



Public awareness of diabetes mellitus in klang district, selangor

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ABSTRACT

Objective

To evaluate the knowledge, attitude and practice of diabetes mellitus among the public of different age, gender, ethnic origin, and highest level of education and to identify the level of awareness of diabetes mellitus among the public.

Methods

A cross-sectional study was conducted from November 2012 to February 2013 to evaluate the level of public awareness along with their knowledge, attitude and practice towards diabetes mellitus. 400 participants aged 12 and above were randomly selected and were asked to participate in this study. They were required to answer a predesigned questionnaire regarding their socio demographic characteristics, knowledge, attitude and practices related to diabetes mellitus.

Results

The results revealed that there is a statistically significant difference in the mean knowledge of respondents with different age ranges and different ethnic origin but there were no significant difference in the knowledge among different gender and highest education level. Out of 400 respondents, 284 respondents which are 71% knew that diabetes mellitus is a condition characterized by raised blood sugar. As for the complications, kidney disease, foot problems and eye disease was found to be the three highest complications at 62.3%, 61.3% and 48.9% respectively.

Conclusion

Age and highest level of education were found to be the predominant predictive factors in most of the respondents whereas the gender of respondents did not affect the findings of this study. The results also revealed that the awareness of the public regarding diabetes mellitus is reasonably good except for some sections that needed to be given more concern such as on the eye care. An improved and well structured educational programmes that will encounter the areas of weaknesses should be recommended to increase the level of public knowledge, attitude and practice along with public awareness of diabetes mellitus.

Keywords: Diabetes mellitus, knowledge, attitude, practice, awareness.

INTRODUCTION

Diabetes mellitus is defined as a group of metabolic diseases whose common feature is an increase in the blood glucose level [1]. It is one of the most common disease causing significant mortality and morbidity throughout worldwide. It is a disease with serious complications that has now reached epidemic proportions and the prevalence

rates are expected to go even higher in the future [2]. If the current trend continues, more than 170 million people worldwide will have this disease and this burden is projected to rise more than double by the year of 2030. In Malaysia, diabetes mellitus is a very big growing concern. Significant changes in the lifestyles of Malaysians caused Malaysia to have a highly prone epidemic of diabetes mellitus. The World Health Organisation

(WHO) has estimated that in the year of 2030, Malaysia would have a total number of 2.48 million diabetics compared to 0.94 million in 2000 which is about 164% increase [2]. This rising trend is mainly due to some factors such as growing population, aging population, urbanization and increased obesity and physical inactivity among the population [3]. Diabetes Mellitus is also associated with long-term consequences that include severe complications. Globally, it is estimated that about 15,000 to 39,000 people lose their sight because of diabetes and about 14.6% aged 40 years and above, developed diabetic retinopathy after a 5-year duration of being in a diabetic condition [4]. People suffering diabetes are more likely to have cardiovascular complications as well and about 20 to 40% of diabetics develop diabetic nephropathy. 12% of all diabetic hospital admissions were found to have foot complications such as ulceration, infection and diabetic Charcot's joint which may result in foot or leg amputation. Although diabetes mellitus are said to be difficult to treat, it can be managed well by having an appropriate lifestyle modifications and treating its complications by referring to a proper guidelines [5]. Diabetes mellitus along with its complications contribute a significant amount of burden to the society of our country. It is predicted that diabetes mellitus soon to become a major problem in our country. If these issues are not addressed seriously and urgently, the country will be faced with more burdens of diabetes mellitus and its complications. This burden will then introduce more costs to the nation in terms of healthcare expenditure and loss of productivity [5]. Although much effort has been done to educate the public about diabetes mellitus through various forms of media, the impact of such efforts has yet to be officially evaluated. It is not clear on how much the public actually knows regarding this disease through the current programs. An understanding of the level of public awareness along with their knowledge, attitude and practice towards diabetes mellitus will be helpful to plan for future programs such as health promotion interventions [6]. Having a high prevalence of diabetes and together with its complications in Malaysia, there is a need to estimate the awareness of diabetes mellitus among the public. Exploring of barriers set up due to ignorance and wrong beliefs on diabetes will aid in setting up a more adapted approach to increase the level of awareness among the public.

METHODOLOGY

Study Design

A cross-sectional community based study was conducted between December 2012 and March 2013. The study areas covered were Taman Sri Andalas, Taman Klang Jaya, Bandar Bukit Tinggi and Bandar Botanic of Klang district, Selangor.

Study Population

A total of 400 participants aged 12 and above were randomly selected and were asked to participate in this study. Respondents of both genders with no hearing or visual impairment were included, regardless of their ethnicity. Individuals will be excluded from participating in the study if they had significant cognitive impairment or psychiatric comorbidity.

Survey Instrument

A structured questionnaire adapted from that described by a studies carried out in Kolkata [7] was used to assess the knowledge, attitude and practice along with the awareness of the public on diabetes mellitus. The questionnaire was given to three lecturers of the faculty of pharmacy to be validated to check whether it was relevant to the study carried out. Before carrying out the survey a written informed consent form was distributed, and a signature was obtained from each participant.

Questionnaire Design

Knowledge had 14 questions regarding general awareness on diabetes mellitus, its symptoms, its complications, prevention and control from question number 1 to question number 19. 8 questions related to attitude regarding life style factors and the management of the disease from question number 20 to question number 27. Practice had 11 questions regarding life style and dietary habits, monitoring of blood glucose, drug compliance, eye examination and foot care from question number 28 to question number 38.

Pilot studies

A pilot study was carried out to validate the questionnaire. The questionnaire was pretested on a sample of 50 public to discover any difficulties in understanding the meaning of the questions and to estimate the amount of time it would take to complete. The feedback showed that the questionnaires were easy to be understood and quit convenient for the public as they just need to tick the correct options.

Data Collection

Data collection was selected through convenient sampling among residents of Taman Sri Andalas, Taman Klang Jaya, Bandar Bukit Tinggi and Bandar Botanic. Before data collection each participant was given a full explanation of the research project and its purpose and was then given to sign an informed consent form. A face-to-face interview was carried out for data collection. Each interview took approximately 10-15 minutes and was conducted at places comfortable for the participant. Some questions were asked when it

was necessary in order to draw out more ideas from the participants.

Analysis

All data were analyzed using SPSS version 21.0. Random checks were performed to detect errors in data entry. Descriptive studies were used to analyze the demographic data obtained whereas Student's *t* test and one-way analysis of variance were applied as appropriate. The level of significance was set at 5% and 95% confidence intervals were used to determine statistical significance.

RESULTS

Table 1 Demographic characteristic of respondents

Demographic Characteristics	Number of respondents (N)	Percentage (%)
Age(yr)		
12-24	196	49.0
25-44	130	32.5
45-64	66	16.5
>64	8	2.0
Sex		
Female	234	58.5
Male	166	41.5
Race		
Malay	74	18.5
Chinese	111	27.8
Indian	203	50.8
Others(Punjabi, Serani)	12	3.0
Education Level		
Primary	35	8.8
High School	100	25.0
College/University	236	59.0
Graduate School	29	7.3

Table 2 Demographic characteristics of the respondents stratified on gender

Demographic Characteristics	Female		Male		Total	
	N	%	N	%	N	%
Age(yr)						
12-24	117	50.0	79	47.6	196	49.5
25-44	84	35.9	46	27.7	130	32.5
45-64	30	12.8	36	21.7	66	16.5
>64	3	1.3	5	3.0	8	2.0
Race						
Malay	50	21.4	24	14.5	74	18.5
Chinese	67	28.6	44	26.5	111	27.8
Indian	108	46.2	95	57.2	203	50.8
Others(Punjabi, Serani)	9	3.8	3	1.8	12	3.0
Education Level						
Primary	17	7.3	18	10.8	35	8.8
High School	54	23.1	46	27.7	100	25.0
College/University	142	60.7	94	56.6	236	59.0
Graduate School	21	9.0	8	4.8	29	7.3

The demographic characteristics which are used to analyse the findings of this study were age, gender, race and highest level of education. Table 1 summarizes the demographic characteristics of the

respondents and table 2 summarizes the demographic characteristics of the respondents stratified on gender.

Table 3 Independent sample test for knowledge, attitude and practice with different genders

	Sex	N	Mean	Std. Deviation	t	Sig
Knowledge	Female	234	57.7	7.5	0.012	0.991
	Male	166	57.6	8.1		
Attitude	Female	234	11.4	2.5	-1.915	0.056
	Male	166	12.0	3.0		
Practice	Female	234	17.8	2.5	1.521	0.129
	Male	166	17.4	2.5		

According to table 3 there is no significance difference in knowledge, attitude and practice between the female and male as the p-value is more than 0.05.

Table 4 Anova for the knowledge of respondents with different age, ethnic and highest education level

Age	N	Mean	Std. Deviation	Sig
12-24	196	58.9	7.8	0.000
25-44	130	57.6	7.5	
45-64	66	54.2	7.0	
>64	8	55.0	6.9	
Total	400	57.7	7.8	
Ethnic Origin				
Malay	74	57.2	6.8	0.000
Chinese	111	61.4	8.7	
Indian	203	55.8	6.9	
Others (Serani, Punjabi)	12	55.2	5.9	
Total	400	57.7	7.8	
Highest Education Level				
Primary	35	60.6	6.3	0.057
High School	100	57.3	8.2	
College/University	236	57.6	7.9	
Graduate School	29	55.4	6.0	
Total	400	57.7	7.8	

Table 4 shows the anova for knowledge of respondents with different age ranges, ethnic and highest education level. According to the table, the respondents aged 12-24 have the highest mean value of 58.9 with standard deviation of 7.8 and the respondents aged 45-64 have the lowest mean value of 54.2 with standard deviation of 7.0. The significance level is 0.000 which shows that the significance value is smaller than 0.05. Therefore, there is a statistically significant difference in the mean knowledge of respondents with different age ranges. As for the ethnic, the Chinese respondents

have the highest mean value of 61.4 with standard deviation of 8.7 and the respondents from the others category consisting of the Serani's and Punjabi's have the lowest mean value of 55.2 with standard deviation of 5.9. The significance level is 0.000 which shows that the significance value is smaller than 0.05. Therefore, there is a statistically significant difference in the mean knowledge of respondents with different ethnics. As for the highest education level, the respondents with highest education level from primary have the highest mean value of 60.6 with the standard

deviation of 6.3 and the respondents with the highest education level from graduate school have the lowest mean value of 55.4 with the standard deviation of 6.0. The significance level is 0.057

which shows that the significance value is greater than 0.05. Therefore, there is no statistically significant difference in the mean knowledge of respondents with different highest education level.

Table 5 Anova for the attitude of respondents with different age ranges, ethnic and highest level education

Age	N	Mean	Std. Deviation	Sig
12-24	196	11.9	2.8	0.361
25-44	130	11.6	2.5	
45-64	66	11.3	3.0	
>64	8	11.4	2.9	
Total	400	11.7	2.7	
Ethnic Origin				
Malay	74	11.7	2.9	0.000
Chinese	111	12.9	2.9	
Indian	203	11.0	2.4	
Others (Serani, Punjabi)	12	10.8	2.1	
Total	400	11.7	2.72	
Highest Education Level				
Primary	35	11.3	3.5	0.531
High School	100	12.0	2.7	
College/University	236	11.6	2.6	
Graduate School	29	11.7	2.4	
Total	400	11.7	2.7	

Table 5 shows the anova for attitude of respondents towards diabetes mellitus with different age ranges, ethnic and highest level education. According to the table the respondents aged 12-24 have the highest mean value of 11.9 with standard deviation of 2.8 and the respondents aged 45-64 have the lowest mean value of 11.3 with standard deviation of 3.0. The significance level is 0.361 which shows that the significance value is greater than 0.05. Therefore, there is no statistically significant difference in the mean attitude of respondents with different age ranges. As for the ethnic the Chinese respondents have the highest mean value of 12.9 with standard deviation of 2.9 and the respondents from the others category consisting of the Serani's

and Punjabi's have the lowest mean value of 10.8 with standard deviation of 2.1. The significance value is smaller than 0.05. Therefore, there is a statistically significant difference in the mean attitude of respondents with different ethnics. As for the highest level of education, high school have the highest mean value of 12.0 with the standard deviation of 2.7 and the respondents with the highest education level from primary have the lowest mean value of 11.3 with the standard deviation of 3.5. The significance level is 0.531 which shows that the significance value is greater than 0.05. Therefore, there is no statistically significant difference in the mean attitude of respondents with different highest education level.

Table 6 Anova for practice of respondents with different age range, ethnic and highest education level

Age	N	Mean	Std. Deviation	Sig
12-24	195	17.5	2.5	0.130
25-44	130	18.2	2.4	
45-64	66	17.2	2.7	
>64	8	16.6	2.6	
Total	399	17.6	2.5	

Ethnic Origin				
Malay	74	17.3	2.2	0.000
Chinese	111	18.6	2.3	
Indian	202	17.3	2.6	
Others (Serani, Punjabi)	12	17.0	2.2	
Total	399	17.6	2.5	
Highest Level of Education				
Primary	35	16.1	3.5	0.000
High School	100	18.2	2.3	
College/University	235	17.7	2.3	
Graduate School	29	17.0	2.2	
Total	399	17.6	2.5	

Table 6 shows the anova for the practice of respondents with different age ranges, ethnic and highest education level. According to the table the respondents aged 25-44 have the highest mean value of 18.2 with standard deviation of 2.4 and the respondents aged >64 have the lowest mean value of 16.6 with standard deviation of 2.6. The significance level is 0.013 which shows that the significance value is smaller than 0.05. Therefore, there is a statistically significant difference in the mean practice of respondents with different age ranges. As for the ethnic, Chinese respondents have the highest mean value of 18.6 with standard deviation of 2.3 and the respondents from the others category consisting of the Serani's and Punjabi's have the lowest mean value of 17.0 with

standard deviation of 2.2. The significance level is 0.000 which shows that the significance value is smaller than 0.05. Therefore, there is a statistically significant difference in the mean practice of respondents with different ethnics. As for the highest education level, high school have the highest mean value of 18.2 with the standard deviation of 2.3 and the respondents with the highest education level from primary have the lowest mean value of 16.1 with the standard deviation of 3.5. The significance level is 0.000 which shows that the significance value is smaller than 0.05. Therefore, there is a statistically significant difference in the mean practice of respondents with different highest education level.

Table 7 Distribution of respondents according to their awareness on the disease condition

Issues on awareness	N	%
Condition of diabetes mellitus		
High blood sugar	284	71.0
High urine sugar	55	13.8
Low blood sugar	12	3.0
Low urine sugar	1	.3
Don't know	48	12.0
Symptoms of diabetes mellitus		
Weight gain/loss	258	64.5
Frequent urination	231	57.8
Frequent hunger	132	33.0
Frequent thirst	181	45.3
Asymptomatic	13	3.3
Others	5	1.3
Don't know	73	18.3
Complications of diabetes mellitus		
Heart disease	173	43.3
Kidney disease	249	62.3
Eye disease	199	48.9
Stroke	128	32.0
Foot problems	245	61.3
Death	79	19.8
Others	5	1.3
Don't know	40	10.0

Prevention of diabetes mellitus		
Healthy diet	358	89.5
Regular exercise	294	73.5
Weight control	236	59.0
Quit smoking	133	33.3
Others	9	2.3
Don't know	15	3.8
Can't be prevented	5	1.3
Treatment of diabetes mellitus		
Drugs	351	87.8
Insulin	346	86.5
Healthy diet	303	75.8
Regular exercise	356	64.0
Weight control	206	51.5
Quit smoking	75	18.8
Others	1	.3
Don't know	27	6.8
Cannot be treated	2	.5
Allied care		
Blood glucose examination	266	66.5
Blood pressure monitoring	146	36.5
Eye examination	108	27.0
Foot examination	93	33.6
Symptoms of hypoglycemia		
Dizziness	158	39.5
Sweating	16	4.0
Weakness/tiredness	6	1.5
Shivering/trembling	4	1.0
Hungry	3	0.8

Out of 400 respondents, only 284 respondents which are 71% knew that diabetes mellitus is actually a condition characterized by raised blood sugar. Weight gain/loss and frequent urination were known to be the most common symptoms of diabetes mellitus at 64.5% and 57.8% respectively. As for the complications, kidney disease, foot problems and eye disease was found to be the three highest complications at 62.3%, 61.3% and 48.9% respectively. Healthy diet, 89.5% and regular exercise, 73.5% were said to be the most common lifestyle modification for diabetes mellitus

DISCUSSION

Knowledge, Attitude and Practice

The results showed that there is a statistically significant difference in the mean knowledge of respondents with different age ranges and different ethnic origin but there was no significant difference in the knowledge among different gender and highest education level which is shown in table 3 and table 4. As for the attitude there was a statistically significant difference in the mean attitude of respondents with different ethnics but there were no significant difference in the attitude among different age ranges, gender and highest education level which is shown in table 3 and table

prevention. The two most popular treatments for diabetes mellitus were medications and insulin therapy at 87.8% and 86.5%. For the allied care, the two most common measures that is important for diabetes mellitus prevention was blood sugar examination for 66.5% and blood pressure monitoring at 36.5%. For the awareness regarding symptoms of hypoglycemia the three main symptoms were dizziness, sweating and weakness/tiredness with 39.5%, 4.0% and 1.5% respectively.

5. For the practice, there is a statistically significant difference in the mean practice of respondents with different age ranges, different ethnic origin and different highest education level but no significant difference in the attitude among respondents of different gender which is shown in table 3 and table 6. The current literatures evaluating the relationship between age and knowledge of diabetes yielded mixed findings. In this study, there was a statistically significant difference in the mean knowledge of respondents with different age ranges and the younger respondents have higher knowledge than the older respondents with higher mean value. This was in agreement with a study carried out in Ankara, Turkey that found lower

level of knowledge of diabetes in older people[8]. This fact was also explained in another studies carried out in Singapore that younger respondents have more exposure such as reading more books and uses the internet as the sources of information compared to the older respondents[9]. This was also proved in this study when the younger respondents showed better practice towards this disease compared to the older respondents. There were some literatures evaluating the relationship between gender and knowledge and reported that gender is not a determinant of knowledge of diabetes mellitus [10] [11] which is also shown in this study that there were no significant differences in the mean knowledge, attitude and practice of respondents among different gender. The males and females currently all are having equal exposure and equal rights to be educated. This is one of the reason that the latest Malaysian National Health Morbidity Survey IV 2011 showed the prevalence of diabetes mellitus does not differ much between the male and female [12]. Highest educational level was found to be the predominant predictive factors of knowledge of diabetes mellitus [10]. However, in this study there were no significant differences in knowledge among respondents of different highest education level. This is a sign that everyone is almost having the same amount of knowledge on diabetes mellitus regardless their education level. However, for the practice section there were significant differences among respondents of different highest education level with the respondents from primary highest education level having the lowest practice. This was in agreement with a studies carried out in southern India that level of education influences knowledge on physical activity which is included in the practice section of this questionnaire [13]. The comparison between respondents of different ethnic showed a significant difference in the knowledge, attitude and practice of diabetes mellitus with the Chinese showing the highest whereas Indians showing the lowest amount of knowledge, attitude and practice in this disease. However, the explanations regarding ethnicity have not been discussed clearly in most literatures.

Awareness

The findings of this study revealed that more than half of the respondents (71%) were aware that diabetes mellitus is a condition of high blood sugar. Some of the respondents (13.8%) claimed that diabetes mellitus is a condition of high blood urine which is also right as it explains a condition known

as glycosuria, which are usually the result of high blood sugar levels especially when the diabetes mellitus were untreated. As the public was aware of this disease condition, we just need to enhance their knowledge through educational programmes to give them a better understanding of the condition of the disease which is also suggested by studies carried out in Singapore [6]. The findings for the symptoms and complications revealed that the respondents had a very good understanding on the symptoms and complications of diabetes mellitus. The respondents were able to recognize the main symptoms and complications of diabetes mellitus. The main symptoms recognized by the public were weight gain (64.5%) and frequent urination (57.8%) whereas the main complications recognized by them were kidney disease (62.3%) and foot problems (61.3%). Knowing the symptoms and complications will be the first step to aid in the disease management and would enable them to seek immediate medical attention without taking them lightly. Early recognition of the symptoms and complications may avoid unwanted conditions such as loss of vision or amputation. According to the studies carried out in Singapore, educating the public regarding the disease symptoms and complications will not only reduce the burden of this disease among individuals but also among their family and friends which in return will reduce the overall burden of this disease in the society [6]. The findings for the prevention and treatment revealed that the respondents are well knowledgeable on this section. The studies carried out in Singapore also revealed the similar results [6]. For the prevention, more than half of the respondents knew that lifestyle modifications such as healthy diet (89.5%), regular exercise (73.5%), and weight control (59%) plays an important role in preventing diabetes mellitus. Apart from that many respondents are aware of the main two treatment for this disease which is the drugs (87.8%) consisting of oral hypoglycemic agents and insulin (86.5%) along with lifestyle modifications. These findings revealed that the public are aware that both pharmacological and non pharmacological management work hand in hand to control diabetes mellitus. Awareness on the measures for allied care to detect early complication of diabetes mellitus revealed that the respondents are quite aware of the necessary measures such as blood glucose monitoring (66.5%), blood pressure monitoring (36.5%), foot examination (33.6%) and eye examination (27%). According to these findings there is still a major

area of concern about the public awareness on eye care. The similar findings were also revealed in Singapore [6]. This shows that the respondents did not know the need for regular eye checkup which should be addressed as soon as possible and given more importance in the future diabetes education programs as stated by a studies carried out in Kolkata[7]. The awareness regarding hypoglycemia was also found to be fairly good among the respondents. By identifying the symptoms of hypoglycemia the respondents will be able to control the symptoms.

CONCLUSION

In conclusion, the results of this study indicated that age and highest level of education were found to be the predominant predictive factors in most of the respondents whereas the gender of respondents did not affect the findings of this study. The results also revealed that the awareness of the public regarding diabetes mellitus is reasonably good except for some sections that needed to be given more concern such as on the eye care. Despite having good awareness, the prevalence and the burden of diabetes mellitus have been still high in Malaysia and it has been increasing according to the latest Malaysian National Health Morbidity Survey IV 2011 [12]. This shows that the public's knowledge and awareness on diabetes mellitus have not really encouraged them to adopt a healthy lifestyle to reduce the risk of developing diabetes mellitus. An improved and well structured educational programme that tackles the areas of weaknesses should be recommended to increase the level of public knowledge, attitude and practice along with public awareness of diabetes mellitus. Moreover, promotion on implementing healthy lifestyle along with the information about risk factors, diet, exercise, and screening should be encouraged through health campaigns. This can be started as early as in school levels and further into the community. However, healthy lifestyle practices are not easy to be implemented especially

in Malaysia where the public are highly exposed to sedentary lifestyle. The public needs to be counseled regularly on their dietary and food habits preferably by health care professions as this has been shown to be effective in motivating the public to achieve a healthy balanced food habits. Lastly, creating awareness is not a sole task it requires a team work consisting of all the health care professions such as the physician, pharmacist, nurse and possibly a dietician to work as a multidisciplinary team in controlling the escalating number of diabetics in Malaysia.

Implications

In future, this studies can be carried out in a bigger scale in Malaysia with a truly random sampling strategy instead of convenient sampling for similar projects. The baseline data obtained from this study will help in planning future educational programmes to control diabetes mellitus. The results obtained would not only help in identifying the areas to focus but also the type of population to be targeted to achieve the desirable outcome. Apart from educating the public, these programmes can be designed in such a way to train and upgrade the health care professions mainly the physicians and pharmacist to produce competent diabetes educators who would be able to educate the public on the control of diabetes mellitus.

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