Do Patients with Type 2 Diabetes Mellitus Know about Specific Dietary Recommendations?

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ABSTRACT

INTRODUCTION: Diabetic patients generally have a good idea about healthy diet however their awareness regarding specific dietary recommendations is questionable. Thus, this paper aims to examine the awareness regarding specific dietary components among diabetic patients at a primary care clinic and its influence on self-reported dietary practice. **MATERIALS AND METHODS:** The Summary of Diabetes Self-Care Activities (SDSCA) questionnaire (English-Malay version) was used. It was adapted with additional questions to assess respondents' awareness on: (1) healthful eating plan, (2) the quantity of one serving of fruits and vegetables, (3) choices and the allowed quantity of high fat food intake, (4) meaning of carbohydrate, and (5) carbohydrate spacing per day. **RESULTS:** From the 360 respondents, 85.0% knew about healthful eating plan. However, those who were unaware of the meaning of carbohydrate, carbohydrate spacing, the allowed high fat food intake, and the quantity of one serving of fruits and vegetables were 34.1%, 47.5%, 40.0%, and 30.8% respectively. Generally, the dietary practice reported by those who knew 'one serving of fruits and vegetables' ($p<0.001$), 'allowed quantity of high fat food intake' ($p=0.001$), 'meaning of carbohydrate' ($p<0.001$), or 'carbohydrate spacing' ($p<0.001$) was significantly different than those who were unaware of these terms. **CONCLUSION:** Although most respondents knew about healthful eating plan, majority of them were unaware of the specific dietary components, suggesting superficial dietary knowledge. Unfortunately, poor dietary awareness significantly influenced their self-reported dietary practice which could be considered as inaccurate. Thus, strategies to improve their dietary knowledge is necessary at the primary care setting.

Keywords: Type 2 diabetes mellitus, diet, awareness, self-care, primary care

INTRODUCTION

The prevalence of type 2 diabetes mellitus (T2DM) is on the rise globally and by 2030 the total number of adults with T2DM in every region in the world is estimated to increase by 50%.[1] In Malaysia, the prevalence of T2DM has increased from 6.3% to 11.6% over two decades and the latest reported prevalence in 2013 was 22.9%.[2,3] Most worrying is that a majority of the patients with T2DM in Malaysia have poor glycaemic control.[4-7] According to a study involving 70,889 diabetic patients from both primary and tertiary centres in Malaysia, only 30.9% of them had HBA1C of less than 7%.[4] Therefore, many patients with T2DM are at high risk of developing multiple debilitating complications.

To delay or even prevent complications of T2DM, maintaining optimal glucose control is the cornerstone of its management. This requires lifelong medical treatment and lifestyle adjustment, which includes healthy eating. Adherence to healthful eating plan for patients with T2DM helps them to achieve good control of blood glucose, weight, blood pressure and lipid.[8] It involves consuming different types of healthy food (e.g. quality carbohydrate, fibre and whole grain, protein, and food containing mono or polyunsaturated fatty acids), portion control, reducing energy intake to promote weight loss, and monitoring carbohydrate intake through counting and spacing of carbohydrate.[8]

Adherence to healthful eating plan can be assessed using various assessment tools namely dietary recall through one-to-one interviews, food diaries and self-administered questionnaires. One of the widely used questionnaires both in research and clinical practice is the Summary of Diabetes Self-Care Activities (SDSCA).[9-11] This self-administered questionnaire assesses the level of practice of self-care activities including diet, exercise, blood glucose testing, foot care and smoking.[9] In terms of diet, the SDSCA measures patients' adherence to four dietary practice within the past seven days, which are: (1) following healthful eating plan (2

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items), (2) eating five or more servings of fruits and vegetables (1 item), (3) eating food containing high fat such as red meat or full-fat dairy products (1 item), and (4) spacing carbohydrate intake evenly through the day (1 item). The SDSCA is a public domain which has been translated into various languages including Malay language and tested for its validity and reliability.[9-12] The psychometric properties of the Malay-version SDSCA were tested among Malaysian children and adolescents and its Cronbach alpha was 0.74.[12]

Even though the Malay-version SDSCA has been shown to be valid and reliable[12] and was used in a number of studies[13-15], difficulties to understand a few terms used in the questionnaire were observed among some patients when the SDSCA was used during our clinical practice. The terms include "healthful eating plan", "five or more servings of fruits and vegetables", "food containing high fat such as red meat or full-fat dairy products", and "space carbohydrate evenly through the day". These patients might have poor knowledge on the specific dietary components since they admitted that they did not know the quantity of one serving of fruits or vegetables, the quantity of high fat food allowed to be taken, and the meaning of carbohydrate and/or carbohydrate spacing.

Previous studies had also shown that superficial dietary knowledge was common among patients with T2DM in Malaysia although a majority of them recognised the importance of healthy diet in achieving good diabetes control.[16-19] Patients with T2DM usually understand the general concept of healthy diet which includes eating small amount of food at regular time, taking more vegetables and reducing intake of sugary food, carbohydrate and high fat food.[16-18,20] However, many patients have poor understanding on the specific components of a well-balanced diet, choices of healthy food and the recommended servings.[16,17,19] This lack of awareness could prevent them from practicing the right healthy diet.[16,17,19,21,22] Thus, it is important to identify gaps in knowledge related to specific dietary components among patients with T2DM.[21,23-25]

Therefore, this article aims to examine awareness of primary care patients with T2DM on specific dietary components which include the quantity of one serving of fruits and vegetables, choices of food containing high fat other than red meat and full-fat dairy products, the quantity of high fat food allowed to be taken, as well as the meaning of carbohydrate and carbohydrate spacing. Their awareness on healthful eating plan was also assessed. In addition, difference in self-reported dietary practice between patients who were aware and unaware of these specific dietary components was examined.

MATERIALS AND METHODS

Study design and study population

This was a cross-sectional study done at a government primary care clinic in Selangor, Malaysia, which had about 3000 registered patients with diabetes. The sample size was calculated using the StatCalc EpiInfo 7 software to satisfy the study's main objective which was to determine the prevalence of patients performing various self-care activities. Prevalence for each self-care activities found by Tan and Magarey (2008) and Safford et al (2005) was used.[17,26] With a precision of 5% and confidence interval of 95%, the largest calculated sample size was 339 respondents based on the prevalence of those who practiced medication adherence ie 54%.[17] This sample size was larger than that required to assess the prevalence of those with good dietary knowledge i.e. 328 respondents.[16,27,28] Considering the drop-out rate of 20%, the total sample size calculated for this study was 405 respondents.

Patients with T2DM aged 18 years or older who could read and understand Malay and/or English were included in the study. Those who were pregnant, diagnosed with psychiatric problems or terminal illness and dependent on others, as well as those who required emergency treatment during the clinic visit were excluded. It was estimated between 1000-1500 T2DM patients would come for their follow-up during the month of data collection. Every third patient who attended the diabetic corner was approached.

Data collection

In this study, a bilingual (English and Malay) self-administered SDSCA questionnaire was used. Six additional questions in both English and Malay language were developed to assess the respondents' awareness on the specific terms used in the SDSCA. These questions were: (1) "Do you know what the healthful eating plan is for patients with diabetes?", (2) "Do you know how much is one serving of fruits and vegetables that you need to take?", (3) "Do you know which food contains high fat apart from red meat or full-fat dairy products?", (4) "Do you know how much high fat food that you could take?", (5) "Do you know what carbohydrate is?", and (6) "Do you understand about spacing carbohydrate in a day?". The response to these questions was either: 'yes', 'no' or 'not sure'. The respondents who answered 'no' or 'not sure' were considered as 'unaware' of the terms assessed, whereas those who answered 'yes' were considered as 'aware' of the terms. A panel of experts consisted of three Family Medicine Specialists and a diabetic nurse educator were involved in validating the content of the adapted questionnaire. Face validity was subsequently conducted on six patients with T2DM at a primary care clinic.

Ethical considerations

This study received approval from the Research and Ethics Committee of Universiti Kebangsaan Malaysia (FF-2013-310) and was registered at the National Medical Research Registry (NMRR-13-941-17109). Permission to use the English and Malay versions of

SDSCA questionnaire was obtained from the original author, Prof Toobert DJ, and the Clinical Centre Research Malaysia respectively.

Data analysis

The analysis was done using the SPSS version 21.0. Descriptive analysis was used to describe the respondents' sociodemographic characteristics and awareness on the specific dietary components. Chi-square test was performed to assess the association between the respondents' awareness of healthful eating plan for patients with T2DM and their awareness of each specific dietary component. The odds ratio (OR) with 95% confidence interval (CI) for each association was also calculated. At the same time, Chi-square test was done to examine the difference in the reported dietary practice between those who were aware and unaware of the assessed dietary components. The p value (two-sided) of less than 0.05 was considered statistically significant.

RESULTS

Out of 405 patients who were approached and met the study criteria, only 360 patients were included in the analysis. Ten patients did not provide consent to participate in this study and 35 of them did not complete the questionnaire, thus they were excluded. The response rate was 88.9%. The respondents' sociodemographic characteristics is shown in Table 1.

Based on the analysis of the additional questions assessing the respondents' awareness of the specific dietary terms used in the SDSCA, 85.0% of them admitted that they knew about healthful eating plan for patients with T2DM. These results are shown in Figure 1.

In this study, the respondents' awareness on healthful eating plan was significantly associated with their awareness of each specific dietary component (Table2). However, there were substantial proportions (63.1-73.6%) of those who were unaware of these specific dietary components also claimed to know the healthful eating plan.

Generally, the dietary practice reported by those who knew the specific dietary components (i.e. 'the quantity of one serving of fruits and vegetables', 'the allowed quantity of high fat food intake', 'meaning of carbohydrate', or 'carbohydrate spacing in a day') was significantly different compared to those who were unaware of these specific dietary components (Table 3). Significantly more respondents who knew about 'the quantity of one serving of fruits and vegetables' [90.0% (aware) versus 75.7% (unaware), p<0.001], 'the meaning of carbohydrate' [86.4% (aware) versus 75.0% (unaware), p<0.001] or 'carbohydrate spacing' [90.0% (aware) versus 74.3% (unaware), p<0.001] practiced the related diet as recommended in more days per week (i.e. ≥3 days/week) as compared to the unaware groups. In line with the above findings, a significantly higher proportion of the respondents (p=0.001) who knew the allowed quantity of high fat food intake (72.7%) ate high fat food in lesser days per week (i.e. ≤2 days/week) who were unaware of it (57.0%).

Table 1: Sociodemographic characteristics of the respondents

Sociodemographic characteristics	Frequency (%)
Age - years (n=360)	53.4 (10.5)*
≤40	40 (11.1)
41-60	225 (62.5)
≥61	95 (26.4)
Gender (n=360)	
Male	145 (40.3)
Female	215 (59.7)
Ethnic (n=360)	
Malay	260 (72.2)
Chinese	31 (8.6)
Indian	64 (17.8)
Others	5 (1.4)
Education level (n=360)	
Primary education or less	85(23.6)
Secondary education	222 (61.7)
Tertiary education	53 (14.7)
Household Income - RM/month (n=183)	2299.8 (1577.3)*
Low income	94 (51.4)
Middle income	76 (41.5)
High income	13 (7.1)
Occupation (n=360)	
Employed	146 (40.6)
Unemployed	214 (59.4)
Living status (n=360)	
With others	350 (97.2)
Alone	10 (2.8)
Marital status (n=360)	
Single/Divorced/Widowed	59 (16.4)
Married	301 (83.6)

***** Mean (SD)

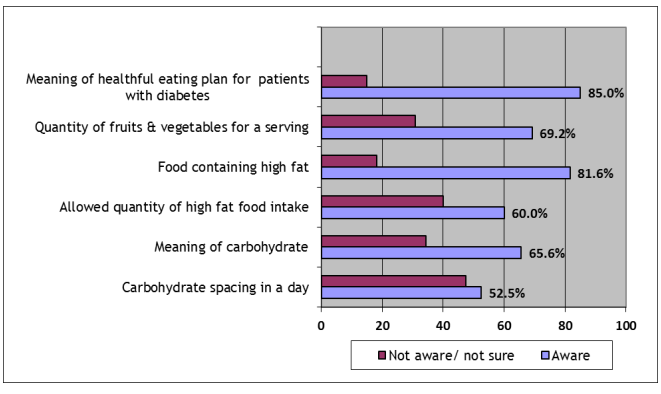

Figure 1: Respondents' perceived awareness on the specific dietary components assessed in the SDSCA questionnaire (n=360)

Table 2: Perceived awareness of the specific dietary components among respondents who were aware and not aware about healthful eating plan for patients with T2DM

Awareness about specific diet	Awareness of the healthful eating plan for patients with T2DM		p-value*	Crude OR (95% CI)
	No/Not sure (n=54) Frequency (%)	Yes (n=306) Frequency (%)		
One serving of fruits & vegetables				
Not aware / Not sure (n=111)	41 (36.9)	70 (63.1)	<0.001	1
Aware (n=249)	13 (5.2)	236 (94.8)		10.6 (5.40, 20.96)
Food containing high fat				
Not aware / Not sure (n=65)	21 (32.3)	44 (67.7)	<0.001	1
Aware (n=295)	33 (11.2)	262 (88.8)		3.79 (2.01, 7.14)
Allowed quantity of high fat food				
Not aware / Not sure (n=144)	38 (26.4)	106 (73.6)	<0.001	1
Aware (n=216)	16 (7.4)	200 (92.6)		4.48 (2.39, 8.41)
Meaning of carbohydrate				
Not aware / Not sure (n=124)	33 (26.6)	91 (73.4)	<0.001	1
Aware (n=236)	21 (8.9)	215 (91.1)		3.71 (2.04, 6.76)
Carbohydrate spacing in a day				
Not aware / Not sure (n=171)	46 (26.9)	125 (73.1)	<0.001	1
Aware (n=189)	8 (4.2)	181 (95.8)		8.33 (3.80, 18.25)

*Chi-square test; significance: p<0.05

DISCUSSION

Most of the respondents admitted to know the meaning of healthful eating plan for patients with T2DM, however many of them were unaware of the 'meaning of carbohydrate', 'carbohydrate spacing in a day', 'the allowed quantity of high fat food intake' and 'the quantity of one serving of fruits and vegetables'. These findings are consistent with other local studies which also showed poor knowledge on components of a well-balanced diet among many of the diabetic patients.[16,17,19,28] Their knowledge on choices of food and the recommended servings of a well-balanced diet was lacking too.[16,17,19,28] This gap in dietary knowledge was also found among diabetic patients in other countries.[21,29]

Since the majority of them received dietary advice from healthcare providers as shown by Tan and Magarey (2008), this poor knowledge may suggest that the counselling was ineffective.[17] However, in primary care settings, dietary advice is mainly provided by doctors, thus the dietary information could be non-specific due to time constraints during clinical consultations.[16] On the other hand, those who received dietary counselling from dieticians might have difficulties to retain information they learnt during the sessions.[17] Perhaps, the information was too complex and overwhelming. Therefore, dietary advice tailored to the patients' needs should be provided.[8,19] Strategies or aids that can improve patients' ability to remember and understand the information given should be practiced too.

Since majority of the respondents in this study knew about 'high fat food other than red meat and full-fat dairy products', there is a possibility that high fat food was the most popular dietary information known to patients with T2DM.[16,28] This is not surprising as high fat food is widely available in Malaysia. Our local diet is mostly rich in fat such as fried food (e.g. fried rice, fried fish, fried chicken, banana fritters, fish crackers, and paratha) and food cooked with coconut milk (e.g. curry, nasi lemak, and rendang). However, two-fifths of the respondents in the current study were unaware of the 'quantity of high fat food allowed to be taken'. This finding may also be due to their inability to retain details about dietary recommendations or non-specific dietary advice received by them from their healthcare providers.[16,17] The healthcare providers might focus on advocating diet with low fat but failed to emphasise the portions of high fat food that they could take.

In this study, the respondents who knew each of the specific dietary components were significantly more likely to know about the healthful eating plan compared to those who were unaware of these specific dietary components. However, up to 73.6%

Table 3: The association between the respondents' awareness of specific dietary components and their practice (n=360)

Days performing specific diabetic diet in a week	Eat 5 or more servings of fruits and vegetables				Eat high fat food				Space carbohydrate in a day			
	≤2 days n (%)	3 to 5 days n (%)	≥ 6 days n (%)	p-value*	≤ 2 days n(%)	3 to 5 days n (%)	≥ 6 days n (%)	p-value*	≤ 2 days n (%)	3 to 5 days n (%)	≥ 6 days n (%)	p-val-ue*
Awareness on one serving of fruits & vegetables												
Yes	25 (10.04)	120 (48.19)	104 (41.77)	<0.001								
No	27 (24.32)	54 (48.65)	30 (27.03)									
Awareness on food containing high fat												
Yes					202 (68.47)	80 (27.12)	13 (4.41)	0.20				
No					37 (56.92)	24 (36.92)	4 (6.16)					
Awareness on allowed quantity of high fat food												
Yes					157 (72.69)	55 (25.46)	4 (1.85)	0.001				
No					82 (56.94)	49 (34.03)	13 (9.03)					
Awareness on meaning of carbo-hydrate												
Yes									32 (13.56)	125 (53.97)	79 (33.47)	<0. 001
No									31 (25.00)	28 (22.58)	65 (52.42)	
Awareness on carbohy-drate spacing in a day												
Yes									19 (10.05)	98 (51.85)	72 (38.10)	<0. 001
No									44 (25.73)	55 (32.16)	72 (42.11)	

*Chi-square test; Significance: p<0.05

of those who were unaware of these specific dietary components, claimed to know about the healthful eating plan too. This may indicate that these respondents might have optimistic perception of their knowledge on healthy eating as similarly observed by Tan and Magarey (2008).[17] They might perceive that they were knowledgeable, but their actual knowledge on healthy eating might be superficial. Therefore, it may not be enough to ask about their dietary practice in general.[30] Their understanding and practice of specific diet should be explored to identify particular knowledge that is lacking, especially those related to food choices, carbohydrate spacing and the recommended servings of well-balanced food.

There was a significant difference in the self-reported dietary practice between respondents who knew 'the quantity of one serving of fruits and vegetables', 'the allowed quantity of high fat food intake', 'meaning of carbohydrate', or 'carbohydrate spacing in a day' compared to those who did not know about these specific dietary components. These findings may suggest that dietary adherence reported by some of the primary care patients as assessed by the SDSCA might be

questionable. This may be because many diabetic patients in primary care settings in Malaysia do not receive specific dietary advice from dieticians or trained healthcare providers,[16,28] thus they may not know the specific dietary terms used in the SDSCA. Therefore, this questionnaire should be tested among this population to ensure its validity and reliability. Alternatively, we should assess patients' understanding about the terms and explain its meaning if necessary before assessing their practice using the questionnaire. Minor adaptation to the questionnaire could also be made by adding questions to screen out those with poor understanding of the terms or by stating definitions of the terms to improve their understanding. Even though the SDSCA has been proven to be a useful tool as it is brief and easily self-administered by patients, the best method to assess patients' dietary practice and adherence is still one-to-one interview using actual plates and bowls of different sizes to demonstrate portions and photos or replica of food. Through this method, their food intake in a day can be measured more accurately. However, this method of assessment is can be time-consuming and requires assistance from a trained healthcare provider.

In this study, the respondents' awareness of the specific dietary components were based on their perception of knowledge. Their actual knowledge was not assessed. Thus, the findings of this study were subjected to errors related to their misperception. Another limitation of this study is related to its cross-sectional design done at one primary care clinic. Thus, the findings of this study cannot be generalised to other diabetic patients from other primary care clinics. This is because these clinics may be different in terms of their patients sociodemographics, support in service (availability of trained dieticians and diabetic educators), and educational programme. The prevalence of those who were unaware of the specific dietary components in this study might also be under-reported. This is due to exclusion of a substantial number of patients from the analysis who failed to complete the questionnaire. These patients might have poor dietary knowledge thus they became discouraged to complete the questionnaire.

CONCLUSION

Although majority of the respondents in this study admitted to know about healthful eating plan and choices of food containing high fat, substantial proportions of them were unaware of 'carbohydrate spacing' and the recommended quantity of high fat food and fibre intake. These findings suggest that their dietary knowledge was superficial. Thus, a special medical nutritional therapy programme is needed at the primary care setting to improve patients' dietary knowledge and hopefully their dietary practice as well. This study also highlights that the self-reported adherence to diet claimed by those with poor dietary awareness may be inaccurate. Thus, in healthcare settings where many patients may have poor dietary knowledge due to absence of a well-organised dietary service, their dietary practice and adherence should be assessed using methods other than self-administered questionnaires.

Conflicts of interest: None to declare

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