ORIGINAL ARTICLE

Effects of Social support and Self-efficacy of Glucose Control Among Malaysian Type 2 Diabetes Mellitus Patients in Primary Care

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ABSTRACT

Introduction: Diabetic control depends partially on self-management. Diabetes self-care is reported to be a strong predictor of glycemic control in Type 2 Diabetes Mellitus (T2DM) patients. Factors contributing to better self-care include self-efficacy and social support. We aim to determine effects of these factors on glucose control in T2DM patients in a primary care clinic. **Methods:** This study utilised data from a bigger study looking into factors affecting social support and self-efficacy and their correlation in T2DM patients. This study was done among 329 T2DM patients attending a primary care clinic in Selangor, Malaysia between November 2013- January 2014. Systematic random sampling was used. Instruments used were the MOS Social Support Survey and the Diabetic Management Self Efficacy Scale (DMSES). Patients' socio-demographic data and glucose monitoring records were obtained. The association between social support and self-efficacy with blood glucose control was determined using logistic regression. **Results:** The mean age of the respondents is 54.6 (+11.2), mostly female (55.3%) and Malay ethnicity (63.5%). Being older and retired were predictors for good glucose control (OR=1.05,p=0.01 and OR=2.2,p=0.023) respectively. There is also significant correlations between number of close friends/relatives with social support and self-efficacy (r=0.162,p=0.030 and r=0.190,p=0.01) respectively. The correlation of social support and self-efficacy with HbA1c levels are r= -0.044(p=0.426) and r= -0.08(p= 0.744) respectively. **Conclusion:** There were no correlations between social support and self-efficacy with the level of HbA1c among patients with T2DM in this study. We found older aged and retired patients to have better HbA1c levels.

Keywords: Social support, Self-efficacy, Diabetes, Primary care, Noncommunicable diseases, Family medicine

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INTRODUCTION

The prevalence of Type 2 diabetes mellitus (T2DM) is increasing worldwide. In Malaysia, the prevalence is reported to be 15.2% in adults over 18 years old and 20.8% in those over 30 years old (1). This high prevalence of T2DM has contributed significantly to increasing numbers of cardiovascular diseases, and other complications which include nephropathy, retinopathy, dermopathy and neuropathy (1). It is therefore, important to prevent complications secondary to this often silent disease so that patients could continue to maintain a good quality of life (1).

In order for this to happen, T2DM needs to be managed effectively. There are many important factors that need to be considered when managing patients having this condition. Since diabetes is a disease that is mainly self-managed, the concept of self-care is essential (2, 16). Self-care is defined as the utilitisation of patient's own knowledge and skills in enabling positive health behaviours (2). Diabetes self-care includes factors such as healthy dietary plan, performing physical activity, foot care, self-monitoring of blood glucose as well as adherence to medications (3). Self-efficacy and social support are two key factors that have been found to be associated to improved self-care among patients with T2DM (4).

Social support is defined as a psychological sense of belonging, acceptance, and assistance which increases people's ability to cope better with stressful conditions (2). Self-efficacy meanwhile, has been defined as having the belief about one's own capabilities to produce positive effects (5). Greater levels of social support have shown significant correlations with better self-care in adults with T2DM (7). Social support has repeatedly

been shown to also significantly correlate with self-efficacy (8,9). However, studies on social support, self-efficacy and glucose control have reported conflicting results (6, 10–12, 16, 20).

Specifically in our local context, social support has been reported to increase with increasing levels of HbA1c, while another study states that the two factors are not significantly associated with each other (12, 20). The first study was done among elderly patients at tertiary centres, while the latter study was done in a primary care clinic attached to a university hospital (12, 20). Studies conducted on self-efficacy among Malaysian patients with T2DM have reported no significant association with self-care among patients in a tertiary centre, but to be significantly, negatively correlated with HbA1c levels in the primary care setting (6, 16).

Since social support and self-efficacy are important elements of self-care and studies on this associations are often bogged with conflicting results in the local primary care setting, this study aims to determine the effects of social support and self-efficacy on glucose control among patients with T2DM in a primary care clinic.

MATERIALS AND METHODS

Study design and setting

This paper reports previously unreported findings of a larger study entitled "The level of social support, self-efficacy, its associated factors and their correlation in Type 2 Diabetes Mellitus in a primary care clinic." (13). This is a cross sectional study done between November 2013 to January 2014. It was done in an urban public primary healthcare clinic in Selangor. This location was selected as it reflects a busy urban clinic that caters for a population of around 100,000 patients with a good mixture of the major ethnicities in Malaysia.

Study population and sampling

There were 329 patients recruited for this study. Those who were 18 years and above, on follow up for at least 1 year for T2DM, and on pharmacological treatment were recruited into the study. Those with psychiatric illness, unable to understand Malay or English and with cognitive impairment were excluded from the study. Systematic random sampling method was used, whereby every second patient was approached to be part of the study. Once participants had given written consent, they were given a questionnaire to be answered.

Study tool

This study used a self-administered questionnaire which consisted of 3 sections. The first section consisted of socio-demographic data including age, gender, ethnicity, and employment. The second section consist of the Medical Outcome Study Social Support Survey and final section consist of the Diabetes Management Self-Efficacy Scale.

Medical Outcome Study (MOS) Social Support Survey

This questionnaire was used due to its high reliability, validity, and its comprehensiveness in assessing social support. It is also user-friendly, and analysis of the results is fairly straightforward. This 20-item questionnaire looks into how participants perceived social support, with four subscales which are " informational/emotional " support, "affectionate support", "positive social interaction" and "tangible support". Respondents were required to rate the availability of social support for different scenarios. The responses were graded via a Likert scale with 1 being "never" and 5 being "all of the time". The final score ranged from 1 to 100, with higher scores indicating better social support. Both English and Malay versions of this questionnaire was used for this study (12). This questionnaire possesses good internal consistency with a Cronbach alpha coefficients of 0.91 and 0.96, respectively for this two different language versions in two previous validation studies done earlier (12,14) . Part of the questionnaire is a question on how many close friends and contacts that they have, where patients need to write down a specific number.

Diabetic Management Self Efficacy Scale (DMSES)

The Diabetic Self Efficacy Scale (DMSES) was used in this study due to its high reliability in English and Malay. It is designed specifically for diabetic patients and issues relating to diabetic self-care. The questionnaire used to measure self-efficacy is the 20-item Diabetic Management Self Efficacy Scale (DMSES), which was also available in both Malay and English versions (15–17). Participants were asked to rate their perceived confidence in managing their diabetes based on a Likert scale ranging from 1 (they cannot do at all) to 10 (certain can do). The DMSES had four domains which were eating plan, blood glucose, physical exercise and medications. Scoring was done in two ways, which was either a total score ranging from 0 to 200, or the mean score for each subscale. Again, both language versions used had good internal consistency with a Cronbach alpha of 0.91 for the English version and 0.81 for the Malay version in two previous validation studies (16,17).

Glycemic control

Participants' glycemic control were assessed by their capillary blood glucose reading taken on the same day they were recruited for the study and also by their latest HbA1c level that were traced from their previous medical records. The capillary blood glucose readings were tagged as either fasting or random samples, depending on whether the participant were fasting.

Statistical Analysis

Statistical analysis was done using Statistical Package for Social Science (SPSS) Version 22.0. The baseline and clinical characteristics of study participants as well as their total scores for the MOS Social Support Survey and DMSES were reported using descriptive statistics. The association between social support and self-efficacy

with glucose control was determined using multiple logistic regression . The level of statistical significance was set at p<0.05.

Ethical approval

This study was approved by the National Medical Research Register; NMRR-13-772-17002 and the Medical Research Ethics Committee in Universiti Kebangsaan Malaysia; project code: FF-2013-369.

RESULTS

A total of 356 participants who fulfilled the inclusion criteria agreed to participate. Out of this number, 27 were excluded due to incomplete questionnaires.

Characteristics of study population

Table I shows the socio-demographic and blood glucose profile of the respondents. The mean age of the respondents were 54.6 ± 11.2 years. Majority of the respondents were female (182, 55.3%). The respondents were ethnically diverse with the Malay ethnicity making up the majority (209, 63.5%). More than half the respondents had secondary level education (191, 58.1%). Around one third of the respondents were retired (100, 30.4%). This similar sociodemographic profile was also reported in a previous study (8). In terms of glycemic control, the mean HbA1c was 8.0 ± 1.9 %, while the mean fasting and random blood glucose levels were 8.7 ± 3.0 mmol/L and 9.7 ±3.8 mmol/L, respectively.

Table I: Socio-demographic and blood glucose profile of respondents

Variables (N=329)	n (%)	Mean (±SD)
Age (years)		54.6(11.2)
Gender		
Male	147 (44.7)	
Female	182 (55.3)	
Ethnicity		
Malay	209 (63.5)	
Chinese	42 (12.8)	
Indian	75 (22.8)	
Others	3 (0.9)	
Education Level		
None	26 (7.9)	
Primary	62 (18.8)	
Secondary	191 (58.1)	
Tertiary	50 (15.2)	
Occupation		
Unemployed	96 (21.2)	
Employed	112 (34)	
Self-employed	21 (6.4)	
Retired	100 (30.4)	
Numbers of Close friends and Relatives		17.2 (34.8)
Sugar Control		
HbA1c		8.0 (1.9)
Fasting	105 (31.9)	8.7 (3.0)
Random	224 (68.1)	9.7 (3.8)

Factors associated with glucose control among T2DM patients

Table II shows the factors associated with poor HbA1c control among Type 2 DM patients using both the simple and multiple logistic regression tests. In the simple logistic regression analysis, poor glycemic control was associated with age (unadjusted OR= 0.984, 95% CI=0.925-0.9720, p< 0.01) and employment status (unadjusted OR= 0.529, 95% CI=0.282-0.989, p=0.046). In multiple logistic regression, it was found that being older and a retiree had a 0.951 (95%CI=0.923-0.980) and 0.44 (95%CI=0.923-0.980) lower odds of having a poor HbAIc control.

Association of social support and self-efficacy with close contacts

Table III shows the correlation between social support and self-efficacy and their subscales with the number of close contacts that the respondents had reported. Both the total scores of social support and self-efficacy showed a significant positive correlation with the number of close contacts (r=0.162, p=0.03 and r=0.190, p=0.01 respectively). For the subscales, the MOS social support survey shows significant positive correlations with the 'tangible' and 'affectionate' subscales (r=0.138, p=0.012 and r=0.113, p=0.041, respectively). Meanwhile for DMSES, the only subscale that had a significant positive correlation with the number of close contacts (r=0.162, p=0.003) was the subscale for 'blood glucose monitoring'.

Social support and self-efficacy with glucose control

Table IV shows the correlation between social support, self-efficacy and glucose control. None of the scores and subscales were significantly correlated with glucose control. The HbA1c levels significantly correlated with the blood glucose levels which were either the fasting blood glucose (r=0.426, p<0.01) or the random blood glucose reading (r=0.356, p<0.01) taken on the day of follow up.

DISCUSSION

This study explores the effects of social support and self-efficacy with glucose control among T2DM patients in a Malaysian primary care setting. The mean age of the respondents were similar to previous local studies done among T2DM patients in Malaysia which were around the ages of 54-58 years old (6, 16). However our study had a slightly younger aged respondents compared to another study done in a university hospital based primary care clinic where the mean age was 61.9 years old (12). The Malay ethnic group made up the majority

Table II: Factors associated with poor HbA1c among Type 2 DM patients

Factors	Control of HbA1c		Univariate analysis			Multivariate analysis		
	Good control (≤6.5%)	Poor control (>6.5%)	Unadjusted odds ratio	95% Confidence interval	P value	Adjusted odds ratio	95% Confidence interval	P value
Age , mean	59.4±12.3	53.0±10.3	0.984	0.925-0.972	**<0.001#**	0.951	0.923-0.980	**0.001#**
Gender								
Male	35	112	Reference					
Female	47	135	0.898	0.542-1.486	0.675			
Ethnicity								
Malay	48	161	Reference					
Chinese	12	30	0.745	0.355-1.567	0.438			
Indian	21	54	0.767	0.421-1.395	0.384			
Others	1	2	0.596	0.053-6.719	0.676			
Educational level								
Nil	10	16	Reference			Reference		
Primary	19	43	1.414	0.543-3.683	0.478	0.955	0.340-2.681	0.930
Secondary	44	147	2.088	0.885-4.929	0.093	1.445	0.540-3.866	0.463
Tertiary	9	41	2.847	0.977-8.300	0.055	2.071	0.614-6.989	0.241
Employment								
Unemployed	22	74	Reference			Reference		
Employed	21	91	1.288	0.658-2.523	0.460	0.573	0.256-1.281	0.175
Self employed	3	18	1.784	0.481-6.622	0.387	1.082	0.277-4.233	0.910
Retired	36	64	0.529	0.282-0.989	**0.046***	0.440	0.216-0.894	**0.023***
Social support score, mean	75.7±22.9	71.7±20.8	0.991	0.979-1.003	0.150	0.988	0.975-1.001	0.065
DMSES, mean	148.6±44.6	147.3±32.1	0.999	0.992-1.006	0.759			

*P<0.05 #p<0.01

Table III:Ccorrelations∂ between social support and self-efficacy with the number of close contacts (friends and relatives)

Scores with subscales	Numbers close	P value
MOS Social Support Survey		
Emotional/ informational	0.105	0.057
Tangible	0.138	0.012#
Positive social interaction	0.113	0.041#
Affectionate	0.208	0.208
Total Score	0.162	0.030#
DMSES		
Eating plan	0.103	0.061
Blood glucose monitoring	0.162	0.003*
Physical exercise	0.085	0.123
Medication	0.032	0.558
Total Score	0.190	0.010*

∂ = Spearmann rho # p<0.05, * p ≤0.01

Table IV: correlations∂ between social support, self-efficacy and glucose control

Scores with subscales	HbA1c	p value
MOS Social Support Survey		
Emotional/ informational	-0.052	0.346
Tangible	-0.049	0.376
Positive social interaction	-0.078	0.159
Affectionate	-0.022	0.691
Total Score	-0.044	0.426
DMSES		
Eating plan	-0.041	0.064
Blood glucose monitoring	0.103	0.063
Physical exercise	0.033	0.051
Medication	-0.098	0.075
Total Score	-0.018	0.744
Glucometer Readings		
Mean Fasting	0.426	< 0.01#
Mean Random	0.356	< 0.01#

∂ = Spearmann rho #p<0.01

of the respondents, with the majority of the respondents also having secondary education as their highest level of education and are retired, as reflected in other similar studies conducted previously in both primary care and tertiary care setting in an urban area (6, 8, 12,16). This findings may differ if this study was done instead in the rural setting where the sociodemographic profile may not be similar.

The mean HbA1c in this study was 8.0%, which was comparable to the Malaysian National Diabetes Registry report from 2009-2012, indicating that our sample population is representative of the Malaysian population (18). Our analysis suggested that being of an older age and having a retired employement status were independently predictive of a better glycemic control, which is opposed to findings of another published study that showed increasing HbA1C levels with age (19). We hypothesise that this may be due to the fact that T2DM patients who were older and belonging to retired employment status have ample time to look after their health compared to those that are still in active employment.

We found significant correlations between the numbers of close contact with both social support and self-efficacy scales. However, these correlations are weak which suggest that they are other factors that needs to be considered when analysing one's support system in relations to their level of social support and self-efficacy. This is not surprising as human interactions are often variable and unique.

All the social support subscales did not correlate with the HbA1c levels. The lack of correlation between HbA1c level and social support had been shown before in many studies (12,22). Various factors that can affect HbA1c levels including adherence, treatment optimisation and lifestyle can be possible confounding factors, all of which had not been studied in this study. These factors were unfortunately not within the scope of this study. Another possible reason for this lack of correlation between social support and HbAIc levels could be due to the fact that the MOS measures perceived social support in general, rather than disease specific support. In contrast, a study which examined family support using a Diabetic Family Behaviour check list, found a significant association between family support and HbA1c levels, in where it was noted that the higher the support level, the lower the HbA1c level (11). Here in this study, diabetic social support was specifically measured. This suggests that diabetes-relevant family support may have more effect on the HbA1c level as compared to general social support. Provision of group interventions as a form of social support were found to be helpful in various studies (23,24). Significant results of better HbA1c level after an educational intervention program amongst patients with diabetes has also been reported (24). Providing education was akin to providing informational support to the patients. However, the level of social support received from such interventions were not measured. The above studies showed that provision of social support via various methods of diabetes intervention programmes may assist in achieving better glucose control.

There were no significant correlations found in this study between the level of HbA1c with the level of self-efficacy or its subscales. Several studies had reported similar findings (6,20,25). Some interventional studies however, reported that higher diabetic self-efficacy leads to better glycaemic control (22,26–28). In particular, one study that was measuring self-efficacy among Dutch and US outpatient patients with T2DM, found that there were significant associations between self-efficacy with the reduction of HbA1c levels in the US population (26). Meanwhile, another study demonstrated that there was negative correlations between perceived competence in handling diabetes and HbA1c level ($r = -0.20$, $p<0.01$) (27). A study reported that a diabetes specific intervention programme significantly improved self-efficacy, which later translated into improved glycaemic control (28). Another study also found significant negative correlation between self-efficacy with baseline HbA1c level ($r = -0.187$, $p<0.01$) (22). This study involved patients who were not on treatment but only on diabetes specific diet control plan, which is probably the reason for getting a significant correlation as opposed to this current study. This demonstrates the fact that sometimes by just adhering to a specific dietary plan coupled with recommended minutes of physical exercise, patients are able to achieve good glycaemic control. The non-significant correlation between self-efficacy and HbA1c level found in this current study could be explained by the fact that other factors needed to achieve better glycaemic control; such as affective symptoms, belief and willingness to change may also need to be investigated in order to understand the complexity of factors that may affect HbA1c level(29).

Although this study did not find any significant associations between social support and self-efficacy and glucose control, we found other factors that were significantly associated with better glucose control which were the age and employment status of the patient. This can be a valuable information to the treating healthcare professional in managing this complex disease, especially since it was carried out in a public primary care setting where the bulk of the T2DM patients are usually seeking treatment.

Limitations encountered in this study included variations in the duration of the latest HbA1c taken, nevertheless, we compared the readings with glucose levels taken on the same day as follow up as we analysed this data in order to provide justification on the level of glucose control in this population. The tools used to analyse social support and self-efficacy in this study were self-reported, which may lead to inaccurate reporting, however it remained as one of the most practical method as opposed to only basing it on direct observation (6, 30). Lastly, other factors that could affect the glucose level such as adherence, treatment optimisation and lifestyle were not studied due to limitation of the scope of this study.

CONCLUSION

HbA1c levels are found to be significantly better in T2DM patients who are older and retired in this study. The number of close contacts were found to have an effect on both social support and self-efficacy. However, both social support and self-efficacy does not significantly affect the glycemic control of these patients. Further studies can look into the evaluation of these subscales in self-efficacy and social support as this would be helpful in specifying which categories that can be specifically looked into that will eventually have the highest impact on the overall glucose control.

ACKNOWLEDGEMENT

We would like to thank the Director General of Health Malaysia for his permission to publish this article.

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