Knowledge and Practices of Cardiovascular Diseases Prevention Among Patients With Type 2 Diabetes Mellitus at Hospital Universiti Sains Malaysia

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a well-known risk factor for cardiovascular disease (CVD). Healthy lifestyle practices can prevent cardiovascular complications among type 2 diabetes mellitus patients, but most studies showed that many people ignore these preventive measures. This study aimed to evaluate the knowledge and practices of cardiovascular disease prevention among patients with type 2 diabetes mellitus at Hospital Universiti Sains Malaysia (USM). **Methods**: The study involved 54 respondents through systematic random sampling. The self-administered questionnaire was used for data collection from February 2020 to March 2020. **Findings:** The mean age of the respondents was 54.50 ± 15.04 years. The findings revealed that 50% of the respondents had good knowledge while the other 50% had poor knowledge. Half (51.90%) of the respondents had poor practice regarding cardiovascular disease prevention. Factors significantly associated with the level of cardiovascular disease prevention practice were ethnic (p<0.05) and monthly household income (p<0.03). **Conclusion**: The knowledge of cardiovascular disease among the respondents was average but the practices of a healthy lifestyle to prevent the disease were still inadequate. The study emphasizes the need for more effective educational programs about cardiovascular disease and the recommended healthy lifestyle practices precisely for diabetic patients to keep the complication at bay thus achieving a better quality of life.

Keywords: Knowledge, Practice, Cardiovascular Disease, Type 2 Diabetes Mellitus

INTRODUCTION

Cardiovascular diseases (CVD) are disorders of the heart and blood vessels (1). CVD is a major health problem and a leading cause of mortality, morbidity, and economic burden in the world with an estimated 17.9 million people died from CVD in 2016 which represents 31% of all global deaths (2). In Malaysia, CVD has remained the top disease and first cause of death in Malaysia for 13 years since 2005 (3). The number of deaths attributable to CVD in Malaysia had increased almost double where 54.0% of death due to heart diseases, with total death 13,503 deaths in 2017 compared to only 8776 deaths in 2007 (Jay, 2019).

Diabetes mellitus (DM) is a chronic non-communicable disease identified by hyperglycemia due to relative or absolute impairment in beta cell insulin secretion with different degrees of peripheral resistance to the insulin action. Type 2 diabetes mellitus (T2DM) is the most common type of diabetes in adults. The statistic by the Institute for Public Health (4) reported that one in five adults in Malaysia have diabetes. The total of DM in 2019 was 18.3% of the total population which accounts for 3.9 million people affected with 9.4% known DM and 8.9% undiagnosed DM. In addition to the statistic, the prevalence of diabetes in the Kelantan state was around 20.0% to 25.1% (4).

Most patients with T2DM have at least one complication, and CVD is the leading cause of morbidity and mortality among these patients (5). T2DM was strongly associated with composite cardiovascular mortality and all type of CVD; peripheral arterial disease, ischaemic stroke, stable angina, heart failure, and non-fatal myocardial infarction (6). Despite that, undiagnosed diabetic patients also have an increased risk of developing macrovascular and

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microvascular complications (7).

The strong correlation between CVD and T2DM found in statistics from the American Heart Association (8) which stated that at least 68.0% of people age 65 or older with diabetes died from heart disease and 16.0% died from a stroke. In addition to this statistic, adults with diabetes are two to four times probably to die from heart disease than adults without diabetes. Assuredly, patients diagnosed with diabetes and have other risk factors such as hypertension, dyslipidemia, obesity, lack of physical activity, smoking and poorly controlled blood sugar are at even greater risk of heart disease compared to the one who has risk factor alone. However, by managing their risk factors, diabetic patients may avoid or delay the development of heart and blood vessel diseases (8).

Regardless of many advance medical cares that have been intervened, CVD remains the prime cause of morbidity and mortality in people with T2DM. Yet, many diabetic patients still not aware of the connection between these two conditions, and in turn, may not taking proper steps to reduce CVD risk because they may not well educate about it. Furthermore, most people did not notice having heart disease until experiencing a heart attack or notice chest pain and shortness of breath with simple exercise or when walking (9)

CVD will keep on being a health threat if the CVD risk factors are unidentified and no actions are implemented to lessen their impact (10). With the elevated prevalence of risk factors and mortality cases, the efforts focused on CVD risk factors reduction in patients with diabetes continue to be essential. As it was unknown whether CVD knowledge enabled diabetic patients to prevent CVD complications, this study endeavoured to investigate the knowledge and practice of CVD prevention among diabetes patients and factors associated with the practice.

The objectives of this study are 1) to determine level of knowledge and practice towards CVD prevention among T2DM patients in Hospital USM, 2) to examine the association between practices of CVD prevention and knowledge and 3) to examine other factors influence practice of CVD prevention among T2DM patients in Hospital USM. Study hypothesis was there is an association between knowledge and practices of CVD prevention among T2DM in Hospital USM.

METHODOGY

The study used a cross-sectional study design and was conducted at Klinik Rawatan Keluarga (KRK) of Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan from February until March 2020. This study was conducted among patients with T2DM who attended KRK of Hospital USM within the data collection period. The inclusion criteria were patients diagnosed with type 2 diabetes mellitus, age above 18 years old, and able to understand and respond in the Malay Language. The exclusion criteria were patients that had an underlying psychiatric disease and cognitive impairment.

The sample size estimation was calculated using a single proportion formula and the population proportion taken based on a previous study conducted by Mohamad et al (11). A systematic random sampling method was used for the collection of data. A list of patients with T2DM which under follow-up KRK in a month has been obtained first to calculate sample interval. Patients were selected based on the ratio 1:5 of the day list during the day of data collection. All of them were given a set of questionnaires to be completed.

The study protocol was approved by the Research Ethics Committee (Human) of Universiti Sains Malaysia, Kubang Kerian (USMKK/JEPeM/19110772). Written informed consent was obtained from the participants before data collection. All participants and their backgrounds were kept anonymous and confidential.

A set of validated knowledge and practice of CVD questionnaire was adopted from Mohamad et. al, (15). The first part consists of socio-demographic data. Part II consists of 28 items for knowledge regarding cardiovascular disease. The subdomains included risk factors, symptoms, and normal levels for CVD risk factors. The respondents had three options of "Yes", "No" and "Not Sure" for their responses to the knowledge questions. The respondents scored 1 marks for correct answers and 0 for the wrong answer and not sure. The cumulative score for knowledge would range from zero to 28. The total score of knowledge was categorized based on mean; as good if the score was 17-28 point and poor if the score less than 16 point. There are 12 questions about the practice of CVD prevention with each question has three options of answers which are "Always", "Never" and "Seldom". The respondents scored 2 marks for the practice they should adopt in their life to prevent CVD development while 1 mark for the seldom practice and 0 marks for the practice that they should avoid. The cumulative score for practice would range from zero to 24. The total score for practice was categorized based on the

mean; as good if the score was 14-24 point and poor if the score was less than 13 point. The Cronbach's alpha for these questionnaires was 0.73 and 0.72 respectively (15).

Data were analyzed using Statistical Package for Social Sciences Software (SPSS) version 24.0. Descriptive analysis was used to analyze the socio-demographic and the level of knowledge and practice on CVD prevention. All numerical variables were tested for normality using the Kolmogorov-Smirnov goodness-of-fit test. Numerical variables for knowledge and practice score were normally distributed and were analyzed using parametric tests: Pearson correlation to examine the association between knowledge and practice. A Chi-square (χ2) tests was used to examine significant association of categorical variables and practice of CVD prevention.

RESULTS

Sociodemographic Data of Respondents

A total of 54 T2DM patients were invited to this study. All of them completed the questionnaires making the response rate 100%. The mean age of the respondents was 54.5 ± 15.0 years with ranging from 18 years to 79 years old. Female was the majority of respondents (64.8%) and there were only two races involved in the study which were Malay (92.6%) and Chinese (4.7%). Besides, almost all of them were married (94.4%). More than half of the respondents (72.2%) were unemployed while 20.4% were employed and 7.4% were self-employed. For the education level, 38.9% of the respondents finished their education until secondary education followed by tertiary education (33.3%) and primary education (22.2%). The mean of the monthly household income of the respondents was RM2100.54 ±RM1851.81.

CVD Risk Factors of Respondents

Respondents were asked about their related CVD risk factors as shown in Table 2. The majority of respondents have been diagnosed with hypertension (68.5%) followed by hypercholesterolemia (64.8%). Besides, 48.1% of the respondents were obese or overweight and 29.6% of them had ischemic heart disease. Most of the respondents had a family history of hypertension and diabetes mellitus (53.7%) followed by heart disease (22.2%) and early heart attack (11.1%).

Knowledge of Cardiovascular Disease

Most respondents gave correct answers for general knowledge questions (Table 3). In terms of knowledge on CVD risk factors, the most agreed CVD risk factor was stress factor (88.9%). Furthermore, many respondents realized that lifestyle factors which are obesity, hypertension, high lower-density lipoprotein (LDL) cholesterol, smoking are the factors that affect CVD development. Less than 20% of the respondents in this study did not know that smoking and diabetes can exacerbate CVD. Regarding knowledge of CVD symptoms, chest pain symptom was the highest correct answer from the respondents. Most of the respondents (68.5%) knew the normal value of fasting blood sugar and 63% of them knew the normal value of blood pressure. The mean score of knowledge regarding CVD among T2DM patients in this study was 16.9 ± 4.7. In overall, 59.3% T2DM patients in this study had good knowledge and 40.7% had poor knowledge regarding CVD.

Practice on CVD Prevention

The most common practice of CVD prevention from respondents in this study was reducing stress in their life (98.1%). Fortunately, the respondents in this study care for their health as they take treatment as recommended by the doctor (88.9%) and they had visited the doctor regularly (92.6%). The highest seldom practices practiced by respondents were taking fatty food more than three times per week followed by exercise more than 20 minutes three times a week. However in term of modification of diet in preventing CVD, majority (85.2%) T2DM patient in this study cannot take less salt in their diet per day. The mean score for the practice of CVD prevention was 13.6 ± 3.1. In overall, only 48.1% T2DM patients in this study had good practice on CVD prevention. Thus, the practices of CVD prevention among T2DM patients is still inadequate.

This study also assessing the practice towards CVD prevention in an aspect of CVD risk factors which are blood pressure, cholesterol, and body weight. All respondents had measured their blood pressure and body weight but 16.7% of them never checked their cholesterol level (Table 4). In terms of the regularity of screening of CVD risk factors, the majority of the respondents had measured all the CVD risks in less than a year. For the level of measurement among CVD risk factors, cholesterol level had the least normal value among respondents (14.8%). Over half of respondents (61.1%) indicated that they had a normal value of blood pressure and half of them had normal body weight.

Table 1: Socio-demographic data of respondents (n=54)

Variables	n (%)	mean ± SD
Age		54.5 ± 15.0
Gender		
Male	19 (35.2)	
Female	35 (64.8)	
Race		
Malay	50 (92.6)	
Chinese	4 (7.4)	
Marital status		
Single	3 (5.6)	
Married	51 (94.4)	
Occupation		
Unemployed	39 (72.2)	
Employed	11 (20.4)	
Self-employed	4 (7.4)	
Level of education		
No formal education	3 (5.6)	
Primary education	12 (22.2)	
Secondary education	21 (38.9)	
Monthly income (RM)		2100.54 ± 1851.81

*RM = Ringgit Malaysia

Table 2. A self-reported CVD risk factor of respondents (n=54)

Variables	n (%)
Smoking status	
Yes	5 (9.3)
Hypertension	
Yes	37 (68.5)
Ischemic heart disease	
Yes	16 (29.6)
Hypercholesterolemia	
Yes	35 (64.8)
Obesity/overweight	
Yes	26 (48.1)
Stroke	
Yes	5 (9.3)
Family history of heart disease	
Yes	12 (22.2)
Family history of early heart attack	
Yes	6 (11.1)
Family history of hypertension	
Yes	29 (53.7)
Family history of diabetes mellitus	
Yes	29 (53.7)
No	25 (46.3)

Table 3: Percentage of knowledge items regarding CVD among T2DM patients in HUSM (n=54).

Knowledge on CVD	Yes	No	Not sure
	n (%)	n (%)	n (%)
General knowledge			
CHD is narrowed small blood vessel	43 (79.6)	3 (5.6)	8 (14.8)
Heart disease is the main cause of death in Malaysia	33 (61.1)	9 (16.7)	12 (22.2)
Knowledge of CVD risk factors			
Stress	48 (88.9)	2 (3.7)	4 (7.4)
Obesity	45 (83.3)	4 (7.4)	5 (9.3)
Hypertension	41 (75.9)	4 (7.4)	9 (16.7)
High LDL cholesterol	41 (75.9)	6 (11.1)	7 (13.0)
Smoking	40 (74.1)	6 (11.1)	8 (14.8)
Diabetes	39 (72.2)	7 (13.0)	8 (14.8)
Chronic renal failure	33 (61.1)	9 (16.7)	12 (22.2)
Regular exercise[a]	14 (25.9)	32 (59.3)	8 (14.8)
Increasing age	31 (57.4)	15 (27.8)	8 (14.8)
Family history of heart disease	24 (44.4)	22 (40.7)	8 (14.8)
Previous history of MI	24 (44.4)	23 (42.6)	7 (13.0)
Menopause	16 (29.6)	17 (31.5)	21 (38.9)
Knowledge of CVD symptoms			
Chest pain	52 (96.3)	1 (1.9)	1 (1.9)
Palpitation	49 (90.7)	-	5 (9.3)
Shortness of breath	47 (87.0)	2 (3.7)	5 (9.3)
Sweating	47 (87.0)	3 (5.6)	16 (29.6)
Epigastric pain	32 (59.3)	9 (16.7)	13 (24.1)
Pain at jaw, neck, and left shoulder	30 (55.6)	8 (14.8)	16 (29.6)
Dizziness	30 (55.6)	11 (20.4)	13 (24.1)
Headache	27 (50.0)	12 (22.2)	15 (27.8)
Nausea and vomiting	28 (51.9)	14 (25.9)	12 (22.2)
Knowledge on normal CVD risk level			
Fasting blood sugar normal	37 (68.5)	3 (5.6)	14 (25.9)
Blood pressure normal < 140/90	34 (63.0)	1 (1.9)	19 (35.2)
BMI normal <25kg/m²	7 (13.0)	1 (1.9)	46 (85.2)
LDL-C normal > 2.6 mmol/L[a]	10 (18.5)	5 (9.3)	39 (72.2)
HDL-C normal <1 mmol/L[a]	10 (18.5)	4 (7.4)	40 (74.1)

[a]Knowledge items that had the answer "No" correctly

Table 4: Percentage of practice towards CVD prevention among T2DM patients in Hospital USM (n=54)

Practice towards CVD prevention	Always	Never	Seldom
1. Reduce stress	53 (98.1)	-	1 (1.9)
2. Take treatment as recommended by doctor	48 (88.9)	1 (1.9)	5 (9.3)
3. Visit a doctor for advice regularly	50 (92.6)	3 (5.6)	1 (1.9)
4. Doing nothing and depend on fate[a]	5 (9.3)	48 (88.9)	1 (1.9)
5. Take traditional medicine or herb[a]	4 (7.4)	42 (77.8)	8 (14.8)
6. Maintain normal weight	22 (40.7)	24 (44.4)	8 (14.8)
7. Avoid smoker or being a passive smoker	22 (40.7)	29 (53.7)	3 (5.6)
8. Exercise more than 20min 3x/week	14 (25.9)	23 (42.6)	17 (31.5)
9. Taking Omega 3 for heart disease prevention	9 (16.7)	39 (72.2)	6 (11.1)
10. Increase knowledge about CVD through mass media or internet	7 (13.0)	33 (61.1)	14 (25.9)
11. Taking fatty food more than 3x/week[a]	27 (50.0)	4 (7.4)	23 (42.6)
12. Taking salt more than 3 spoon/day[a]	46 (85.2)	3 (5.6)	5 (9.3)
	Blood Pressure	Cholesterol	Body Weight
Ever measured	54 (100)	45 (83.3)	54 (100)

Regularity
    <than yearly
    Yearly
    ≥2 yearly
	51 (94.4)
	2 (3.7)
	1 (1.9)
		40 (74.1)
		3 (5.6)
		2 (3.7)
			49 (90.7)
			3 (5.6)
			2 (3.7)

Level
    Normal
    Not normal
    Not sure
	33 (61.1)
	20 (37)
	1 (1.9)
		8 (14.8)
		33 (61.1)
		4 (7.4)
			27 (50)
			26 (48.1)
			1 (1.9)

[a]Negative practice item which respondents should avoid

Table 5: Association of socio-demographic factors and practice of CVD prevention among diabetic patients in Hospital USM.

Variables	Level of CVD practice prevention, n (%)		p-value
	Poor (0-13)	Good (>14)	
Age	56.0	53.5	0.56[a]

Gender
    Male
    Female
	
	6 (31.6)
	15 (42.9)
		
		13 (68.4)
		20 (57.1)
			0.42[b]

Ethnic
    Malay
    Chinese
	
	21 (42.0)
	-
		
		29 (58.0)
		4 (100.0)
			0.10[b]

Marital status
    Single
    Married
	
	2 (66.7)
	19 (37.3)
		
		1 (33.3)
		32 (62.7)
			0.31[b]

Occupation
    Unemployed
    Employed
	
	16 (41.0)
	5 (33.3)
		
		23 (59.0)
		10 (66.7)
			0.60[b]

Level of education
    Low education
    High education
	
	16 (44.4)
	5 (27.8)
		
		20 (55.5)
		13 (72.2)
			0.24[b]

Monthly household income	1406.9	2583.0	0.04[a]

p-value <0.05 was considered as statistically significant

[a]Independent Sample Test

[b]Chi-Square test

Factor influence the practice of CVD prevention

Factors that were examined in this study are knowledge of CVD and sociodemographic which include age, gender, ethnicity, marital status, occupational status, level of education, and monthly income. Based on Pearson Correlation test, there is no significant correlation between knowledge of CVD and the practice of CVD prevention (r = 0.12, p = 0.37). There was a significant association between the practice of CVD prevention and household income (p=0.04) while other factors showed no significant association (Table 5). Respondents that have more income practiced good CVD prevention while respondents who had less income practiced poor CVD prevention.

DISCUSSION

Knowledge of Cardiovascular Disease among Diabetic Patients

The findings showed that more than half (59.3%) T2DM patients in Hospital USM had a good knowledge regarding CVD with mean score 16.4. This percentage of having good level of knowledge among T2DM patients in this study was much better compare to patients with acute myocardial infarction in Karachi Pakistan (42%) (12). This mean score knowledge of CVD was consistent with study among adult Turkish as their knowledge levels about risk factors on CVD at a medium level of score (13). However, mean score in this study was low compare to study among diabetic patient in Turkey (62.81 ± 17.59 out of 100) (14).

The present study showed that stress was recognized as CVD risk among respondent compared to other risk factors. Stress is the behavior associated with depression and it is one of the factors that can contribute to the development of CVD. Diabetic patients are found to be approximately three times possibly to have depression than nondiabetic people, while diabetic patients are already predisposed to a greater risk for poor cardiovascular health (15). Besides, the present study reported the other risk factors of CVD chosen by respondents were obesity followed by hypertension, hypercholesterolemia, and smoking. A study among the public in Kuwait also reported

moderate knowledge regarding CVD risk factors and four-fifths of their respondents identified that smoking, obesity, unhealthy diet, and physical activity were the common factors for CVD (16).

Diabetes has become one of the most critical risk factors that cause CVD. However few studies showed that a quite number of the respondents from his study did not know about this fact. Besides few studies also found that less than 40% of their respondents knew that diabetes could be the risk factor for CVD (17–19). The current study reported more than half of the respondents agreed that diabetes was the risk factor of CVD, but they're still the slightest number of respondents who did not agree and unsure about this. This shows that not everyone knows the relationship between diabetes and CVD.

Regarding the symptoms of CVD, most respondents recognized chest pain was the most commonly known symptom followed by palpitation and shortness of breath, however many of them did not know atypical symptoms such as sweating and pain in the jaw, neck, and left shoulder were also the symptoms of CVD. The result was consistent with the study done among the general public in Kuwait and Penang as for the most chosen and unchosen symptoms in the questionnaire (16,17). In the aspect of the level of risk measurement, more than half of the respondents knew the normal level of fasting blood sugar and blood pressure, but they were not aware of bad (LDL) and good (HDL) cholesterol followed by the least which was BMI. The result was also reported by Muhammad et al (11) among women in Kelantan.

High percentage of T2DM patient in this study had good knowledge regarding CVD probably because they had regular health visit to clinic for their follow up and treatment. This is also supported when they were high percentage of respondent that had hypertension, hypercholesterolemia and more than half were obese. Having comorbidities will lead to more awareness among people as being reported by Andsoy et al (13), people who have other health conditions valued themselves as high risk of CVD and had high knowledge.

The practice of Cardiovascular Disease among Diabetic Patients

The responses on the questionnaires showed that 51.9% of the respondents adopting poor practice which indicates that diabetic patients not practicing healthy lifestyles in their life. The result

was consistent with other study by Ejaz, et al. (20) among adults in a rural community in Lahore, Pakistan. The study found that overall practice regarding CVD risk reduction behavior was poor where no one was following regular exercise, dietary modification, manage stress, and smoking. The study had suggested the rural community should modify their lifestyle to improve the behavior.

The highest common practice among diabetic patients in this study was reducing the stress in their life. This behavior was the most common as the majority of the respondents knew stress as the risk factor of CVD in the knowledge section of the questionnaire. This result was in contrast with another study among Malaysian public university students as they found most of the respondents lead a stressful life although they believed that reducing stress was one of the ways to prevent or reduce the heart disease occurrence (19). The difference results might be due to the age gap and responsibilities between the respondents in the studies. Furthermore, many respondents had good health-seeking behavior as they took treatment as suggested by the doctor and they visited the doctor for advice regularly. According to National Morbidity Health Survey report (4), 57.5% of Malaysian adults sought treatment, medication, or advice from healthcare which supported the findings.

The present study showed poor practice in dietary habits where the majority of diabetic patients took fatty food and salt more than the appropriate amount, respectively. These findings are in agreement with Oli et al, who reported that diet as a major contributor to CVD. Salty, fatty, and oily food were identified as a frequent cause of cardiac ailments (21). Salt reduction strategy is the simplest and most cost-effective measure for reducing CVD because of its high impact on health, high feasibility, and low implementation costs. Without strategic interventions to reduce salt intake, the prevalence of hypertension, and potentially resulting from CVD. High consumption of saturated fatty acids increases the risk of developing CVDs and increased prevalence of stroke (22).

Furthermore, exercise is one of the practices of CVD prevention. Only less than 30% of the diabetic patients in this study always exercise more than 20 minutes three times every week. Sadly, the majority of the respondents never did the exercise as recommended and 31.5% of them rarely did the exercise. This was consistent with a study from Andsoy et al, that reported the respondents showed undesired levels of regular exercise (13). This is supported by the National Morbidity Health Survey (4) report on level of physical activity among Malaysian adults. It showed that the prevalence of physical inactivity among Malaysian adult was 25.1% where there was a reduction compared to 2011 (35.7%) and 2015 (33.5%).

As the sample of this study was taken at the clinic in Hospital USM, so all the respondents had measured their blood pressure and body weight. However, there still had a difference in the regularity of the check-up where the majority of the respondents had a check-up in less than a year. There were third-fifth of the respondents who had a normal level of blood pressure while only a small number of them had normal cholesterol levels. Despite that, the statistics showed that the total of hypercholesterolemia among Malaysian adults in 2019 was 38.1% were affected and the trend decreased from the prevalence in National Health Morbidity Survey (NHMS) in 2015 (4). For bodyweight, half of the respondents claimed had a normal body weight while others were not normal. A previous study found that respondents with low practice scores of CVD prevention had higher BMI when compared to those with high practice scores (23). It also being highlighted in NHMS where 50.1% of Malaysian adults had overweight or obese with 30.4% of them were overweight while 19.7% were obese and the highest was found among females and those aged 55 to 59 years old (4). Statistic from these studies shows that Malaysian did not practice a healthy lifestyle and not attempted to reduce their weight to a normal level.

The nation's rapid economic growth along with technological advancement and urbanization in many developing countries including Malaysia has led to changes towards a lifestyle of convenience and luxury with smoking, increasingly sedentary lifestyle, and unhealthy dietary practices. These are the common practices that contributed to the rise of CVD.

Factors influence the practice of CVD prevention

Knowledge is an important part of behavior changes and people must have the necessary information on CVD risk factors to implement preventive behavior (11). Good health behavior has always been assumed to have correlations with good knowledge. However, the current study found that there was no significant association between knowledge of CVD and

practice of CVD prevention. This finding was similar to previous studies (18, 25). However, this finding is contrary to a previous study by Muhamad et al (11) which suggested a positive association between knowledge, attitude, and practice independent of sociodemographic factors among female patients in Kelantan, Malaysia. It can be concluded that knowledge of T2DM patients in Hospital USM was good, however half of them had poor practice level of CVD prevention. Thus, they still need more empowerment about CVD prevention to prevent this complication of diabetes.

In the current study, monthly household income of respondents is the one factor significantly associated with the practice of CVD prevention (p < 0.05). The current study showed no association between age and practice of CVD. It can be seen that most respondents who participated in this study are from age 55 years old. It was revealed that most Malaysian adults were not practicing healthy eating habits or moderately physically active. A previous study had reported that older age was associated with multiple risk factors of CVD in both men and women. However, the occurrence of having more than three risk factors was higher among men in the middle age while for women, the significantly higher prevalence was observed at a younger age group. This might be due to women become more sedentary and obese at a younger age compared to men (25). In terms of gender, there was no association with the practice of CVD prevention which consistent with Haque et al (18). The result was opposite with a previous study which had found the significant association between gender and practice of risk-reducing for CVD (p =0.017) with females had a better practice level than males. Compared to another study among Asian patients reported that males have higher practice scores than females (24).

The monthly household income of respondents in this study showed a significant difference in the practice of CVD prevention. The study by Der Ananian et al (26) found that the participants with lower economic status were perceived as having more life stressors and reduced access to health insurance, healthy food choices, and places to be physically active. The study suggested the interventions for people with low income can focus on ways to improve dietary quality, how to locate healthy, affordable foods, and how to engage in low-cost physical activities. Besides, the intervention also can focus on enhancing healthcare access among low-income individuals through screenings and improving connectivity to healthcare. This finding highlights the need for targeting individuals with low income as it may due to their capability to afford healthy food (26).

Limitation of this study

Our study has few limitations. First, level of knowledge was assessed using a structured questionnaire. Subjects may have responded positively to all knowledge item introduced. Secondly, despite the questionnaire has been validated by original author but the Cronbach alpha for the questionnaire was quite low that may need revision of the items. The chosen of this questionnaire because this is the only Malay version of questionnaire regarding knowledge and practice of CVD prevention available as we had lack of time to do validation study or adopted from other language version. Finally, the results obtained from the sample group of this study cannot be generalized to the entire T2DM patients in Malaysia. However, this study provides direction for future studies about CVDs knowledge and practice with larger sample groups of T2DM patients.

CONCLUSION

This research has shown that the level of knowledge regarding CVD among T2DM patients in Hospital USM was good (59.3%), but the level of practice towards CVD prevention among them was poor (51.9%). Although the knowledge level was good among respondents in this study, it is still not optimal as their practice was still poor. Besides, there was no significant association between knowledge and practice of CVD in this study. The study found only one significant associations between sociodemographic and practice of CVD prevention which was monthly household income of the respondents. Diabetes mellitus is the established risk factors, and their adequate control is known to reduce the incidence of cardiovascular disease. Thus, this study suggests the need for further empowerment of the practice of prevention among T2DM patients especially in term of lifestyle modification.

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CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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