committee approval. Informed consent was obtained from all respondents in this study. The descriptive-frequency study was conducted in a total of 209 respondents around Nilai, Cheras and Kuala Lumpur through convenience sampling. Data were collected through a valid and reliable questionnaire, consisting of two sections. In total, 55% of respondents were in normal Body Mass Index (BMI) (18.5 – 24.9). However, there were 21% of respondents were overweight (25 – 29.9), 17% were underweight (<18.5) and 7% were obesity (30 – 40). The result showed that there were about 81% of respondents were unaware about their own blood glucose level and only 19% of respondents were reported to have regular health check up to know the blood glucose level. Furthermore, the respondents had chosen the exercise, followed with balance diet and thirdly practising optimal healthy habit in achieving healthy life style. The least to be chose in achieving healthy life style was medication. Overall results in this study reported that the majority of respondents are not aware about function of Mulberry leaf in normalizing the blood glucose level. There were only 12% of respondents had reported to consume Mulberry leaf extract. And 6% of respondents had consume it before and claimed to feel no changes after consumption. The findings indicated that the community and public awareness towards risk of diabetes and potential value of Mulberry leaf consumption need to be improved especially among teenagers and young adults to cultivate good health promotion and natural product consumption for beneficial.

Keywords

Diabetes mellitus, Mulberry, Public perception

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Introduction

Diabetes mellitus (DM) is a most common chronic disease which had caused mostly health impairment to the society. The International Diabetes Federation (IDF) is well known as an umbrella organization of over 230 national diabetes association in 170 countries and territories. It represents the growing number of people with diabetes and those who are at risk. The federation has been leading the global diabetes community since 1950. According to the newest executive summary done by IDF in 2017 had shown that the cases of DM in the whole world had 425 million cases and expected to be 629 million DM cases in year of 2045 which would had increased 48% in 28 years. Besides that, IDF also shown that the expected outcome of increase of DM cases among the population of between 20 – 64 years old would be from 327 million in 2017 to 438 million in 2045, however for the population of between 64 to 79 years old would be increase from 98 million in 2017 to 191 million in 2045 (IDF, 2017).

Moreover, DM is also one of the major health alert in Malaysia. The National Diabetes Registry Report (NDRR) had shown the accumulation of DM cases between 2006 and 2011 as reported by National Health and Morbidity Survey (NHMS) in 2011. The survey was actually based on the amount of cases which had undergo registered report of DM patient in primary healthcare clinic under Ministry of Health (MOH) and not including the unregistered cases in the community. The survey had shown that from 2006 to 2011, the percentage of Malaysian living with total diabetes cases had been increased to 3.6% which means that there are about 2.6 million of Malaysian are suffering with DM. Besides that, the cases of known and undiagnosed DM also reported increased to total up of 3.7%. According to the registry dataset of NDRR, the highest population of DM type 2 are Malay race which had total of 58.9% among other races. The other 41.1% of DM cases are referring to 21.4% Chinese, 15.3% Indian, 4.2% others and 0.2% unknown (MOH, 2013).

The rapid increasing of DM had clearly shown among the young generation, especially the Type 2 Diabetes Mellitus (T2DM). Besides that, the incidence of diabetes complications is extremely high such as cardiovascular disease (Xing, 2016), diabetic nephropathy, diabetic peripheral neuropathy, diabetic retinopathy (Wu et al., 2018) and diabetic foot (Wang & Gao, 2019) which would cause the disabling and lethal for the patient. Moreover, there is no treatment to cure T2DM. Therefore, prevention is needed to lower down the chances of getting DM and decrease harmful of diabetes and its complication onto the health of the youngster in future. Other than the modern science treatment, complementary medicine can be an alternative option in managing the DM cases among Malaysian with lower cost spend.

One of the herbal medicine plant that shows high potential in lowering the blood glucose level is the Mulberry leaf. Mulberry plant from *Moraceae* family, is also known as white mulberry. Its scientific name as *Folium Mori* that originates from *Morus Alba Linn* (species), *Morus* (genus) and *Rosales* (order) (Andallu & Varadacharyulu, 2007). Mulberry leaf was first mentioned in the ancient book of *Shennong Herbal Classic (Shen Nong Ben Cao Jing)* manuscript about its properties based on Traditional Chinese Medicine. In TCM, Mulberry leaf is known as *Sang Ye*. It also known as *Tie Shan Zi* from the ancient book of *Bai Cao Jing*. It has cold properties and belongs to lungs

and liver meridian distribution. Besides that, Mulberry leaf actually has the function to prevent bleeding and usually prescribe for hemoptysis, hematemesis and nosebleed condition with combination of other hemostatic group of herbs (Zhong et al., 2017). Furthermore, according to Zou and Chen (2003), Mulberry leaf contain rutin, quercetin, volatile oil, amino acid, vitamins and microelements, which have many pharmacological activities such as reducing blood glucose, anti-hyperlipidemia, hypertensive, bacteriostasis and anti-viral properties. As per reported in other studies, Mulberry leaf consists of several type of substances that showed regulation of blood glucose level (Xu et al., 2015; Ji et al., 2015; Chen et al., 2009 & 2011).

Thus, in enhancing the usage and demand of complementary medicine and natural remedy product consumption, this study had been carried out in order to review the public perception of targeted community towards risk of DM and their knowledge in regards to the potential of Mulberry leaf which currently becoming more popular as one of the herbal plants in treating DM in complementary medicine.

Methodology

All survey and interview for collection of data in this research study were performed in accordance with the INTI International University research ethics guideline with approval reference no: FHLS/RAC/JAN19/001 dated on 13th March 2019. Questionnaire form was designed according to the reference questionnaire form from the research paper of Public Perceptions of Obesity and Bariatric Surgery in Singapore: A Pilot Study. The questionnaire comprises of two sections; Section A and Section B. The Section A consists of demographic data including age, gender, race, educational level, occupation, monthly income and BMI. The Section B consists of questions on perceptions of ideal blood glucose level and medical problems, respondents' personal exposure to various methods to achieve healthy life style, as well as factors that influence their health and lastly the awareness of the function of Mulberry leaf.

The survey was carried out at the INTI International University Nilai campus, Malaysian Chinese Medical Association (MCMA), Persatuan Akhlak Chin Chee Kok Kuala Lumpur and Bandar Tasik Selatan KTM station that covered the public community population around Nilai, Kuala Lumpur and Bandar Tasik Selatan. With the inform consent signed, all respondents were required to complete the questionnaire with the assistance of multiple language as prepared for the questionnaire form (English, Bahasa Melayu and Mandarin). The perceptions of the participants were further analyzed based on qualitative study. Analysis of qualitative data was done with frequency distribution method and relative frequency (percentage) according to their individual data and answer. All the collected information would be combined in the form of pie chart or bar chart to display as research findings.

Results

Total number that were completed the survey in this research study were 209 respondents. There were 9 respondents who had fail to complete the questionnaire and contribute to incomplete data

resources for analysis. Therefore, only 200 respondents and their data were further analyzed. As recorded, there were total of 81 males and 119 females from total number of respondents with 56 respondents were Malay, 113 respondents were Chinese, 28 respondents were Indian and 3 respondents were others. Besides that, the total respondents (n=200) based on age ranges are stated in the followings; 39% (n=79) were ≤ 20 years old, 35% (n=71) were $20 \leq 30$ years old, 7% (n=13) were $30 \leq 40$ years old, 4% (n=8) were $40 \leq 50$ years old, 6% (n=12) were $50 \leq 60$ years old, 4% (n=8) were $60 \leq 70$ years old, and 5% (n=9) were $70 \leq 80$ years old.

In this study, the result of the BMI status of 200 respondents were showed that the majority of respondents; 55% of respondents (n=109) were reported normal BMI (Normal BMI: 18.5 – 24.9). However, there were total of 21% of respondents (n=42) were reported overweight (Overweight BMI/ Obesity Grade I: 25 – 29.9). 17% of respondents (n=35) were reported underweight (Underweight BMI: <18.5). And 7% of respondents (n=14) were reported obese (Obesity Grade II BMI: 30 – 40 & Obesity Grade III BMI: ≥ 40). In additional about 81% of respondents (n=162) were not aware to monitor and do regular checking for their blood glucose level (unknown). Only 19% of respondents (n=38) were aware to monitor and do regular checking for their blood glucose level (known).

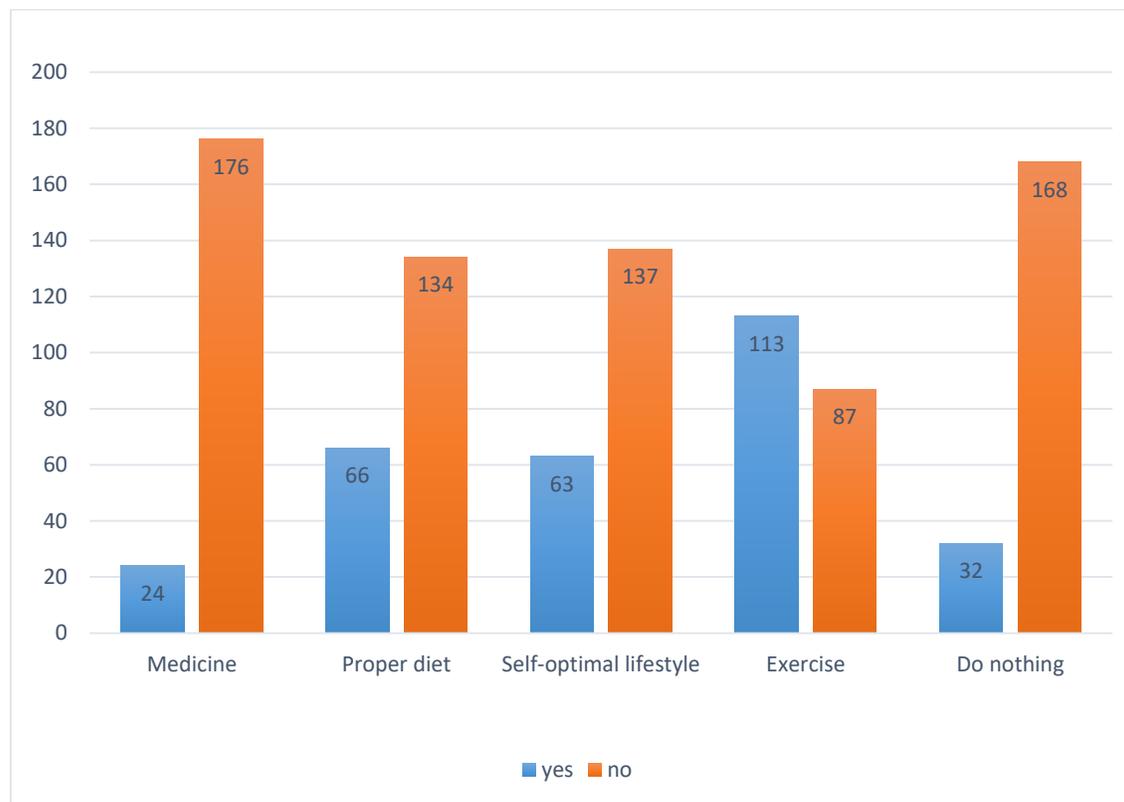


Figure 1. Respondents' choice in achieving healthy life style.

The Figure 1 above had shown that there were four choices (as option provided in questionnaire form) for their decision in achieving healthy life style. According to 200 respondents there were 12% of respondents (n=24) were chose medicine and about 88% of respondents (n=176)

were not chose medicine as the way to practice in achieving healthy life style. While the other choice reported that there were 33% of respondents (n=66) were chose for taking healthy diet and there were 66% of respondents (n=134) were not chose healthy diet as the way to practice and achieve the healthy lifestyle. It was reported that among this 33% of respondents were chose to take vitamins, calcium, Western medication, Traditional Chinese herbs, Traditional Malay herbs and Traditional India herbs. Besides, there were 31.5% of respondents (n=63) were chose self-optimal lifestyle (healthy life style) and about 68.5% of respondents (n=137) were not chose self-optimal lifestyle (healthy life style) as the way to practice. In other choice, it was reported that the majority of the respondents that were 56.5% of respondents (n=113) were chose to do regular exercise and about 43.5% of respondents (n=87) were not chose to do regular exercise as the way to practice in achieving healthy life style. Unfortunately, there were 16% of respondents (n=32) were chose to not practice any from the provided option for achieving healthy life style.

The other result had shown that most of the respondents were not aware about potential and function of Mulberry leaf as one of the traditional herbal plant that able to lower down the blood glucose level, blood pressure and blood cholesterol. According to the data collected, there were only 19% of respondents (n=24) had reported to know about the usage of Mulberry leaf and 81% of respondents (n=176) were not yet aware about the Mulberry leaf and their function in complementary medicine. Following to that from 19% of respondents, 15 of them had claimed that the Mulberry leaf is very effective to regulate the blood glucose level, 6 of them had claimed for Mulberry leaf function in regulating blood pressure and 3 of them had claimed to use Mulberry leaf for managing obesity.

Discussions

According to Ann et al., (2015) obesity is associated with chronic diseases such as fatty liver, T2DM, cardiovascular disease and severe metabolic syndrome. Obesity causes metabolic impairment including excessive lipid accumulation and fibrosis in the hepatic tissue as well as the increase in oxidative stress. Lipoprotein abnormalities including elevated triglycerides, low High Density Lipoprotein (HDL) and increased numbers of small dense Low Density Lipoprotein (LDL) particles are common findings in patients with cardio-metabolic risk (CMR). Clinical entities with increased CMR include type 2 diabetes, hyperlipidemia and hypoalphalipoproteinemia (Brunzell et al., 2008). The findings of this research study had reported that most of the respondents' BMI value were normal and that can be explained by the respondents' age range that majority were young adult which are ≤ 20 and between 20 – 30 years old. As for record, most of them were students at secondary and tertiary level of education and supported by their body metabolism state that are still fit, healthy and steady no matter how they are practicing on their daily life style. However, from overall there were 21% of respondents (n=42) were reported overweight (Overweight BMI/ Obesity Grade I: 25 – 29.9) and 7% of respondents (n=14) were reported obese (Obesity Grade II BMI: 30 – 40 & Obesity Grade III BMI: ≥ 40). Sum up of these categories had gain total to 28% (n=56) among the 200 of the respondents which had exceed the $\frac{1}{4}$ of the total respondents. Thus, these research findings supported that there are chances and risk for the overweight population turn into the obesity category if they chose to not perform and

maintain healthy life style. This increasing and alarming risk at teenagers and young adult age may give impact to the national economic in the future particularly in managing the chronic disease such DM because of the incidence that will be increasing in their future and advance age if it fail to be controlled.

Furthermore, according to Jura and Kozak (2016) in their report, one of the causes of the obesity that was increased among aged population is due to the inflammation in both adipose tissues and ageing tissues that leads to insulin resistance which will be also indirectly leads to the emerge of T2DM. Besides that, the reduced secretion of hormone such as growth hormone, leptin and adiponectin due to ageing will also causing the increasing risk of having obesity. This is because these hormones function are able to stimulate the cells to undergo the glucose metabolism which able to prevent the excess glucose to be converted into fat (Jura & Kozak, 2016). According to the examination done in United State (US) population for 1999 to 2006 had shown that the prevalence of having the cases of DM was increased with increasing cases of obesity and there are nearly $\frac{1}{4}$ of the DM population was actually having the problem of poor glycemic control (Nguyen et al., 2011). The reported study above shows the same trend of findings in this study for the respondents' choice in achieving healthy life style with 81% of respondents (n=162) were not aware to monitor and do regular checking for their blood glucose level (unknown) and only 19% of respondents (n=38) were aware to monitor and do regular checking for their blood glucose level (known). The recorded data showed that most excuses were occur due to their current healthy fit condition and in addition to no sign and symptom pertaining to DM at this moment.

As to be emphasized from this alarming reasoning, the development and progress of DM at early stage can be asymptomatic especially at pre-diabetes state or during young adult age. There are hidden risk for them being unaware toward their body health since most of the cases of diabetes happened due to their unaware of their daily choice in achieving healthy life style and ways of prevention. Rehabilitation and secondary medication had to involve good education and tooling up patients for better self-management of their condition and complementary medicine can be one to be considered for managing this risk of DM incidence particularly in Malaysia. There were many reported study about beneficial and pharmacological properties of Mulberry leaf, but unfortunately findings from this study reported that 81% of respondents (n=176) were not yet aware about the Mulberry leaf and their function in complementary medicine.

Conclusions

The perception of peoples particularly among Malaysian through convenient sampling method in this study had showed awareness of the risk of DM and Mulberry leaf consumption was poor and below expectation. Although there are a lot of campaign and educational programs that were advertised in mass media such as radio, television, social media and internet, the awareness of people in practicing good life style are still need to be improved. Besides, a lot of reports that show the vast medical function and pharmacological properties of Mulberry leaf in various diseases and condition and particularly about Mulberry leaf effect for lowering blood glucose level, cholesterol level and blood pressure, but the awareness of people about it are still below expectation. Hope that the Mulberry leaf can be used widely in the treatment for diabetes and can be one of the first

option for herbal medicine in DM, hypertension, and obesity as the natural herb remedy in the future due to its vast beneficial effects for health. With this current vision and best practice and management for DM in the future, the case of incidence for DM can be lower down and able to be managed where at the same time can also improve the government economical state by reducing the health cost in buying diabetic synthetic drugs for patients that definitely much more expensive than Mulberry as natural herb remedy for prevention and medication. Therefore, with the combination of the good awareness for choosing healthy life style and Mulberry leaf consumption as supplement will be able to decrease the diabetes cases in Malaysia for the future.

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