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Artikel Asli/*Original Articles*

Family Support and Self-Motivation Influence Dietary Compliance and Glycaemic Control among Type 2 Diabetes Mellitus Outpatients

(Sokongan Keluarga dan Motivasi Diri Mempengaruhi Pematuhan Pemakanan dan Kawalan Glisemia dalam Kalangan Pesakit Luar Diabetes Mellitus Jenis 2)

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ABSTRACT

Diabetes Mellitus is a disease due to reduced insulin sensitivity and secretion in the body which associated with obesity and hypertension. This study aimed to determine the influence of family support and self-motivation towards dietary compliance and glycaemic control among Type 2 Diabetes Mellitus (T2DM) outpatients. This cross-sectional study involved 35 subjects selected from Universiti Kebangsaan Malaysia Medical Centre (UKMMC) in Cheras and Ampangan Health Clinic in Seremban. Anthropometric measurements and fasting blood glucose have been obtained. Face-to-face interview session was done to obtain socio-demographic and diet intake. Further, dietary compliance, social support and self-motivation were assessed using Summary Diabetes Self Care Activities (SDSCA), Diabetes Social Support Questionnaire Family version (DSSQ-Fa) and Treatment Self-Regulation Questionnaire (TSRQ), respectively. Only 8.6% of subjects complied with dietary counselling. Fasting blood glucose for both men (7.93 ± 1.99 mmol/L) and women (8.77 ± 3.08 mmol/L) were higher than normal range. Self-motivation ($r = 0.358$, $p < 0.05$) and family support ($r = 0.460$, $p < 0.01$) significantly correlated with dietary compliance. Self-motivation and family support are important factors which can increase compliance towards dietary counseling. Further investigation should be carried out to determine factors that may influence dietary compliance and family support towards achieving desirable glycaemic control among T2DM patients.

Keywords: Family support; self-motivation; dietary compliance; glycaemic control; Diabetes Mellitus

ABSTRAK

Diabetes Mellitus adalah penyakit yang disebabkan oleh kemerosotan sensitiviti dan rembesan insulin dalam badan dan dikaitkan dengan obesiti dan tekanan darah tinggi. Kajian ini bertujuan untuk menentukan pengaruh sokongan keluarga dan motivasi diri terhadap pematuhan dietari dan kawalan glisemik dalam kalangan pesakit luar Diabetes Mellitus Jenis 2 (DMJ2). Kajian hirisan lintang ini melibatkan sebanyak 35 subjek yang dipilih dari Pusat Perubatan Universiti Kebangsaan Malaysia di Cheras dan Klinik Kesihatan Ampangan di Seremban. Pengukuran antropometri, gula darah berpuasa dan sejarah pengambilan diet turut diambil. Temu bual dijalankan untuk mendapatkan maklumat mengenai demografi dan pematuhan diet. Pematuhan terhadap diet, sokongan sosial dan motivasi diri ditentukan menggunakan Summary Diabetes Self Care Activities (SDSCA), Diabetes Social Support Questionnaire Family version (DSSQ-Fa) dan Treatment Self-Regulation Questionnaire (TSRQ), masing-masing. Hanya 8.6% subjek yang mematuhi kaunseling diet. Purata aras gula darah berpuasa bagi lelaki (7.93 ± 1.99 mmol/L) dan wanita (8.77 ± 3.08 mmol/L) adalah lebih tinggi dari julat normal. Motivasi diri ($r = 0.358$, $p < 0.05$) dan sokongan keluarga ($r = 0.460$, $p < 0.01$) berkorelasi secara signifikan dengan pematuhan diet. Motivasi diri dan sokongan keluarga adalah faktor-faktor penting yang boleh meningkatkan pematuhan terhadap kaunseling diet. Kajian yang lebih mendalam perlu dijalankan untuk melihat faktor lain yang mempengaruhi motivasi diri dan sokongan keluarga bagi mencapai kawalan glisemik yang dikehendaki dalam kalangan pesakit Diabetes Mellitus Jenis 2.

Kata kunci: Sokongan keluarga; motivasi diri; pematuhan pemakanan; kawalan glisemik; Diabetes Mellitus

INTRODUCTION

According to the National Health Morbidity Survey (NHMS) 2011, 2.6 million Malaysian's populations are diabetic. The prevalence of diabetes has increased from 11.6% to 15.2% compared with 2006. Compliance is an approach to maintain or improve health status and manage the symptoms and signs of disease. Compliance is a factor that can influence the glycemic control. Non-compliance rate can be varying widely across different disease conditions, treatment regimen and patients population. Dietary compliance led to a positive change in dietary habits in T2DM patients (Siddiqui et al. (2010). Healthy diet plan is an integral part of diabetes self-care because it improves

blood glucose level, lipid profile and blood pressure. More recently, Houle et al. (2015) concluded that an improvement in dietary intake was associated with a decrease in Hba1c level both at 6 and 12 months among diabetic patients. However, a local study conducted among T2DM patients at the Hospital UniversitiSains Malaysia (HUSM) showed that patients were less compliant with dietary intake, with only 16.4% of patients had good dietary compliance (Tan et al. 2011). In Philippine, 50% participants had a good adherence towards healthy eating plan approximately 4 to 6 times in a week. However, some of them not eating too much vegetables and fruit weekly (Roxas & Nicodemus 2014). In other disease such as heart failure, adherence in low sodium diet is improved when their spouse and family members also follow the diet (Chung et al. 2015). Among haemodialysis patients, family members were important providers of social support for patients (Kugler et al. 2005; Kara et al. 2007; Ahrari et al. 2014).

Comprehensive glycaemic control is necessary to improve outcomes and avoid complications in individuals with diabetes. Self-monitoring of blood glucose (SMBG) provides important information for glycaemic control, for the purpose of monitoring and supports treatment optimization (Chowdhury et al. 2015). Comorbidity such as hyperlipidaemia and peripheral neuropathy is one of the factor that associated with poor glycaemic control (Woldu et al. 2014). Further, environmental factors such as social activities are one of the barriers in adhering towards dietary intake. Social support can help patients to comply towards a management plan in everyday life and enable to motivate them during illness. Lack of social support and mental illnesses such as depression may lead towards lower adherence of diabetes care as being reviewed systematically by Sumlin et al. (2014).

Self-monitoring, motivation and social support related to each other from time to time (Jin et al. 2008; Julien et al. 2009). Low self- motivation is identified as one of the factors contributing to poor dietary compliance (Williamson et al. 2000). Patients with higher self-efficacy had better self-management behaviors in diet, exercise, blood sugar testing, and taking medication aspects (Al-Khawaldeh et al. 2012) . However, little is known about the influence of social support and self- motivation towards dietary compliance among diabetic patients in Malaysia. Thus, this study aimed to determine the association between self-motivation, social support with dietary compliance and glycaemic control among diabetic patients in Klang Valley of Malaysia.

MATERIALS AND METHODS

This cross-sectional study utilised purposive sampling method. It was conducted among 35 T2DM outpatients at UKMMC and Ampangan Health Clinic. The sample size was small due to only 35 diabetic patients were in regular follow-up with dietitians. Verbal and written consent were obtained from subjects. Inclusion criteria for this study including patients who had been diagnosed with DM at least one year prior this study and aged between 35 to 60 years old. Subject also had been attending dietary counselling by dietitian at least once within one month during the study and they were able to read or communicate either in English or Malay. Exclusion criteria including Type 1 or gestational DM patients, renal, liver diseases or cancer, with those with psychiatry problems, mute or deaf and receiving enteral and parenteral nutrition. Ethical approval was obtained from the Research Ethics Committee, Secretariat for Medical Research and Innovation, Universiti Kebangsaan Malaysia Medical Centre in Jun 2013 (NN-076-2013).

DATA COLLECTION

A name list consisting all T2DM patients was obtained from KlinikWarga UKMMC and Ampangan Health Clinic. Only eligible patients were short-listed as the subjects of this study. Patients were contacted by telephone to ask if they would like to participate in the study. Upon approval, an appointment date set according to the requirements of the subjects. Subjects were given questionnaires to obtain socio-demographic information, compliance rate, level of self-motivation and family support. Dietary compliance was assessed using Summary of Self Care Activities (SDSCA) (Cronbach's alpha = 0.79) which consisted of three parts, self- care activities, diet and physical activities. The parameter used was the frequency of carrying out the items in a week. A score of more than five days per week considered compliant, vice versa. Self- motivation level was assessed using Treatment Self- Regulation Questionnaire (TSRQ) (Cronbach's alpha = 0.87). A total of 15 items were asked and subjects have to rate the extent to which each reason is true for them by using 5- point scale. Family support level was assessed via Diabetes Social Support Questionnaire-Family Version (DSSQ-Fa) (Cronbach's alpha= 0.72). It consisted menu planning, physical activity, self- monitoring blood glucose and insulin injection. Two methods of scoring were used, the frequency of family members with diabetes care related activities and feelings of the participant when family members do the activity. To obtain the score for each item, the frequency of family members with diabetes care activities multiplied by the participant feeling when family members do the activity (frequency x feeling). Total score for each item is from -5 to 15.

Anthropometric measurements including weight, height, body fat percentage and waist circumferences were also taken using standard technique. Height was measured using SECA 206 (SECA, Germany) to the nearest 0.1 cm while weight was measured using TANITA HD 309 (TANITA, Japan) to the nearest 0.1 kg. Body Mass Index (BMI) of each participant was calculated using the following formula: weight (kg) / height (m^2) and classified based on WHO (2004). In addition, body fat percentage was also measured using a fat monitor Omron HBF 302 (Omron,

Japan). Waist circumference was measured using Lufkin metric tape and was recorded to the nearest 0.1 cm. The cut-off point for waist circumferences was compared to normal range according WHO/IASO/IOTF 2000.

Food intake of subjects was assessed using diet recall. All types of food consumed were recorded using household measurements such as cups, bowls, spoons, teaspoons, etc. These data are compared with the recommendations of Medical Nutritional Therapy (MNT) Guidelines for Type 2 Diabetes Mellitus (MDA 2013). Only carbohydrate, protein, fat, dietary fibre and total sugar were used for comparison. Current fasting blood glucose was obtained using ACCU-CHEK Advantage where subjects were asked to fast prior to interview session. The normal reading was classified according to WHO (2006). Medicine prescription, co- morbidities, A1c, previous anthropometric data and fasting blood glucose were obtained from patient medical records.

DATA ANALYSIS

Statistical analysis was carried out by using Statistical Product & Service Solution (SPSS) version 19.0. With a total of 35 subjects, Shapiro-Wilks test is used to test the normality of data distribution. Descriptive analyses such as mean, standard deviation and percentages were used to perform socio- demographic information, health (anthropometric, biochemical and dietary) compliance to dietary counselling for each item and the level of glycemic control. To determine the relationship between dietary compliance and fasting blood glucose, Spearman's rho correlation test was used due to abnormally distributed data. Meanwhile, to find out the correlation between family support and self-motivation with dietary compliance, Pearson correlation test was used for normally distributed data. To determine other factors that influence dietary compliance and fasting blood glucose, Independent t- test is used for normally distributed data and the Mann-Whitney U test for abnormally distributed data. For data that has three or more variables, Analysis of variance test (ANOVA) was used for normally distributed data while Kruskal-Wallis test was used if the data was abnormally distributed.

RESULTS & DISCUSSION

GENERAL CHARACTERISTICS OF SUBJECTS

This study involved 35 subjects with T2DM, in which 11 subjects were from UKMMC and 24 subjects from Ampangan Health Clinic. A total of 65.7% subjects were women and 34.4% were men. About 88.6% of subjects were Malay and 11.4% were Chinese. The average age of the subjects was 56.37. About 80.0% of the subjects were married, most of the subjects lived with their spouse and children, a total of 71.4%. 40.0% subjects still employed, 37.1% subjects earned income from salaries and 74.3% subjects were low income, the monthly income of less than RM1500.

Patient-centred factor included demographic characteristics, smoking and alcohol consumption are one of the factors that influence compliance (Jin et al. 2008). There is no significant correlation between dietary compliance with its demographic characteristics in this study (Table 1). This result is similar to other studies that show the demographic characteristics have no significant correlation with dietary compliance (Riyadh 2009; Gao et al. 2013). Thus, demographic characteristics do not determine dietary compliance and glycemic control.

TABLE 1. General characteristic of participants and association of SDSCA score and fasting blood glucose with socio-demography characteristics

Characteristics (n = 35)	Frequency (%)	Mean (SD)	SDSCA Score	p value	FBG	p value[a]
			Mean (SD)		Mean (SD)	
Gender:				0.139		0.714
Male	12 (34.3)		2.95 (0.92)		8.34 (3.03)	
Female	23 (65.7)		3.52 (1.13)		8.73 (2.81)	
Ethnic:				0.694		0.822
Malay	31 (88.6)		3.30 (1.06)		8.75 (3.00)	
Chinese	4 (11.4)		3.53 (1.39)		7.40 (0.18)	
Age:				0.075		0.932
30-59 years old	23 (65.7)		3.56 (1.02)		8.62 (2.91)	
More than 60 years old	12 (32.2)		2.88 (1.10)		8.53 (2.86)	
Marital status:				0.232		0.204
Mate less	28 (80.0)		3.22 (1.11)		8.28 (2.65)	
Married	7 (20.0)		3.77 (0.91)		9.83 (3.51)	

Continued

TABLE 1. *Continue*

Characteristics ($n = 35$)	Frequency (%)	Mean (SD)	SDSCA Score	p value	FBG	p value[a]
			Mean (SD)		Mean (SD)	
Educational level:				0.311		0.577
Primary school	13 (37.1)		2.96 (1.17)		8.48 (2.90)	
Secondary school	15 (42.9)		3.50 (0.94)		8.22 (2.60)	
University	7 (20.0)		3.63 (1.19)		9.60 (3.46)	
Stay with:				0.903		0.068
Spouse	5 (14.3)		3.45 (1.18)		6.54 (0.83)	
Spouse and children	25 (71.4)		3.24 (1.10)		8.84 (2.72)	
Children	3 (8.6)		3.63 (1.14)		7.03 (2.74)	
Relatives	2 (5.7)		3.63 (1.41)		13.0 (3.54)	
Occupational status:				0.117		0.176
Not working	6 (17.1)		3.04 (0.90)		6.48 (1.39)	
Housewife	10 (28.6)		2.90 (1.11)		9.47 (3.17)	
Retired	(5.7)		2.57 (0.92)		8.70 (3.11)	
Retired but still working	3 (8.6)		2.79 (1.26)		10.90 (3.93)	
Working	14 (40.0)		3.91 (1.01)		8.36 (2.85)	
Source of income:				0.201		0.595
Pension	5 (14.3)		2.65 (0.95)		10.14 (3.27)	
Salary	13 (37.1)		3.78 (1.12)		8.26 (2.52)	
From family	10 (28.6)		3.11 (1.12)		8.10 (2.66)	
Others	7 (20.0)		3.27 (0.86)		8.80 (3.60)	
Total income:				0.321		0.809
Less than RM1500	26 (74.3)		3.20 (1.06)		8.60 (3.05)	
RM 1500-RM 2999	3 (8.6)		3.17 (0.76)		7.93 (2.74)	
RM3000 and above	6 (17.1)		3.94 (1.08)		8.92 (2.35)	
Smoking:				0.372		0.908
Yes	6 (17.1)		2.96 (0.97)		8.47 (3.70)	
No	29 (82.9)		3.40 (1.11)		8.62 (2.73)	
Alcohol:				0.290		0.292
Yes	2 (5.7)		4.13 (1.59)		6.50 (1.41)	
No	33 (94.3)		3.28 (1.06)		8.72 (2.88)	
Co- morbidity:				0.935		0.731
Yes	29 (82.9)		3.23 (1.02)		8.66 (2.86)	
No	6 (17.1)		3.82 (1.33)		8.54 (3.5)	
Insulin therapy:				0.738		0.172
Yes	12 (34.3)		3.24 (1.22)		9.54 (2.47)	
No	23 (65.7)		3.37 (1.03)		8.10 (2.96)	
SMBG:				0.344		0.379
Yes	29 (82.9)		3.41 (1.10)		8.85 (3.01)	
No	6 (17.1)		2.94 (1.03)		7.35 (1.53)	
Taking other medicine:				0.581		0.598
Yes	30 (85.7)		3.29 (1.11)		8.62 (2.71)	
No	5 (14.3)		3.58 (1.01)		8.44 (3.97)	

Continued

TABLE 1. *Continue*

Characteristics (n = 35)	Frequency (%)	Mean (SD)	SDSCA Score	p value	FBG	p value[a]
			Mean (SD)		Mean (SD)	
Number of dietary counselling:				0.163		0.943
Once	22 (62.9)		3.53 (1.04)		8.62 (2.74)	
More than once	13 (37.1)		2.99 (1.11)		8.54 (2.92)	
Duration for counselling session:				0.935		0.731
15-30 minutes	16 (45.7)		3.35 (1.30)		8.66 (2.86)	
31-60 minutes	19 (54.3)		3.31 (0.89)		8.54 (2.92)	
BMI (before study):						
Pre- obese	3 (8.6)					
Obese class I	15 (42.9)					
Obese class II	16 (48.5)					
BMI (during study):						
Pre- obese	4 (11.4)					
Obese class I	19 (54.3)					
Obese class II	12 (34.3)					
Waist circumference: (n = 31)						
Male < 90cm; Female < 80cm	3 (8.6)					
Male > 90cm; Female > 90cm	28 (91.4)					
Height (cm)		158.74 (10.47)				
Weight (kg) (before study)		73.39 (12.05)				
Weight (kg) (during study)		72.74 (11.56)				
Body fat percentage (%)		34.72 (6.29)				
A1c (%)		8.02 (1.74)				
Fasting blood glucose (mmol/L) (before study)		8.47 (2.73)				
Fasting blood glucose (mmol/L) (during study)		8.59 (2.85)				

There are 82.9% subjects in this study had co-morbidities such as hypertension and hyperlipidaemia. Apart of it, 17.1% were smokers and only 5.7% were taking alcohol. About 82.9% were practicing Self-Monitoring Blood Glucose (SMBG) in which some subjects did not receive insulin therapy also carry out SMBG at home. Subjects who had received dietary counselling once were 62.9%, while 37.1% subjects attended more than once dietary counselling. On average, the time for a dietary counselling was 40.71 minutes.

Subjects had reduced their weight from average 73.39 kg to 72.74 kg. This also can be seen where 16 subjects in Obese class III before study and had reduced to 12 subjects during study. However, their fasting blood glucose reading had increased from average of 8.47 mmol/L to 8.59 mmol/L. The results showed no significant differences between SMBG score and glycemic control with socio-demographic characteristics.

DIETARY COMPLIANCE AND GLYCAEMIC CONTROL

Based on diet history, subjects met recommendation for carbohydrate, fat and sugar intake. However, fiber intake (4.67 ± 7.10 g/d) did not meet the recommendation. Most of subjects dislike vegetables, high fiber cereals and grains including oats and wholemeal breads. Effort should be made to educate patients on adequate fiber intake as a meta-analysis conducted by Post et al. (2012) and (Silva et al. 2013) were in agreement of the benefits of dietary fibre in improving glycaemic controls in patients with T2DM.

Overall, 74.3% of participant did not adhere to dietary counselling which showed poor glycaemic control. Only 8.6% of subjects adhered to the prescribed diet regime but their glycaemic control were not satisfactory. However, 17.1% of subjects had normal glucose level even though they were not adhering to dietary counselling (Table 3). Thus, there was no correlation between the level of dietary compliance and glycaemic control using fasting glucose

TABLE 2. Association between dietary compliance and glycaemic control using fasting blood glucose

	Fasting blood glucose (mmol/L)		*p* value[a]
	Good (< 6.1)	Poor (≥ 6.1)	
Dietary compliance			
Good compliance	0 (0.0)	3(8.6)	0.425
Poor compliance	6 (17.1)	26 (74.3)	1.000

[a]Mann-Whitney U test for abnormally distributed data, α was set at 0.05

TABLE 3. Assessment of glycaemic control using fasting blood glucose and its association with dietary self-care behaviours (SDSCA)

	Item	Mean (SD) (*n* = 35)	Fasting blood glucose (mmol/L)		*p* value[a]
			Good (< 6.1)	Poor (≥ 6.1)	
1.	Follow a healthy eating plan	3.51 (1.98)			
	Good compliance		2 (5.7)	9 (25.7)	1.000
	Poor compliance		4 (11.4)	20 (57.1)	
2.	Eat 5 or more servings of fruits and vegetables	3.69 (2.19)			
	Good compliance		1 (2.9)	12 (34.3)	0.377
	Poor compliance		5 (14.3)	17 (48.6)	
3.	Eat high fat foods such as red meat or full- fat dairy products*	2.31 (2.07)			
	Good compliance		4 (11.4)	10 (28.6)	0.191
	Poor compliance		2 (5.7)	19 (54.3)	
4.	Distribute carbohydrates evenly throughout the day	3.71 (2.49)			
	Good compliance		4 (11.4)	10 (28.6)	0.191
	Poor compliance		2 (5.7)	19 (54.3)	
5.	Reduce added sugar intake	5.20 (2.25)			
	Good compliance		3 (8.6)	21 (60.0)	0.352
	Poor compliance		3 (8.6)	8 (22.9)	
6.	Eat lots of food high in dietary fibre such as vegetables or oat	2.46 (2.69)			
	Good compliance		0 (0.0)	10 (28.6)	0.152
	Poor compliance		6 (17.1)	19 (54.3)	
7.	Carry out physical activity	2.06 (2.56)			
	Good compliance		0 (0.0)	7 (20.0)	0.311
	Poor compliance		6 (17.1)	22 (62.9)	
8.	Carry out physical activity for more than 30 minutes in each session	1.26 (1.84)			
	Good compliance		0 (0.0)	2 (5.7)	1.000
	Poor compliance		6 (17.1)	27 (77.1)	

*Question with reversing scoring

[a]Chi-Square test or Fisher's Exact test, α was set at 0.0

levels ($p > 0.05$) (Table 2). This finding is probably due to other factors might influence glycaemic control such as medication, physical activity and behaviour. Among the eight dietary self-care behaviours being investigated, item number 5 (reduced added sugar intake) had the highest compliance rate (mean = 5.20). However, item number 8 (Carry out physical activity for more than 30 minutes in each session) had the lowest compliance rate (mean = 1.26). Other studies also highlighted poor dietary compliance among diabetic patients (Khattab et al. 2010; Tan et al. 2011). A study in Mexico stated the percentage of T2DM patients who did not comply with the dietary regimen was 62%. This is due to the difficulty to change their eating habits (Hernandez-Ronquillo et al. 2003). Venkataraman et al. (2012) suggested T2DM patients to practice dietary modification and do physical exercise regularly to control the disease. They emphasised that patients who were able to adhere with dietary counselling had a higher self-esteem to control diabetes.

In DSSQ-Fa, item "Join you in eating the same food as you" had the highest score indicated by mean of 3.60 while item "Help you to inject insulin" had the lowest score indicated by mean of 0.33 (Table 4). Results showed significant, moderate and positive correlation between family support and dietary compliance but non-significant correlation with glycaemic control (Table 6). Spouse support is important in improvement of behaviour that associated with diet (Beverly et al. 2008). Most patients felt that their efforts to adhere to dietary counselling have not been reached if family support is lacking. Moreover, stress is related to a greater variability in patients' fasting glucose readings and, among patients with less support (Rook et al. 2015).

TABLE 4. Mean and standard deviation of each item in DSSQ-Fa

Item	Mean (SD)
Menu planning (n = 35)	
Encourage you to eat right food according to suggested diet	2.49 (1.87)
Ask if certain foods are okay for you to eat before serving them	1.71 (1.89)
Remind you about sticking to your meal plan	2.74 (1.85)
Suggest food you can eat on your meal plan	1.66 (1.91)
Tell you not to eat something you should not	3.09 (1.84)
Join you in eating the same food as you	3.60 (1.90)
Prepare the right food suitable with your modified diet	1.37 (1.70)
Eat at the same time as you do	3.74 (1.69)
Monitor what you eat to make sure that you eat the right food	2.60 (2.00)
Praise you if you follow the recommended diet modification	1.54 (1.98)
Exercise	
Remind you to exercise	1.26 (1.79)
Invite you to join in exercising with them	0.86 (1.57)
Praise you when you have done exercising	0.77 (1.46)
Self- Monitoring Blood Glucose (n = 31)	
Ask about your blood glucose test result	2.81 (1.97)
Monitor your blood glucose test result	2.52 (2.11)
Know the symptoms you experience 'hypo'	2.10 (2.18)
Insulin injection (n = 12)	
Remind you to inject insulin	2.42 (2.54)
Praise you when inject insulin on time	1.17 (1.99)
Help you to inject insulin	0.33 (1.16)
Wake you up in the morning so that you can inject insulin ontime	1.08 (2.02)

Social support influences the performance in the care of diabetes patients and this gives indirect impact on glycaemic control (Tang et al. 2008; Mayberry & Osborn 2012). In addition, good communication with the patient as well as social support and self-ability associated with diabetes self-care behaviours for the better, directly controlling glycaemic control (Gao et al. 2013). The findings indicated that family members had influence on the self-management of adult persons with diabetes and gave an impact on dietary compliance and played a crucial role in maintaining lifestyle changes and optimizing diabetes management.

Results showed that subjects had a sense of self responsibility to take care of themselves, with the highest mean of 4.66 (Table 5). Subjects were aware that their health was not the responsibility of others. The participant did not feel pressure from others to adopt a healthy diet, in which the mean was the lowest (1.83). There was a significant, moderate and positive correlation between self- motivation and dietary compliance (Table 6). Other studies also found that the higher the level of self-motivation, the higher the patient self-management and led to better glycaemic control (Norris et al. 2001; Jones et al. 2003; Deakin et al. 2005; Sousa et al. 2005; Xu et al. 2008). The responsibility of a dietitian is not just limited to giving advice about diet or exercise modifications. Supports for patients also needed to increase the patient's self-confidence and motivation toward the target diabetes control. However, results showed non-significant correlation between self- motivation and glycaemic control (Table 6).

TABLE 5. Mean and standard deviation for each item in TSRQ

Item	Mean (SD)
I feel that I want to take responsibility for my own health.	4.66 (0.54)
I would feel guilty or ashamed of myself if I did not eat a healthy diet.	2.77 (1.26)
I believe it is the best thing for my health.	4.43 (0.78)
Others will be upset with me if I did not.	2.80 (1.28)
I really don't think about it.*	2.20 (0.96)
I have carefully thought about it and believe it is very important for many aspects of my life.	4.09 (0.85)
I would feel bad about myself if I did not eat a healthy diet.	3.11 (1.34)
It is an important choice I really want to make.	4.17 (1.01)
I feel pressure from others to do so.	1.83 (0.75)
It is easier to do what I am told than think about it.	3.26 (1.20)
It is consistent with my life goals.	3.83 (1.12)
I want others to approve me.	2.23 (1.06)
It is very important to be as healthy as possible.	4.29 (0.67)
I want others to see I can do it.	3.03 (1.20)
I don't really know why.*	2.11 (0.90)

*Questions with reversing scoring

TABLE 6. Association between family support and self- motivation with dietary compliance

	SDSCA Score		Glycaemic control	
	r	*p* value	*r*	*p* value
TSRQ score	0.358	0.035[a]	-0.103	0.299[c]
DSSQ-Fa score	0.460	0.005[b]	-0.106	0.543[c]

[a]Pearson's correlation test, α was set at 0.05
[b]Pearson's correlation test, α was set at 0.01
[c]Spearman's rho test for abnormally distributed data, α was set at 0.05

The study has highlighted the issues related to poor dietary compliance which were found to be associated with self-motivation and social support. However, there are some limitations of the study that have been recognised. Firstly, the use of fasting blood glucose as glycaemic control compared to HbA1c due to financial limitation and most of patients at the health clinic did not being measured for HBA1c. Second, the number of follow-up patients attending dietary counselling by dieticians is also limited which thus restricts our sample size. Since we had a relatively small sample size (n = 35) this, in turn, might not allow for sufficient scope in detecting potential relationships. Future, larger scale multicentre study should be conducted.

CONCLUSION

In this study, adherence rate for dietary counselling were low which was only 8.6%. Further, good glycaemic control were also low, with only 17.1% of subjects had normal fasting blood glucose level. Family support and self-motivation were found to be associated with dietary compliance, but not glycaemic control among T2DM subjects in PPUKM and Ampangan Health Clinic. Further, larger scale study should be carried out in order to identify factors influencing compliance. Actions and strategies should be implemented to improve dietary compliance among diabetic patients, probably involving more contemporary approach of dietary counselling such as motivational interview.

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