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SELF-CARE PRACTICES OF DIABETES PATIENTS AMONG THREE ETHNICS IN MALAYSIA: MALAY, CHINESE AND INDIAN

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ABSTRACT

Introduction: There are areas of discrepancy related to the effectiveness of self-care practices in improving diabetes management especially when it involved a socio-cultural background of patients or their living situations.
Aim: This study aim to determine the level of diabetes knowledge and self-care practices of diabetes patients among Malay, Chinese and Indian ethnic.
Method: This study was a cross-sectional study that conducted in diabetic clinic, hospital Sungai Buloh, Selangor, Malaysia. Self-administered questionnaires were distributed to diabetic patients from December 2011 to February 2012.
Results: 212 respondents involved part in this study with 75 Malay, 72 Chinese and 65 Indian. Based on the result, there was significantly different on level of diabetes knowledge assessment among three ethnics ($F= 39.07$, $p<0.05$), Indian had the highest mean score (mean=18.09, SD 1.17) followed to Malay (mean=16.15, SD 1.78) and Chinese (mean=15.46, SD 2.23). There was significantly different in leisure activity ($F=16.80$, $p<0.05$) and non-leisure activity ($F=8.99$, $p<0.05$). Chinese had the highest score for leisure activity (mean=13.00, SD 0.96) while Indian had highest score in non-leisure activity which indicate they were most active among the three ethnics (mean=14.52, SD 0.79). There was significantly different in self-monitoring blood glucose level among the three pairs of ethnics ($F=44.29$, $p<0.05$) where Chinese dominated the total score (mean=18.09, SD 1.09). There was no significantly different on diet pattern ($F=1.906$, $p>0.05$) and medication intake ($F=45.33$, $p>0.05$) between three ethnics.
Conclusion: In this study, there was significantly different on self-care practices among three ethnics except for diet and medication intake. It can be concluded that individualized nursing interventions should be trained for high risk diabetic patients based on their customs and background to improve physical outcome.

Keywords: diabetes, ethnic(s), patient(s), practice(s), self-care.

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1. INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (Buysschaert & Bergman, 2011; Feinglos & Bethel, 2008; Meiner & Luecknotte, 2006). There are two major clinical forms of diabetes namely Insulin-Dependent Diabetes Mellitus (IDDM) or type 1 diabetes mellitus and Non-Insulin-Dependent Diabetes Mellitus (NIDDM) which is known as type 2 diabetes mellitus (Stoppler, 2011). Diabetes is a serious disease that can cause complication such as blindness, kidney failure, heart attacks and strokes. It is a common condition associated with increased morbidity and mortality (Beckles et al., 1998; Lutchuman et al., 2006 ; Mafauzy, 2006). Type 2 diabetes remains a leading cause of cardiovascular disorders, blindness, end-stage renal failure, amputations, and hospitalizations (Beckles et al., 1998; Inzucchi et al., 2012). The incidences of diabetes keep increasing years by years. It is estimated that the world incidence of diabetes for adults is 285 million in year of 2030 (Shaw et al., 2010). The incidence of diabetes was reported varies by ethnics. In the United State, Hispanic, black, Native American, Alaska Native, and Asian American population have higher rate of diabetes than non-Hispanic white ethnic (Chatterji et al., 2011).

In 1986, the prevalence of diabetes in Peninsular Malaysia as reported in the first National Health and Morbidity Survey was 6.3% and in 1995 as reported by the Cardiovascular Unit in the Department of Public Health, Ministry of Malaysia was 7.7% (Mafauzy, 2006). The incidence of diabetes seemed to be in rise. The Third National Health and Morbidity Survey stated the prevalence of the disease for adults aged 18 and 30 years old and above has risen to 11.6% and 14.9% respectively (Letchuman et al., 2010). By ethnicity, the highest diabetes prevalence was found to be the Indians at 19.9%, followed by 11.9% in the Malays and 11.4% in the Chinese (Letchuman et al., 2010). Among the impaired glucose tolerance (IGT) however, the Chinese recorded high prevalence namely 6.5% and since it is said that about one-third of IGT progressed to diabetes, the prevalence in the Chinese would increase in 5 to 10 years time (Taiyeb-Ali et al., 2011). It is also possible that the risk factors for diabetes could differ considerably between ethnic groups because of differences in diet, physical activity, body weight, and lifestyle variations (Ahmed et al., 2011).

Patient self-care practices are believed to have a major role in managing diabetes. However, culture and ethnicity also plays a large role in explaining diabetes self-care and health outcomes (Munshi & Lipsitz, 2007; Weinger, 2007). Thus, a research regarding the self–care practices among Malay, Chinese and Indian is very important and it was necessary to help diabetes patients evaluate their daily self-care practices, to identify barriers and to understand why patients were unable to perform such task as well as to identify areas of self-care practices in which patients needed assistance. This study done thus determined the level of diabetes knowledge and self-care practices of diabetes patients among Malay, Chinese and Indian ethnic.

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4. METHODOLOGY

2.1 Design, sample and setting

This was a cross-sectional study conducted from 1st December 2011 to 28th February 2012 in a diabetic clinic government hospital, Selangor, Malaysia.

Non-probability convenience sampling with specific eligibility criteria was employed. In this study, convenience sampling defined as respondents were those who attended the diabetic clinic that fulfilled the inclusion and exclusion criteria to be included to participate in this study and participation was voluntary.

Sample size was calculated based on prevalence from previous study (Mastura et al., 2008); a sample size of 75 Malay, 72 Chinese and 65 Indian considered adequate. The respondents who were eligible for this study would be if they have been diagnosed with either Type 1 or Type 2 diabetes, aged 18 years and above, speak and understand either Malay or English and had no major severe disease that could interfere with self-care.

2.2 Instrument

The English Version of Diabetes Self-Care Practices scale was adopted (Tan et al., 2011). This questionnaire had been validated and reliable among Malaysian population with the overall Cronbach's alpha reading was 0.71 with individual sections ranging from 0.69 to 0.86 (Tan et al., 2011). The questionnaires were divided into three parts. Part A concerned the ethnicity (1item), part B concerned on diabetes knowledge assessment (20 items), and part C concerned on self-care activities (32 items) that included diet pattern (7 items), medication intake (4 items), non leisure physical activity (9 items), leisure physical activity (7 items) and self-monitoring blood glucose (5 items).

A pilot study was also conducted that involved 10% of the targeted population. Internal consistency estimate was computed for knowledge assessment and the self-care activities that consisted of dietary, medication intake, physical activities, and self-monitoring blood glucose using Cronbach's alpha from the data of the present study. The knowledge assessment had a Cronbach's alpha of 0.60 and the self-care activities part was 0.58. The total score was 0.60.

2.3 Ethical considerations

The ethical approval was registered and approved by Ministry of Health (reference: (2) dlm.KKM/NIHSEC/08/0804/p12-126) and Research Ethic Committee, Faculty of Health Sciences, Universiti Teknologi MARA (reference: 600-FSK (PT.5/2).

All respondents in this study were voluntary and they were free to turn down and no longer be involved in this study if they eventually chose to. Full confidentiality and anonymity was maintained.

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2.4 Data collection method

Once the potential respondents were identified, the investigators approached the respondents with the information sheet. If the respondents agreed to participate, the investigator then approached them with the consent form. Data collection commenced following respondents consent. After demographic data was collected, each question was read to the respondents. After three repeated, the investigators recorded the answers. Each interview took about 30 minutes.

2.5 Data analysis

The statistical package for social sciences (SPSS) version 18.0 was used for this analysis. The level of significance was used set at 0.05 for all analysis. Demographic data in part A was analyzed using descriptive analysis. Analysis of Variance (ANOVA) was used to assess any difference between knowledge of subjects and the ethnicity. In order to identify any different between self-care practices and the ethnicity, Analysis of Variance (ANOVA) was also used to answer the second objective.

5. RESULTS

3.1 Objective 1: Level of knowledge between Malay, Chinese and Indian

The mean score on level of knowledge of the Malay respondents was 16.15 (SD=1.78) and range from 14-20 points. The maximum score was 20 points. Fifty-three respondents (71%) of Malay population scored 15 points and above, with only twenty-two respondents (29%) scoring less than 15 point. The mean score of Chinese respondents was 15.46 (SD=2.23) and range from 13-20 points. Thirty-nine respondents (54%) of Chinese population scored 15 points and above while the rest thirty-three respondents (46%) scoring less than 15 points. Compared with two other ethnics, the mean score of Indian was 18.09 (SD=1.17) and range from 17-20 points. All the Indian respondents (100%) scored 15 points and above. There was significant different on level of diabetes knowledge among three ethnics (F= 39.07, P<0.05). Only 'Malay and Indian' and Chinese and Indian' pairs are significantly different by post hoc test Scheffe's procedure. From the result shown, the ethnicity influence on the level of diabetic knowledge. Thus, there were differences in level of diabetic patient's knowledge among Malay, Chinese and Indian. See table 3.1.

Variable	Ethnic	n	Mean(SD)	F(df)	P	Post Hoc Test
Level of diabetes knowledge	Malay	75	16.50(1.78)	39.07(2;209)	<0.05	Indian> Malay> Chinese
	Chinese	72	15.46(2.23)			
	Indian	65	18.09(1.17)			

Table 3.1: Comparing mean level of knowledge among three ethnics (n=212)
Analysis of Variance (ANOVA)

3.2 Objective 2:

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3.2.1 Self-care practices of diet pattern

Based on the test using Analysis of Variance (ANOVA), the result presented showed that there is no significant different on diet intake pattern among the three ethnics (Malay, Chinese and Indian), ($F= 1.906$, $P> 0.05$). The mean score for Malay was 7.17 (SD=0.83), Chinese was 7.01 (SD=0.81) and Indian was 7.29 (SD=0.88). Indian dominated followed by Malay and Chinese. Nevertheless, the comparisons were done in term of to investigate the pattern of diet intake for each question given. Based from the result the investigators stated that the there were no differences in dietary self-care practices of diabetic patients among Malay, Chinese and Indian. See table 3.2.

All the 212 respondents agree with the statement 'following your meal plan or controlling your diet is important in your diabetes care'. All the respondents that consisted of Malay, Chinese and Indian are advised by their health care provider to control their diet.
For snack intake, sixty-five Malay respondents show the highest percentage (39%) for the scoring four and below, followed by Indian with fifty-five respondents (33%) were found. The lowest race for this scoring was Chinese with forty-five respondents. In contrast, Chinese with twenty-five dominate the scoring above four for snack intake. However, Malay and Indian have showed the same results with ten respondents for this question. Regarding to this percentage, Malay and Indian have equally of snack pattern intake.

Regarding to the sweetened food or drink intake, the descriptive analysis was used in order to compare the dietary pattern between the three ethnics. Thirty seven percent with 75 Malay respondents has scoring 4 and below followed by Indian with sixty-five respondents (32%) and lastly was Chinese with sixty-two respondents (31%). Chinese respondents consumed more frequent sweet intake compared to Malay and Indian respondents consumed the least frequent sweet intake.

Carbohydrate intake includes sweetened food and drinks. The scoring of three and above indicates reduced the carbohydrate intake during meal for each time the respondents ate sweetened food or drinks. From the percent of the analysis, sixty Malay respondents showed the highest score followed by thirty-three Chinese respondents and eighteen Indian respondents.

For waking hours intake that resemble for last week, about eighteen Chinese respondents chose 2-3 hourly, no respondents either from Malay and Indian. The total scoring for this interval was 4 and below. Seventy-five Malay respondents (39%) show the highest scoring that is above four. Seventy-two Chinese respondents (37%) and forty-seven Indian respondents (24%) were included in this scoring.

For the eating habits, all the respondents stated that they did not have same diet habits as the last three months. Eighty-four respondents (40%) seldom have same diet habits for the last three months while the other one hundred twenty eight respondents (60%) sometimes have the same diet habits for the last three months. For the 'seldom' answer, the percentage of Malay answered is fifteen percent (15%), Chinese eighteen percent (18%) and Indian is seven percent (7%). For the 'sometimes' answer, Indian has higher percentage which is forty-two percent (42%), followed by Malay (20%) and Chinese (16%).

3.2.2 Self-care practices of medication intake

Hundred and ten respondents (52%) controlled their diabetes by taking tablets. Sixty-nine respondents (33%) reported that they took injections to control diabetes. Another thirty-three respondents (15%) used the combination of oral drug and insulin injections. The result showed that there was no difference in the medication intake of diabetic respondents among

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Malay, Chinese and Indian. Indian dominated the result (mean=19.11, SD=1.12), followed by Chinese (mean=16.47, SD=1.12) and Malay (mean= 12.42, SD=1.45). See table 3.2.

3.2.3 Self-care practices of physical activities

To have better understand respondent's physical activities practices, assessment included non-leisure activities such as occupational and household activities, transportation mode to the above activity, leisure activities which included a regular exercise program. The perceived influence of exercise in diabetes management and advice received from the healthcare providers regarding respondent's physical activity behavior was also explored.

3.2.3.1 Perceived Important of Physical Activity

Two hundred and twelve respondents (100%) agree that being physically active was important in management of diabetes.

3.2.3.2 Physical Activity Assessment

All the activity groups were classified into three categories which are 'least active', 'moderate active', and 'most active' according to the points scored. According to the result from this study, there were no groups that scored mostly active.

3.2.3.3 Non- leisure activity

Malay

Non-leisure activity score ranged between 10-17 points. The mean score of non -leisure activity was 13.16 (SD=2.38) with the median 12. Forty-five respondents (21%) were least active with the total score 6 to 13 points. Thirty respondents (14%) were moderately active with 14-21 points of scoring during their non-leisure hours. No respondents were most active within Malay ethnic.

Chinese

Total score of non-leisure activity is evaluated according to range. Based on the result, the number of Chinese respondents that get score ranged from 6-13 points is 25 respondents (12%) which indicate least active. The rest forty-seven respondents (14%) scored range from 14-21 points which are moderate active. There are no respondents scored for most active. The mean score for Chinese was 13.8 (SD=2.04) with median 14.

Indian

Sixty-five respondents (31%) show moderate active with total score points (14-21). No respondents for least active and most active. The mean was 14.5 (SD=0.79), and the median was 14.00.

From the One-Way Variance (ANOVA) test, it showed that Indian were more active compared to Malay and Chinese. This finding was supported by a significant different between non-leisure activity and the ethnics ($F=8.985$, $P< 0.05$). Post-hoc analysis showed that the mean score of non leisure activity are significant different between Malay and Indian. See table 3.2.

3.2.3.4 Leisure Activity

The respondents that had scoring 3-9 points are considered least active. Scoring from 10-20 points considered moderate active and respondents that most active would score from 21-31 points. However, in this study the range of points for all respondents were from 11 until 15 which mean that all of them are moderate active. Nevertheless, from post-hoc test, there was significant different in leisure activities among the three ethnics ($F= 16.804$, P

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<0.05). Mean difference in leisure activities show which group that was more active than the other. Based on post-hoc result, Chinese (mean=13.00, SD=-0.96) was more active than Malay (mean=12.49, SD=1.309) and Indian (mean=12.00, SD=0.559). See table 3.2.

3.2.4 Self-care practices of self- monitoring blood glucose (SMBG)

All the 212 respondents agreed that it is important to test blood glucose level at home and in between clinic visits. The respondents were all advised to monitor their blood glucose at home and in between the clinic visit by the physician and health care providers. Nevertheless, thirty-eight respondents (18%) reported that they did not test their blood glucose at home while the rest one hundred-seventy four respondents (82%) reported that they did. From 18%, Malay dominating the percentage where the percentage of Malay was forty-six percent (46%) Chinese and Indian were equally same which was twenty-seven percent (27%) both. From one hundred-seventy four respondents, 33% respondents that reported they did tested their glucose at home or between clinic visit was Malay. Sixty-two Chinese respondents (36%) had tested their glucose blood level at home or between clinics visit. 31% or fifty-five Indian respondents reported that they did tested their blood glucose level at home or between clinic visits.

Questions 4 from sub-topic self-monitoring revealed how frequent the respondents test their blood glucose level at home for a last week. The result showed that thirty-nine respondents (19%) did not test their blood glucose level, one hundred-forty nine respondents had test their glucose level below five times and twenty-four respondents test their blood glucose five times and above on a week before. From thirty-nine respondents whom did not test their blood glucose level, nineteen respondents (8%) was Malay, ten respondents (7%) was Chinese and another ten respondents (4%) was Indian. Fifty-six Malay respondents (26%), thirty-eight Chinese respondents (18%) and fifty-five Indian respondents (26%) had tested their blood glucose level below five times. All twenty-four (11%) respondents who tested their blood glucose level five times or more was Chinese. All the respondents did not aware about the importance of changing treatment plan based on blood glucose result as evidence by least time change the plan which was below than three times. From the result, there was significant different ($F= 44.29$, $P< 0.05$). So it means that at least one pair among the ethnics were significant different. The mean score of self-monitoring blood glucose for Malay was 12.12 (SD=1.39), Chinese 15.46 (SD =3.41) and Indian 18.09 (SD=1.09). From here, Indian had the higher mean score that indicate the Indian has much more test their blood glucose and regularly change their treatment plan based on the blood glucose reading. From the post-hoc test, all the ethnics have significant different for blood glucose testing. See table 3.2.

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Table 3.2: Comparing mean of physical activities among three ethnics (n= 212)

Variable	Ethnic	n	Mean(SD)	F(df)	P	Post Hoc Test
Diet	Malay	75	7.17(0.83)	1.91(2;209)	>0.05	
	Chinese	72	7.01(0.81)			
	Indian	65	7.29(0.84)			
Medication	Malay	75	12.42(1.45)	45.33(2;209)	>0.05	
	Chinese	72	16.47(3.46)			
	Indian	65	19.11(1.12)			
Non-leisure	Malay	75	13.16(2.38)	8.99(2;209)	< 0.05	Indian> Chinese>
physical	Chinese	72	13.88(2.04)			Malay
activity	Indian	65	14.52(0.79)			
Leisure	Malay	75	12.49(1.31)	16.80(2;209)	< 0.05	Chinese> Malay>
physical	Chinese	72	13.00(0.96)			Indian
activity	Indian	65	12.00(0.56)			
Self-	Malay	75	12.12(1.39)	44.29(2;209)	< 0.05	Indian>Chinese>
monitoring	Chinese	72	15.46(3.41)			Malay
blood glucose	Indian	65	18.09(1.09)			

Analysis of Variance (ANOVA)

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4. DISCUSSION

4.1 Level of diabetes knowledge

Indian had the higher level of knowledge toward diabetic management compared to Malay and Chinese. Chinese got the lower percentage of scoring for total score 15 and above compared to the Malay and Indian. From the result, the investigators found that only 'Malay and Indian' and 'Chinese and Indian' pairs were significantly different. No significant different between Malay and Chinese for this study. Indian was more knowledgeable compared than Malay and Indian regarding to the diabetic care. Wee and Li (2007) stated that in variable analyses of the diabetic knowledge survey toward ethnics, there was significant associated with diabetes knowledge among Chinese, Malay and Indian. The investigators found that ethnicity influenced the diabetes knowledge score because different ethnics have different thought of diabetic care and this could partially explained the difference in knowledge among the ethnics. By contrast, Tan et al., (2005) stated that Chinese showed better diabetes knowledge than Malay and Indian (mean 9.1%,10.3% and 11.0% respectively). Tan and Magarey (2008) mentioned that there was a significant different in diabetes knowledge between Chinese (20.1%), Malay (24.8%) and Indian (28.9%). From the survey, there had been reported that there was significant different in diabetes knowledge and ethnicity. Indian continued to lead with a percentage rate of 19% which was almost double that of other major ethnics.

4.2 Diet pattern

From the result, there was no significant different between ethnics toward diet intake pattern. All the patients agreed that the important of controlling diet and perceived advised from the doctor to control the diet.

In this study, Chinese with twenty-five (50%) consumed more than four carbohydrate exchange per snack per meal. Based from the previous study, besides the three main meals, 93% of subjects had regular snack which is consistent with local dietary habits (Karim & Kather, 2003). The recommended numbers of meals per day for patient with diabetes depend on treatment regime, body weight and individual habit (Association, 2004). The allowable carbohydrate exchange for snack is usually between 1-2 carbohydrate exchanges which have to be included within the daily allowance (Pearson & Powers, 2006).

From the obtaining result, Chinese patients (100%) consumed the most frequent sweet intake in the preceding week, compare with Malay and Indian patients consumed least frequent sweet intake. Chinese with sixty-two patients (31%). 100% scoring above 4 go to the 10 Chinese patients and no patients from Malay and Indian. Although interventional studies since the 1980s had shown that free sugars or sucrose are allowed to 10% of total calories intake or 50gm per day in context of a healthy diet and distributed throughout the day, it needs to replace other carbohydrate food in total daily calories (Shahar et al., 2000).

4.3 Medication intake

There was no significant different between medication intake and ethnics. In this study, the investigators found that all the patients agreed the important of taking the medication and they never neither miss nor needed help in taking the medication. In contrast to other study, fifty-four percent of the patients adhere to their medication intake which was lower than prior self-reported medication adherence intake (Balkrishnan, 2005).

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4.4 Physical activity

All the patients in this study agreed that being physical active is important to control the diabetes. All the patients had being advised by their doctor to have exercises regularly or be physically active.

Supported by the previously study done by Tan et al., (2011), found that many of the patients considered their daily schedules in housework or work outside their home as being active, so they indicated had adequate of physical activity in their daily living. A similar perception of physical activity was reported among Asian people in Western societies (Fischbacher et al., 2004).

Non-leisure activity

For non-leisure activity, 21% of Malay patients, 12% of Chinese patients and none of the Indian patients were 'least active'. In addition, Chinese was associated with lower level of non-leisure physical activity than Malay and Indian (Nang et al., 2010). For the 'least active' score, they tended to almost all the time sitting, almost none of the time standing or walking, seldom carry heavy thing and travel by car or motorbike. Malay was the race that was reveal as least active. By contrast for 'moderate active', Indian 31% was the highest percentage followed by Chinese 22% and Malay 14.4%. None of the races have percentage for 'more active'. This finding was consistent with prior report that 60% of adults in Malaysia are inactive (Ismail et al., 2002).

Most of the Malay used car and or motorbike as their daily transport. In the assessment of transportation to and from non-leisure activity in this study, none of the patients using public transport or cycle or walking between home and other activities. This statement was supported by the previous study done by Jacobson et al., (1991). This reflected the indirect influence of modernization and mechanization on Malaysian Society.

There was significantly different in the non-leisure physical activity of diabetic patients among Malay, Chinese and Indian. Comparing with the study done by Nang et al., (2010) ethnics were not significant different with achieving the recommended level of activity.

Leisure activity

None of the ethnics had score for the 'least active' and 'most active'. All the patients in this study were 'moderate active'. The criteria for the 'moderate active' were sometimes do gardening, walk around the house, sat down to watch TV and may have an infrequent regular exercise program with minimum intensity. Based on Tan et al., (2008), leisure physical activity was more prevalent among Indian than Malays and Chinese. This result is comparable with the finding by Ayiesah (2007), who reported that in term of ethnicity, the patients in leisure physical activity was highest among the Chinese, while the Malay demonstrated the highest proportion of inactivity. From this study, none of the ethnics was in 'most active' like walk around the house, performing gardening and have regular exercise program. In the other study by Mandey (1996), the patients reported five types of activities commonly performed that is walking, tai chi, gardening, stretching and bicycling. Walking was the most commonly reported physical activity consistent with studies done in other countries (Lampinen et al., 2000). In Malaysia, the Healthy Lifestyle Campaign places great emphasis on walking as a recommended activity towards health gains (Afonso et al., 2001)**.** These would have probably influenced the choice of leisure physical activities in this study group. From the result obtained in this study, there was significant different of leisure physical activity of diabetes patients among Malay, Chinese and Indian.

4.5 Self-monitoring blood glucose (SMBG)

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From the result obtained in this research, Indian had the highest rank in blood glucose monitoring by evidence of mean score 18.09 that higher than Malay and Chinese. From the analysis, there was significant different of self-monitoring among ethnics. Based from the Post-Hoc test, 'Malay and Indian', 'Malay and Chinese' and 'Chinese and Indian' pairs are significantly different. Although the numbers of Indian respondents were the lowest, this race still show their positive practices in blood glucose testing for the last 7 days. Blood glucose control is an important factor in prolonging patient's life due to diabetes. Blood glucose can be controlled either by testing glucose level at home or during clinic visits. Self-monitoring to detect hypoglycemia or hyperglycemia is vital to prevent long term effect to diabetic complications. However self- monitoring has its disadvantage as well, especially when there is a need to calibrate the instrument regularly (Ismail et al., 2002). In this study, the majority of the patients were having blood glucose testing below 5 times (70%). The result was supported by the previous study (Ismail et al., 2002). The percentage of respondents were having poor blood glucose monitoring was 70.3%. Comparable to the study conducted previously (Jacobson et al., 1991). In that study, 69.7% of the patients have good blood glucose testing.

5 IMPLICATIONS

This study had assessed about three ethnics which represent a large part of the population in Malaysia. Thus, management in treating diabetes mellitus can be focused on vulnerable population in order to give better outcome in future medical and nursing management. There are several ways that can be implied. Since Chinese had lower knowledge in diabetes, one of the ways to help this population to gather more knowledge is by providing Chinese educator or Chinese nurse to guide and give health teaching regarding diabetes so that Chinese patients can understand well what has been presented. The reason is maybe there was language barrier that influence the patient to gain understanding in what has been taught. Malay and Indian had a problem in performing physical activities. Examples of potential interventions to increase physical activities in Malay and Indian include refer the patients to physical fitness programmers, organize aerobic activity once in a week and encourage the patients to go to gymnasium to exercise. Malay had low compliance in self-monitoring blood glucose. Further research should be conducted to investigate why the situation happen. However, there is some implication can be done. It is by referring the patient to 'Pusat Zakat' (obligation centre) or referring to welfare to get financial support if the patients have lower income and do not has a budget to buy glucometer (item to measure blood glucose level).

Future studies should also look into the reasons why different people choose different activity and its relation to their functional status to ensure better understanding of the patterns of physical activities among the different ethnics. By doing so, education on physical activities for diabetic patient can be delivered more effectively by the involved health care providers.

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6.0 RECOMMENDATIONS

Nursing practice

The nurses should give specific instructions rather than general advice in self-care practices to increase compliance. It is necessary to stress on the pathogenesis of diabetes mellitus, risk factor, symptom and complication as well as monitoring of diabetes mellitus in health promotion programs in order to improve the overall awareness of the disastrous impact of diabetes epidemics on the quality of life and its socioeconomic burden.

Nursing education

There is necessary to stress on the pathogenesis of diabetes mellitus, risk factor, symptom and complication as well as monitoring of diabetes mellitus in health promotion programs in order to improve the overall awareness of the disastrous impact of diabetes epidemics on the quality of life and its socioeconomic burden. Educator must take note that including culture belief in education is necessary since it may influence patients understanding regarding the topic and gain patient's adherence to the practices.

Nursing research

Further research should be done regarding factors that contribute to the disease. Cultural belief should be included in future research since it may influence self-care practices.

7.0 LIMITATION

There are several limitations in this cross-sectional study. The demographics data of this study is only ethnicity. This limits the field of study. Supposedly, this study must also include the other demographic data such as age, duration of diabetes, family history and level of education. It may broad the findings which are can be beneficial in management of diabetes care. This study is also did not include cultural belief. Different beliefs of their risk of developing the disease are likely to initiate different lifestyle behavior modifications.

7.1 Bias

There is a bias in this study. The investigators acknowledge that the physical activities in this study was based on self-report and easily can be affected by measurement error such as false self-report.

8 .0 CONCLUSION

Most of the ethnics acknowledge about the diabetes but Indian showed that they most knowledgeable. There were no different of diet pattern and medication intake among the ethnics. For leisure activities, Chinese was the highest mean compared to the Malay and Indian respectively. Indian had the highest mean for non-leisure activities. Chinese dominated the mean for blood glucose monitoring followed by Indian and Malay respectively.

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