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Diabetes Knowledge, Attitudes, Self-management, and Quality of Life among People with Type 2 Diabetes Mellitus – A Comparison between Australia- and Malaysia-Based Samples

Yee Cheng Kueh[1, 2]*, Tony Morris[1] and Aziz-Al-Safi Ismail[3]

[1]*Institute of Sport, Exercise and Active Living, College of Sport and Exercise Science, Victoria University, 14428 Melbourne, Australia*

[2]*Unit of Biostatistics and Research Methodology, School of Medical Sciences, Universiti Sains Malaysia, 16150 USM, Kubang Kerian, Kelantan, Malaysia*

[3]*Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia, 16150 USM, Kubang Kerian, Kelantan, Malaysia*

ABSTRACT

The present study aimed to examine the levels of diabetes knowledge, attitudes, self-management and quality of life (QoL) between two countries with different cultural and language backgrounds. Data collection was conducted in two hospitals in Melbourne, Australia, and a hospital in Kelantan, Malaysia. Participants with type 2 diabetes mellitus (T2DM) were asked to complete four questionnaires, measuring diabetes knowledge, attitudes, self-management, and QoL. The differences between the samples were examined using chi-square and independent samples *t*-tests. The variables of gender and type of treatment (using insulin or not using insulin for treatment) based on groups were analysed using one-way ANOVA. All analyses were conducted using SPSS 22.0. The results highlighted some similarities and differences between the Australia-based sample and the Malaysia-based sample. In general, the Australia-based participants scored significantly higher in diabetes knowledge and reported more regular self-management of T2DM in exercise, blood glucose testing and foot care. The Australia-based sample also scored higher on attitudes compared to the Malaysia-based participants. On the other hand, Malaysia-based participants reported a lower level of impacts of T2DM on QoL. There was no significant difference between self-management of T2DM in terms of diet and satisfaction as an aspect of QoL related to living with diabetes between the two samples. The present study highlighted the levels of diabetes knowledge, attitudes, self-management, and QoL among Australia-based and Malaysia-based people with T2DM.

Keywords: Type 2 diabetes mellitus, knowledge, attitudes, self-management, quality of life, insulin, gender

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E-mail addresses:
yckueh@usm.my (Yee Cheng Kueh),
Tony.Morris@vu.edu.au (Tony Morris),
aziz.alsafi@usm.my (Aziz-Al-Safi Ismail)
*Corresponding Author

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INTRODUCTION

The prevalence of type 2 diabetes mellitus (T2DM) is causing a major public health burden across the world. Diabetes is a health, social and economic burden for individuals with the progressive, chronic condition and for their families and the community. It is also associated with various disease complications, so it impacts on the quality of life (QoL) and life expectancy for people diagnosed with diabetes. Diabetes mellitus has been one of the top ten leading causes of death in Malaysia since 2002 (World Health Organization, 2006). The latest statistics released by Diabetes Australia Victoria (DAV) in 2011 stated that diabetes is the sixth leading cause of death in Australia (Diabetes Australia Victoria, 2011). Malaysia was reported to have approximately 1.2 million people with diagnosed diabetes (Zanariah et al., 2009), which is higher than Australia with 898,800 people reported to have diabetes (Australian Institute of Health and Welfare, 2011). However, DAV has reported that an estimated total of 1.7 million Australians have diabetes, but 50% are undiagnosed (Diabetes Australia Victoria, 2011). As diabetes has become the fastest growing chronic disease and one of the leading causes of death in Australia and Malaysia, it is important for researchers to identify ways to help people manage their diabetes more effectively to reduce the progress of complications for individuals and minimise the burden for health services.

Although medical and health services must play a major role in diagnosis, treatment and monitoring of T2DM day-to-day management have to lie with the individuals with diabetes, with the support of their families (Haas et al., 2013). Thus, self-management is critical to maintaining health and slowing down the progress of the disease. Self-management includes lifestyle factors including diet and exercise, as well as taking prescribed medication, and monitoring of blood sugar and foot care. For most individuals with little or no medical background, the nature and progress of diabetes and what can or must be done to manage it is not self-evident.

Being diagnosed with a progressive, chronic condition like T2DM can be a shock and people can react with negative feelings of varying intensities. Individuals' attitudes to having diabetes are likely to impact on their response to the demands of the condition for self-management (Nam, Chesla, Stotts, Kroon, & Janson, 2011). Research has shown that people who were diagnosed with diabetes have lower QoL compared to the general population (Solli, Stavem, & Kristiansen, 2010). The impacts of having diabetes and how people with T2DM address the condition by finding out how to manage it, perceiving ways through to a healthier lifestyle and managing the condition from day to day will affect their QoL. However, the perception of QoL and level of knowledge, attitudes and self-management among people with T2DM may vary across different cultures and countries. Therefore, these variables are the important aspects in diabetes research globally.

One factor that has been widely been cited as distinguishing between cultures in the western countries and many Asian countries is how strongly individualist or collectivist they are (Hofstede, 2001). Most western countries have individualist cultures in which people think first about themselves. Many Asian countries have collectivist cultures in which personal interests are subservient to the needs of the community. This creates cultural differences that can indirectly influence people's self-management of health conditions like diabetes, as well

as how they interact with health professionals (Tripp-Reimer, Choi, Kelley, & Enslein, 2001). Individualistic cultures, such as Australia, which are associated with independent ideas of self, prioritise personal goals and uphold individual attitudes as key determinants of behaviour, including health-related behaviour (Matsumoto, Yoo, & Fontaine, 2008). Therefore, privacy and assertiveness are highly valued in individualist cultures. Conversely, collectivistic cultures, such as Malaysia, are associated with interdependent selves and group-focused goals. They value the group's or community's norms as primary determinants of behaviour, and they value group harmony. These distinctive characteristics that are influenced by the culture of the country people live in may affect how they act on their illnesses and value their life as an individual with T2DM.

Gender differences have been reported in diabetes knowledge, attitudes, self-management and QoL. For instance, Kamel, Badawy, El-Zeiny, and Merdan (1999) showed that women generally had a poorer level of diabetes knowledge compared to males. In a study conducted in Pakistan, Rafique, Azam, and White (2006) reported that males had more positive attitudes in comparison with females. Misra and Lager (2009) also reported that women had more difficulty in managing their diet and self-management than men. This could be because women are mostly responsible for preparing meals for their family and because of their diabetic condition, they have to prepare their own meal separately (Samuel-Hodge et al., 2000). Thus, women are most likely to experience difficulties related to their self-management of diet. Women were also found to be more anxious about their diabetes condition, thus, they generally experienced lower QoL than males (Misra & Lager, 2009).

In addition, diabetes treatment, such as insulin therapy, can have a significant impact on the life of people with T2DM. Insulin therapy usually occurs against a background of many years of habitual diabetes self-management that may have to be changed to improve the health condition of people with T2DM. This can be a reminder of the progressive nature of the condition that requires more complex and invasive treatment. Furthermore, the level of impact of insulin therapy on people with T2DM can vary in different cultural contexts. Some researchers have reported that insulin therapy was not associated with QoL (UK Prospective Diabetes Study Group, 1999). Other researchers have shown the effects of insulin on well-being or QoL, but they have found different relationships, ranging from beneficial (Chow, Tsang, Sorensen, & Cockram, 1995; Pibernik-Okanovic, Szabo, & Metelko,1998) to deleterious (Hanninen, Takala, & Keinanen-KiuKaanniemi, 1998; Goddijn et al., 1999). One reason why the results of studies undertaken in different cultures are not consistent is probably that the research methods varied between the studies. Therefore, it is important to undertake cross-cultural studies in which the same methods are employed in different cultures, allowing direct comparison. Furthermore, we could not find studies in the literature that examined comparisons between countries and gender differences in diabetes knowledge, attitudes, self-management, and QoL among people with T2DM. Such comparative assessments are important for us to understand disparities in those aspects between different cultural groups so that appropriate strategies can be utilised to improve the health condition of vulnerable people in the diabetes population.

In the present study, we aimed to examine the differences in the levels of diabetes knowledge, attitudes, self-management and QoL between individuals based in Australia and

Malaysia, who have been diagnosed with T2DM. Further, we examined differences in the diabetes knowledge, attitudes, self-management, and QoL between adult males and females, as well as between insulin users and non-users in Australia and Malaysia.

METHOD

Participants

Participants for this study were males and females, aged over 18 years. We included only individuals who were diagnosed with T2DM at least a year and above by medical practitioners and were registered with the specific hospitals that collaborated in this research. The participants were identified through the patient database of the hospitals or they were referred to the researchers by staff nurses.

Measures

The Demographic and Health Measure Form included several demographic and health treatment questions. These questions assessed the participants' personal attributes (e.g., age, gender) and their health condition (e.g., how long they have been diagnosed with T2DM, how it has been treated) at the time when they completed the measures.

The Diabetes Knowledge (DKN) scale is a reliable diabetes knowledge assessment in people with diabetes. Furthermore, it is easily administered, being short with 15 multiple choice questions (Beeney, Dunn, & Welch, 1994). All the questions require a single correct answer, except for items 13 to 15, for which several answers are correct and all must be checked to obtain a score of 1. The total score for each form is the sum of correct answers in a score range of 0 to 15, with higher scores indicating higher levels of diabetes knowledge. Then, the scores were converted into percentages. The DKN has internal consistency reliability of Cronbach's alpha 0.82 (Beeney et al., 1994).

The Diabetes Integration Scale-19 (ATT19) consists of 19 self-administered attitudinal statements on the perception of diabetes among people with diabetes. Responses are made on a 5-point Likert scale with possible answers from 1 (*I disagree completely*) to 5 (*I agree completely*). In the present study, the total score was computed by summing the scores from all 19 items. Therefore, the potential score ranged from 19 to 95. The ATT19 has an internal consistency reliability of Cronbach's alpha 0.84 (Welch, Beeney, Dunn, & Smith, 1996).

Summary of Diabetes Self-Care Activities (SDSCA) is a brief self-report measure of diabetes self-management developed by Toobert, Hampson, and Glasgow (2000). It measures of the frequency of practicing different diabetes regimen activities over the past seven days. The SDSCA consists of 11 core items that were used in the present study. These core items measure self-care behaviour in terms of diet (general and specific), exercise, blood glucose testing, foot care and smoking status. In psychometric validation, the average inter-item correlations were high and generally exceeded 0.5 (Toobert & Glasgow, 1994). In the present study, the two items that refer to specific diet were omitted from the data analysis. This is because the specific diet items developed for use in America were not suitable for the Malaysia-based population, where diet is quite different, so they do not provide a meaningful comparison between the samples.

The Diabetes Quality of Life questionnaire (DQoL) measures the relative burden of diabetes treatment, with the goal of maintaining blood glucose levels as close as possible to those of people without diabetes (Diabetes Control and Complications Trial Research Group, 1988). The DQoL questionnaire used in this study consists of 15 items measuring satisfaction, 20 items measuring impacts, and one item measuring self-rated general health. Items are scored on a 5-point Likert scale rated from 1 (very satisfied, no impact) to 5 (very dissatisfied, very impacted). The total scores for each subscale were converted to percentages, where the highest percentage of satisfaction is considered to reflect highest QoL, and the highest percentage of impact is considered to represent lowest QoL. The DQoL has good reliability with test-retest correlations in the range of 0.78 to 0.92 (Diabetes Control and Complications Trial Research Group, 1988).

Procedure

A cross-sectional design study was conducted. For the Australia-based sample, two hospitals, the Alfred Hospital and Western Hospital, agreed to take part in this study. For the Malaysia-based sample, the participants were recruited via the Diabetes Health Clinic in Hospital Universiti Sains Malaysia (HUSM). A non-probability, convenience sampling method was applied in recruiting the participants. For administration to the Malaysia-based sample, the original English-language questionnaires were translated into the local familiar language, which is Malay (Kueh, 2014; Kueh, Morris, & Ismail, 2014). Content and construct validity to ensure the questionnaires were appropriate for use in Malaysia had been conducted in a previous study (Kueh, 2014). People with T2DM were invited to participate in this study by completing the questionnaire pack during their routine clinical appointment with their physician. The participants were provided with a research information sheet and an informed consent form. Written consent was obtained from the participants who had agreed to take part in this study by completing the questionnaires provided to them. The participants were informed they were allowed to withdraw from the study at any stage or to restrict their data for use in the analysis and report. The research was approved by the Human Research Ethics Committees of Victoria University (ethics code: HRETH 08/139), Alfred Hospital and Western Hospital in Melbourne, Australia, and Universiti Sains Malaysia in Malaysia.

Data Analysis

The independent samples t-test was used to identify the difference between the Australia-based and Malaysia-based samples on numerical variables. Chi-square statistic was used to identify any differences between the Australia-based and Malaysia-based samples on categorical variables. The differences between the gender and insulin treatment of both groups were tested using the One-way ANOVA. The differences between each pair of means were then determined by using Post-hoc Tukey tests, which are frequently used in multiple group comparisons. All the statistical analyses were conducted using SPSS 22.0 and significant level was set as 0.05.

RESULTS

Characteristics and Differences of the Participants

The total participants included 284 Australia-based participants and 276 Malaysia-based participants. The mean age for the participants in the Australia-based and Malaysia-based samples were 56.0 (*SD* = 11.01) and 57.1 (*SD* = 8.47), respectively. Table 1 shows the respondents' characteristics in the Australia-based and Malaysia-based samples and the differences between the two samples. The results revealed that there were significant differences between the two samples in terms of duration of diabetes since diagnosis, levels of diabetes knowledge, frequency of conducting exercise, blood glucose testing, foot care and level of impacts on QoL.

Table 1
Independent t-test of Differences in Characteristics of Respondents with T2DM.

Characteristics (numerical variables)	Australia-based sample Mean (SD)	Malaysia-based sample Mean (SD)	*t*-statistic	*p*-value
Age	56.0 (11.01)	57.1 (8.47)	1.30	0.196
Duration of diabetes	12.0 (9.01)	10.4 (7.53)	2.24	0.025
Diabetes knowledge	59.1 (19.69)	52.3 (17.27)	5.80	<0.001
Attitude	63.4 (11.68)	60.5 (9.44)	3.23	0.001
Self-management:				
Diet	4.9 (1.91)	5.2 (2.13)	1.50	0.135
Exercise	3.5 (2.26)	2.4 (2.34)	5.78	<0.001
Blood glucose testing	4.9 (2.48)	1.2 (1.80)	20.38	<0.001
Foot care	3.4 (2.58)	2.9 (2.65)	2.17	0.030
QoL:				
Impact	26.0 (16.30)	22.7 (14.30)	3.98	<0.001
Satisfaction	68.3 (17.99)	70.68 (14.43)	1.73	0.085

Table 2 presents the significant differences between participants from the two cultures in terms of their diabetes treatment, education background, working status, smoking, and self-rated general health. Results showed that there was a significant difference between the cultures in all these areas. In general, the Australia-based participants had experienced higher levels of education compared to the Malaysia-based participants. The results also showed that the majority of the participants were non-smokers for both the samples. More Australia-based participants rated themselves as poor in general health compared to the Malaysia-based participants.

Table 2
Chi-square Test of Differences in the Characteristics of Respondents with T2DM.

Characteristics (categorical variables)	Australia-based sample n (%)	Malaysia-based sample n (%)	χ^2 value	*p*-value
Type of treatment:				
Diet	25 (8.8%)	6 (2.2%)	57.63	<0.001
Diet and Tablet	107(37.7%)	163 (59.1%)		
Diet and Insulin	82 (28.9%)	23 (8.3%)		
Diet, tablet, and insulin	70 (24.6%)	84 (30.4%)		
Education level:				
Less than high school	74 (26.1%)	70 (25.4%)	13.05	0.005
High school graduate	108 (38.0%)	140 (50.6%)		
College graduate	45 (15.8%)	33 (12.0%)		
University graduate	57 (20.1%)	33 (12.0%)		
Working status:				
Yes	183 (64.4%)	113 (40.9%)	29.10	<0.001
No	101 (35.6%)	163 (59.1%)		
Smoking:				
No	230 (81.0%)	248 (89.9%)	8.69	0.003
Yes	54 (19.0%)	28 (10.1%)		
General health:				
Excellent	12 (4.2%)	21 (7.6%)	46.10	<0.001
Good	117 (41.2%)	112 (40.6%)		
Fair	104 (36.6%)	139 (50.4%)		
Poor	51 (18.0%)	4 (1.4%)		

The results from both the tables indicate that when compared with the Malaysia-based participants, the Australia-based participants on average showed greater diabetes knowledge, more positive attitudes towards T2DM, practised self-management more regularly (i.e., exercise, blood glucose testing, and foot care), included a higher percentage of university graduates and a larger proportion of the Australia-based sample were still working. However, a larger percentage of the Malaysia-based participants rated themselves as either excellent or good in general health, and only a small percentage viewed their general health as poor compared to the Australia-based participants.

Results Based on Gender

The ANOVA results in Table 3 for the differences based on gender indicated that there was a significant difference between the males and females in terms of their diabetes knowledge, attitudes, self-management in exercise, blood glucose testing and impact of diabetes.

Table 3
One-Way ANOVA Results for the Differences Based on Gender

Study variables	Australia-based sample		Malaysia-based sample		*F*–statistic	*p*-value
	Female, n=99	Male, n=185	Female, n=147	Male, n=129		
Diabetes Knowledge	66.2 (17.62)	58.8 (20.29)	52.4 (18.86)	52.3 (15.34)	14.79	<0.001
Attitudes	64.2 (11.25)	63.0 (11.92)	60.4 (8.95)	60.7 (10.01)	3.73	0.011
Self-management:						
Diet	5.0 (1.76)	4.9 (2.00)	5.4 (2.06)	5.0 (2.20)	1.52	0.208
Exercise	3.5 (2.10)	3.6 (2.36)	2.1 (2.27)	2.8 (2.35)	13.63	<0.001
Blood glucose testing	5.0 (2.48)	5.0 (2.50)	1.1 (1.85)	1.3 (1.73)	137.33	<0.001
Foot care	3.7 (2.50)	3.2 (2.61)	2.8 (2.57)	3.0 (2.75)	2.26	0.081
QoL:						
Impact	26.6 (16.30)	28.6 (16.30)	22.1 (14.26)	23.4 (14.36)	5.82	0.001
Satisfaction	67.8 (17.86)	68.6 (18.11)	72.0 (13.95)	69.2 (14.87)	1.67	0.173

The Post-hoc Tukey test revealed that the Australia-based females had a significantly higher level of diabetes knowledge than the Australia-based males ($p = 0.007$) and both genders for the Malaysia-based sample (female, $p < 0.001$; male, $p < 0.001$). The Australia-based females had significantly higher positive attitudes than the Malaysia-based females ($p = 0.032$). In self-management of T2DM, the Australia-based participants of both genders conducted self-care activities such as exercise and blood glucose testing more frequently than both genders of Malaysia-based participants. The Australia-based males had a significantly higher mean of diabetes impacts compared to the Malaysia-based males ($p = 0.019$) and females ($p = 0.001$).

Table 4
Post-Hoc Tukey Test for Gender

Study variables	*Difference between groups, p*-value					
	AF vs AM	AF vs MF	AF vs MM	AM vs MF	AM vs MM	MF vs MM
Diabetes knowledge	0.007	<0.001	<0.001	0.009	0.011	1.000
Attitudes	0.811	0.032	0.066	0.117	0.225	0.996
Self-management:						
Exercise	0.995	<0.001	0.114	<0.001	0.022	0.039
Blood glucose testing	0.996	<0.001	<0.001	<0.001	<0.001	0.743
QoL:						
Impact	0.721	0.112	0.418	0.001	0.019	0.888

AF = Female of Australia-based sample, AM = Male of Australia-based sample, MF = Female of Malaysia-based sample, MM = Male of Malaysia-based sample

Results Regarding Treatment with Insulin

Table 5 shows the ANOVA results for the differences based on the treatment with insulin. The findings indicated that there was a significant difference between insulin users and non-insulin users in diabetes knowledge, attitudes, self-management in diet, exercise, blood glucose testing, foot care and impacts of QoL on T2DM.

Table 5
One-Way ANOVA Results for Differences Based on Insulin Treatment

Study variables	Australia-based sample		Malaysia-based sample		*F* –statistic	*p*-value
	Without insulin, n=132	With insulin, n=152	Without insulin, n=169	With insulin, n=107		
Diabetes Knowledge	55.7 (19.10)	66.4 (18.87)	47.6 (16.83)	59.7 (15.29)	31.15	<0.001
Attitudes	62.8 (11.81)	63.9 (11.58)	61.2 (9.36)	59.3 (9.51)	4.41	0.004
Self-management:						
Diet	4.67 (2.09)	5.2 (1.71)	5.3 (2.10)	5.2 (2.18)	2.59	0.052
Exercise	3.6 (2.24)	3.5 (2.30)	2.4 (2.27)	2.5 (2.44)	11.30	<0.001
Blood glucose testing	3.87 (2.59)	5.8 (1.98)	0.7 (1.28)	2.0 (2.16)	192.71	<0.001
Foot care	3.06 (2.61)	3.67 (2.52)	2.6 (2.61)	3.4 (2.64)	4.96	0.002
QoL:						
Impact	25.4 (15.67)	30.1 (16.57)	20.5 (13.21)	26.2 (15.29)	10.70	<0.001
Satisfaction	67.4 (19.02)	69.1 (17.07)	71.4 (14.40)	69.5 (14.46)	1.54	0.202

The results of Post-hoc Tukey test revealed that no matter which culture they are from, people with T2DM using insulin in their treatment had a significantly higher level of diabetes knowledge compared to their counterparts who were not using insulin in their treatment. The Australia-based participants who were not using insulin treatment practised more frequent exercises ($p < 0.001$) compared to the Malaysia-based participants who were not using insulin in their treatment. Regardless of which country they are from, people using insulin treatment practised significantly more frequent blood glucose testing compared to their counterparts who were not using insulin in their treatment. In terms of QoL, people who used insulin in their treatment experienced higher mean impacts of diabetes compared to those who were not using insulin within the Australia-based sample ($p = 0.048$) and Malaysia-based sample ($p = 0.014$).

Table 6
Post-hoc Tukey Test for the Insulin and Non-Insulin Users

Study variables	*Differences between groups, p*-value					
	ANI vs AI	ANI vs MNI	ANI vs MI	AI vs MNI	AI vs MI	MNI vs MI
Diabetes knowledge	<0.001	0.001	0.284	<0.001	0.017	<0.001
Attitudes	0.789	0.591	0.068	0.100	0.004	0.495
Self-management:						
Exercise	0.927	<0.001	0.001	<0.001	0.006	0.963
Blood glucose testing	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Foot care	0.189	0.430	0.753	0.001	0.825	0.066
QoL:						
Impact	0.048	0.031	0.977	<0.001	0.181	0.014

ANI = Australia-based insulin users, AI = Australia-based non-insulin users, MNI = Malaysia-based non-insulin users, MI = Malaysia-based insulin users

DISCUSSION

To date, research has been conducted in population-based samples. There has been a range of research on diabetes knowledge, attitudes, self-management and QoL among people with T2DM, but each study is typically limited to the health-care setting of a single country. In addition, research on these variables, especially diabetes self-management and QoL, has been limited to western countries, and thus, patterns of these variables in non-western cultures remain largely unknown. In comprehensive reviews of diabetes research such as those related to diabetes self-management (Clar, Barnard, Cummins, Royle, & Waugh, 2010) and diabetes QoL (Cochran & Conn, 2008; Schram, Baan, & Pouwer, 2009), the authors found no reports of comparison between two cultures or countries. Thus, this is the first QoL study identified in the literature that examined differences between western and non-western cultures in terms of knowledge, attitudes, self-management and QoL among people with T2DM. It is important to compare critical health-care variables across cultures so as to identify limitations in some countries that could be reduced by adopting practices that are employed in other countries.

In the present comparison, we found that the Australia-based participants with T2DM had a significantly higher level of understanding about diabetes than their Malaysia-based counterparts. This could probably be due to the fact that the Australia-based participants scored higher on the DKN measure of knowledge about diabetes because more Australia-based (36.4%) participants were either college graduates or university graduates than the Malaysia-based participants (24.0%). This is consistent with the research by Maxwell, Hunt, and Bush (1992), who reported a positive correlation between education level and DKN scores. There is either a lack of research or no consistency among the research findings on the relationship between genders and diabetes knowledge. In some developing countries, females were found to have lower levels of knowledge about diabetes than males (Kamel et al., 1999; Rafique et al., 2006). Some researchers, however, found no significant differences between males and

females in terms of their knowledge about diabetes (Tham, Ong, Tan, & How, 2004; Garrett et al., 2005). In the present study, the Australia-based females had a significantly higher level of knowledge about diabetes than males, while the Malaysia-based females and males had almost the same mean level of knowledge about diabetes.

In measuring the attitudes to T2DM, the *t*-test results indicated that the mean scores of attitudes varied significantly across cultures. The Australia-based participants with T2DM scored significantly higher in their mean attitudes than their Malaysia-based counterparts. This finding also indicated that the Australia-based sample showed a more positive attitude toward their illness condition than their Malaysia-based counterparts. This study also revealed that the Australia-based females reported higher levels in attitudes than their male counterparts. In their study, Nielsen et al. (2006) explained that female participants showed more adaptive attitudes towards lifestyle modification as part of diabetic management compared to males. In the present study, however, there was no significant difference between Malaysia-based females and males in their attitude scores.

In self-management, as reflected in their responses to the SDSCA, the results indicated that the Australia-based participants practised exercises more regularly within the week compared to the Malaysia-based participants. Lack of culturally-appropriate exercise facilities available to the community in Kelantan, especially for women, may contribute to low motivation for exercise among people with T2DM. For example, in a study of Arab women, where the majority are Muslim, researchers found that the lack of culturally-sensitive exercise facilities and socio-cultural norms restricted the participants' motivation to engage in exercises (Ali, Baynouna, & Bernsen, 2010). Moreover, some barriers to exercises have been found among Malaysians of Malay ethnic background with T2DM. For example, in a qualitative study conducted among the Malay participants with T2DM in Malaysia, Ali and Jusoff reported that one of the participants explained that she could not do more exercise because she prepared food for her family (Ali & Jusoff, 2010). Other researchers reported that some people with T2DM even perceived exercises that increased heart rate and breathlessness to be inducing illness states, so they regarded such exercises as something they should try to avoid (Lawton, Ahmad, Hanna, Douglas, & Hallowell, 2006).

In their responses to the SDSCA, the Australia-based participants also reported that they checked their blood glucose level and foot care more frequently than the Malaysia-based participants during the week prior to completing the self-report measures. Foot care seems to be the least practised self-management practice by Australia-based participants compared to other self-management regimens. Tapp et al. (2004) observed that foot screening appears to be poor in Australia, with less than one-half of the T2DM population having a regular examination for foot complications. The results indicated that self-management of blood glucose testing and foot care among T2DM people differed significantly depending on whether they were on insulin treatment. The Post-hoc test showed that people with T2DM, who were using insulin in their treatment, had a significantly higher mean number of days on which they practised self-management of blood glucose testing and foot care than those who were not using insulin treatment. This result is consistent across both cultures. However, the Malaysia-based participants had a significantly lower mean number of days of practising blood glucose testing

than observed in the Australia-based sample. This is primarily due to the fact that most of the Malaysia-based participants did not have their own blood glucose test equipment when the data were collected; thus, they were only able to do blood glucose testing during their monthly clinic visit for diabetes. Evidence indicates that self-monitoring of blood glucose is a cornerstone of the treatment of diabetes (Harris, 2001). Thus, the instrument for measuring blood glucose that can be used for self-monitoring should be used as widely as possible by people with T2DM.

In the present study, males in both countries reported to experiencing a higher impact of diabetes than females within their cultural groups. The Malaysia-based females experienced the lowest impact of diabetes among genders in both cultures. A possible reason for this situation may be that the majority of the Malaysia-based participants hold particular religious beliefs that influence their view of diabetes illness in their life (e.g., Mir & Sheikh, 2010; Padela, Killawi, Forman, DeMonner, & Heisler, 2012; Peterson, Nayda, & Hill, 2012). Previous study indicated that there is an association between spirituality and depression in adults with T2DM, which revealed that females with lower educational levels and lower income had greater spirituality, and greater spirituality was associated with less depression (Lynch, Hernandez-Tejada, Strom, Egede, 2012). This indicates that having stronger religious belief plays an important role in self-reported well-being or depression, which may influence QoL, especially in terms of impact, and reflect a negative response to living with T2DM. The Malaysia-based participants were drawn from the state of Kelantan, where Malays with strong Muslim belief are the dominant group, forming 95 percent of the total population (Kelantan Properties, 2006). Thus, it is not surprising that the Malaysia-based participants held spiritual belief related to their religious background. This may explain why females reported lower mean impacts of QoL. However, spirituality or religious belief was not explicitly examined in the present research and evidence regarding faith-based personal motivation (fatalism, religiosity, spirituality) as a mechanism for greater QoL among people with diabetes is still very limited (Lynch et al., 2012). Future research using qualitative methods would be an interesting approach to explore this issue.

Undertaking insulin therapy can be a significant event in the life of people with T2DM. In the Malaysia-based and Australia-based samples in the present research, the participants being treated with insulin reported to have higher mean scores of impact within both cultures. This indicates that people treated with insulin experienced greater impacts of diabetes on QoL compared to those who were not using insulin in their treatment. This result is consistent with other studies (Bradley, Todd, Gorton, Symonds, Martin, & Plowright, 1999; Davis, Clifford, & Davis, 2001). Davis et al. (2001) reported that after adjusting for variables, including diabetes duration, fasting plasma glucose, efficiency in English and ethnicity, insulin treatment was significantly associated with impacts. Davis et al. (2001) also explained that insulin therapy could be a significant adjustment in the life of people with T2DM and this method is relatively complex and invasive. Furthermore, people tend to interpret the use of insulin as a failure on the part of individuals with T2DM. For instance, people with T2DM perceived shifting to insulin treatment as a threat, which emphasised that they had failed in managing their condition through lifestyle changes and oral medication (Gomersall, Madill, & Summers, 2011). This may contribute to the lower QoL reported among those who were on insulin treatment, such

as reported in a study by Shiu et al. in the Hong Kong Chinese population (Shiu, Thompson, & Wong, 2008). Shiu et al. also found that people using insulin treatment had poorer QoL than those who were not prescribed insulin to manage their diabetes.

In the present research, the sample from Australia comprised people who live in a major city (Melbourne), whereas the sample from Malaysia consisted of people who live in a more provincial state in Malaysia (Kelantan). Thus, conclusions about these two samples need to be carefully drawn. Meanwhile, the statistical differences between the Australia-based sample and the Malaysia-based sample might be explained by the differences in the health and medical provisions in the different locations where the samples were examined. We acknowledge that there were some limitations involved in choosing the samples from two different countries because the health system in each country is totally different. However, HUSM is a University's hospital where the health system is considered as advanced within the Malaysian context, given that the University has a diabetes clinic that specialises in providing treatment to people with diabetes in Kelantan, and it should be comparable to the health system in Melbourne, Australia, in terms of its diabetes care.

There are various benefits and strengths of the research comparing Australia-based and Malaysia-based people with diabetes reported in this study. This is the first research that to have identified and compared the levels of diabetes knowledge, attitudes, self-management and QoL among two cultural groups. This increases the understanding and reveals comparisons on the current situation of diabetes knowledge, attitudes to T2DM, self-management of T2DM and QoL of T2DM among people with T2DM who live in a developed country, Australia, and a developing country, Malaysia. For example, as mentioned earlier, this research has provided insights that people with T2DM living in a more advanced country with better facilities of medical care do not necessary experience less impacts of their illness compared to those with T2DM residing in a less advanced country with less opportunity of receiving the most sophisticated diabetes care for their illness. However, that less impact in the Malaysia-based participants reflects lower expectations of care and of health perhaps based on the lack of knowledge. The results suggest that there could be great benefits in exploring the basis of differences between the variables in this study. Among other, this could lead to changes in health-care practices in countries like Malaysia that should lead to improved management of T2DM.

CONCLUSION

The present research has uncovered interesting differences between two samples derived from differing cultures. These results suggest that differences can appear in two cultures or people from different countries in terms of how much they know about diabetes, how positive their attitude is in regard to their illness, how regularly they self-manage some aspects of their treatment regimens and their perceptions of the impacts of diabetes on their QoL. Although Malaysia-based participants scored significantly lower in the areas of diabetes knowledge, attitudes, exercise, blood glucose testing, and foot care, they experienced significantly lower impacts of diabetes than their Australia-based counterparts. This might be due to the lifestyle differences, social-economic status and religious beliefs and practices held within Malaysian culture, which remain an area for future research in the cross-cultural study of diabetes.

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