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Knowledge of and Adherence to Health Advice among Adults with Diabetes in Libya

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Abstract

Background: Non-adherence to medical and health care advice is a common problem, though reasons for non-adherence can differ across different groups and societies as well as between individuals. **Objective:** to examine diabetes knowledge among people with both type1 and type2 diabetes in Libya and explore any other factors that enhance adherence to treatment and management of the condition. **Methods:** A cross-sectional survey design was used to collect data from adults with type1 or type2 diabetes who have been diagnosed for 12 months or more, in Benghazi Diabetes Centre, which is one of the oldest and largest diabetes registries in Libya. A total of 855 participants were asked to fill in two questionnaires; the "Michigan Diabetes Knowledge Test" to investigate the level of diabetes knowledge and the Confidence in Diabetes Self-care Scale to assess self-efficacy. For the purpose of the study descriptive statistics and inferential statistical tests were conducted. **Results:** Diabetes knowledge is very poor especially among females and those classed as illiterate within the sample. The mean HbA_{1c} of 9.4 was higher than the recommended levels. Four variables namely knowledge about diabetes, duration of illness, family history and self-efficacy significantly predicted levels of HbA_{1c}. **Conclusion:** Based on the above findings, two different program of diabetes education would be recommended. The first would target those with inadequate levels of knowledge about diabetes, particularly women and people with long duration diabetes. The second would be for both healthcare professionals and people with type 1 and type 2 diabetes considering the psychological factors that are involved in diabetes management.

Key words: Diabetes management, Diabetes Education, Glycemic control, HbA1c,

Introduction

Diabetes mellitus (DM) is now considered one of the most common non-communicable diseases worldwide (1,2). It

is highly prevalent for all age groups worldwide (3) It is estimated that the number of people with diabetes worldwide was about 366 million in 2011and will increase to 552 million in 2030 (4). According to the International Diabetes Federation's (IDF) statistics released 75% of that figure will be from developing countries (3). Five of the top ten countries estimated to have the highest prevalence of diabetes are from the Middle East and North Africa region (MENA). In Libya, the prevalence of diabetes has recently been reported to be as high as 16.4 % (5). It is important that an individual with diabetes adheres to health care advice to prevent or minimize acute and long-term complications including retinopathy, neuropathy, nephropathy and cardiovascular disease (6). Diabetes complications impact considerably on the person's quality of life and the health economy in general. Diabetes is considered the fifth leading cause of death in most high-income countries (7). Unlike other chronic medical conditions, diabetes is classed as a self-managed/self-care condition. This is because diabetes is a twenty-four hour a day condition for life which requires many dietary and life style change (8). It has been argued that 98% of diabetes care is essentially self-care (6). Hence adherence to the health care advice is crucial for effective self- management.

High levels of non-adherence to diabetes treatment have been reported (9,10). Non-adherence to health advice is a multi-factorial dilemma determined by different factors including patients' knowledge, attitude and belief about their illness, self-efficacy duration and complexity of the management regimen (10,11). However reasons of non-adherence vary across different groups and societies as well as between individuals. There has been little research in this area in the MENA countries in general and particularly in Libya. Hence we undertook this study.

Patients and Methods

Aims and Objectives

We wished firstly to assess the levels of diabetes knowledge among adults with diabetes in Libya, secondly to evaluate the levels of adherence (as measured by HbA_{1c}) to health advice with regards to diabetes management, thirdly to investigate the factors which facilitate and enhance adherence to health care advice and lastly to explore the relationship between self-efficacy and diabetes management.

Research Design

A cross-sectional sampling survey design was used to collect data from adults with diabetes type 1 or type 2 who have been diagnosed for 12 months or more. Participants were asked to fill in two questionnaires in Benghazi Diabetes Centre, which is one of the oldest and largest diabetes registries in Libya.

Participants

A total of 855 participants took part in the study. Ninety two patients had type 1diabetes and 763 had type 2 diabetes. They were recruited whilst attending the diabetes center for their routine care. Of these 446 were females and 409 were males. The mean (SD) age of the whole group was 51.9 (13.2); ranging from 18-96 years.

Study Tools

Two questionnaires were used to collect data from all the participants.

a. Michigan Diabetes Knowledge Test (DKT): The DTK questionnaire of the University of Michigan Diabetes Research and Training Centre was designed to investigate the level of diabetes knowledge. It comprises of 23 items which include 14 items as a general test of management diabetes and 9 items for insulin use (12). Following measurement of diabetes knowledge, the sample was divided into three

Table 1. The range of knowledge score according to the level of knowledge.

Knowledge level	DKT score 23 items	DKT score 14 items general knowledge	DKT score 9 items related to insulin use
Poor knowledge	<11	<7	<5
Average knowledge	11-17	7-11	5-7
Good knowledge	> 17	> 11	> 7

groups based on their response of knowledge of diabetes. The range of the knowledge score was categorized in three different ways as proposed previously by Al-Adsani et al. (13) i.e. for all 23 items, for general knowledge using the first 14 items and for knowledge related to the insulin therapy using the remaining 9 items (Table 1). DKT were scored as 0 for incorrect response and 1 for a correct response. Therefore, the minimum score possible is 0 and the maximum is 23.

b. The Confidence in Diabetes Self-Care Scale (CIDS): The brief CIDS Scale is a self-report questionnaire to assess self-efficacy; it was designed for type 1 diabetes (14). It comprises 20 items to test patient's possibilities and capacities with diabetes management which include performing activities for treatment, self-observation and control of their general health condition and self-regulation to improve the conditions. However, because the participants in the present study had both type 1 and type 2 diabetes, the original questionnaire was modified to 21 items to incorporate questions relating to type 2. Scores for the scale were obtained by adding the items from the scale according to what type of treatment each participant was currently receiving at the time of data collection (Table 2). A

Table 2. Score for Self-efficacy Scale.

Treatment that participant was currently receiving	Number of items used from scale
Diet only treatment	17
Oral hypoglycemic agents	18
Insulin	20
Oral hypoglycemic agents & Insulin	21

Table 3: Demographic characteristic of the sample

Age	18 -96 years
Gender	Male: 409 (47.8%); Females: 446 (52.2%)
Type of diabetes	Type 2: 763 (89.2%) and Type 1: 92 (10.8%)
Education level	307 (35.9%) illiterate 219 (25.6%) obtained a primary school degree, 207 (24.2%) secondary school or diploma 120 (14 %) a university degree
Treatment type	Lifestyle measures only: 12 (1.4%) oral treatment: 106 (12.4%) insulin treatment: 588 (68.8%) combined oral and insulin treatment: 149 (17.4)
Duration of diabetes	12-500 months (1-41.5 years)
Annual income	Mean (3327.34) Standard deviation (2583.61)

subheading containing socio-demographic information was designed and appended to the two questionnaires. Socio-demographic data included age, gender, education level, family history of diabetes, duration of diabetes in years, type of treatment and income. The subheading also includes self-reported known complications of diabetes. In addition, data on the most recent HbA_{1c} value (within the previous three months prior to data collection) were extracted from the case records.

Outcome Measures

Demographic information which include: Age, gender, education, family history of diabetes, duration of diabetes in years, type of diabetes and type of treatment and income. Diabetes knowledge, self-efficacy, HbA_{1c} and presence of any diabetes complications.

Data Analysis

The Statistical Package for the Social Sciences (SPSS, version 17) was used to analyze the data. Descriptive statistics and inferential statistical tests including correlations, t-test, One-Way ANOVA and multiple regressions were performed to explore the relationship between variables and to compare the statistical significant difference between two or more groups.

Table 4. Complication of diabetes among the participants

Problems	Vision	Kidney	Nerve	CVD	More than one	None
Number	352	100	254	177	180	222
Percent %	41.2 %	11.7 %	29.7 %	20.7 %	21.1%	26%

Table 5. The relationship between DKT 23 and education level

Groups	Knowledge 23, Mean (SD)	F	P
Low literacy	10.0 (4.4)	17.1	0.001
Primary/Intermediate	11.6 (4.0)		
Secondary/Diploma	12.5 (3.7)		
University Degree	11.3 (4.1)		

Table 6. Factors are predicted HbA_{1c} levels

Predictor variables	Standardized Coefficients	T	P
	Beta		
DKT 23	0.085	2.474	.014
Self-efficacy	-0.214	-6.336	.000
Duration of DM	0.078	2.206	.028
Family history	0.151	4.401	.000
Complication	0.111	3.241	.001
Educated or not	-0.059	-1.676	.094

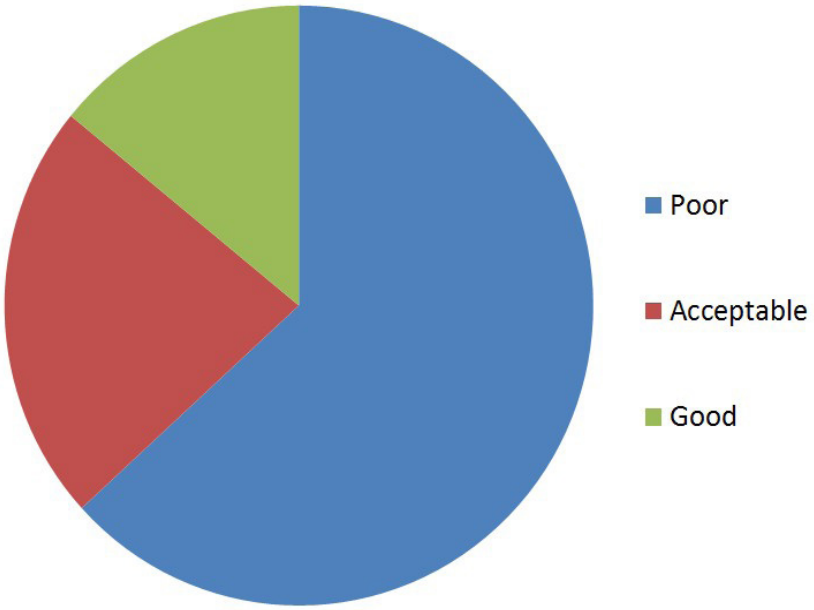

Figure 1. Distribution of degrees of glycemic control as good (HbA1c <7%), acceptable (7-8%) and poor (>8%).

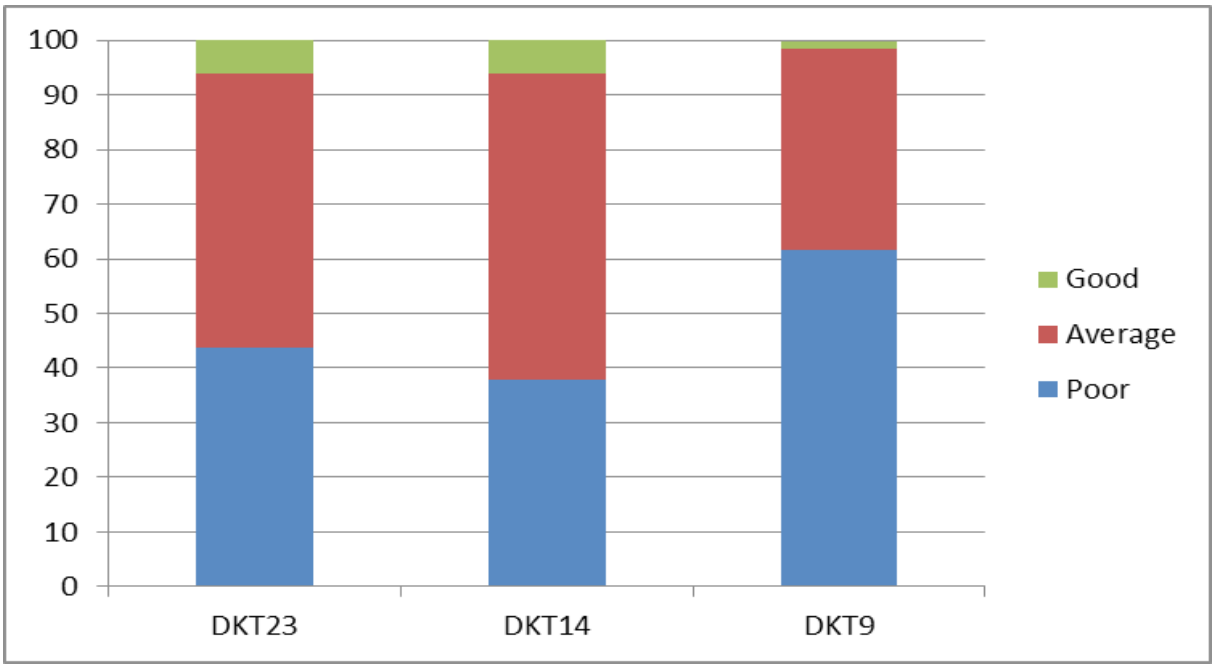

Figure 2. Categories of diabetes knowledge scores (poor, average and good) measured by DKT23 (overall knowledge), DKT14 (for non-insulin therapy related knowledge) and DKT9 (for insulin therapy-related knowledge).

Results

Patients' Characteristics

The characteristic of the 855 participants are summarized in the table 3. The mean age and standard deviation of participants was 51.9 years (SD =13.2). The mean and standard deviation of diabetes duration was 128 months (16.1 years) (SD = 92.1).

DKT Scores

The range of score for the sample is 0 to 21 and the mean and standards deviation of the total sample score is 11.2 (SD = 4.2), which indicate less than fifty per cent of the participant (48.6, SD= 18.3) correctly answered the DKT 23. The DKT data were further analyzed as described above (Table 1). This resulted in the sample being divided into three different groups (DKT23, DKT14 & DKT9) based on their measured knowledge of diabetes. The results of the three subgroups are presented in Figure 1. The participants reported moderate level of self-efficacy, with the mean and standard deviation of the total sample 3.2 (SD = 1.1) in the diabetes self-efficacy scale.

Glycemic Control

The mean (SD) for HbA_{1c} was 9.4 (2.4) %. Data were further analyzed, and the sample was divided into three groups based on HbA_{1c}: Group 1 with HbA_{1c} less than 7%, denoted as 'good' control. Group 2 with HbA_{1c} between 7-8 % denoted 'acceptable' whilst group 3 with HbA_{1c} higher than 8 % denoted as 'poor' control. Table 4 shows that 63.2 % of participants had had poor glycemic control and just above 14% of the participants had had HbA1c indicative of good glycemic control.

Frequency of Diabetic Complications

Seventy four per cent of the participants reported one or more diabetes complications. The numbers of participants and the respective reported diabetes-related complications are detailed in table 5. The most common complication was related to vision with nearly 40% of total participants experiencing this. Some participants experience more than one complication (21%), whilst 26% of participants reported no known complications.

Relationship between Variables

An independent t-test results showed that there is no significant difference in duration of diabetes, HbA_{1c} test result, level of diabetes knowledge, and self-efficacy scales between type 1diabetes and type 2 diabetes. There was a significant difference between males and females; females were less knowledgeable than males about diabetes in general with respective mean (SD) scores being 10.9 (4.5) versus 11.5(3.8) on DKT 23; p= 0.026* and 7.07(3.3) versus 7.7(2.5); p= 0.005** for DKT 14. In addition, a one way ANOVA test used to compare four groups for educational level (Table 4) suggested that those with lowest level of literacy were significantly different from the remaining 3 groups as they had lower levels of knowledge about diabetes. Multiple regression was conducted with the HbA_{1c} as the dependent variable and knowledge score (DKT 23), self-efficacy, duration of diabetes, family history, complication problem and education status as predictor variables. The results indicated that model accounted only for 9.5% of the variance (Adjusted $R^2 = 0.095$) ($F = 15.34$, $p < 0.01$) as shown in table 7.

Discussion

Non-adherence to medical advice for people with diabetes is a common problem in every community. This is mainly due to the fact that diabetes management is surrounded by numerous factors which make adherence to health advice rather problematic. In general, studies have shown that adherence among people with diabetes is poor (9, 16). This current cross-sectional survey study of 855 individuals with diabetes has used HbA_{1c} value to measure adherence and found that 64% of participants reported poor glycemic Control. The HbA_{1c} mean for the total sample was (9.3 $\pm$ 2.3) which is higher than the ADA (1) and DCCT (2) recommended. This current study indicated that duration of the illness; self-efficacy, family history, and complication of diabetes and the level of diabetes knowledge were significantly affecting HbA_{1c} level. According to this study the longer the participants have been diagnosed with diabetes the higher HbA_{1c} level and the lower self-efficacy level about the management of the condition. A possible explanation for this might be that people lose confidence in their ability to control the condition over time. Bandura (17) suggests that people stop carrying out the required regime because they either lose their confidence or they believe that they cannot change the outcome. The other important factors affecting HbA_{1c} level was the level of diabetes knowledge which indicated that people with higher level of knowledge had also higher HbA_{1c}. This finding is however is different to the finding of other studies (18, 19) which found that diabetes knowledge is associated with better glycemic control. The positive correlation found in this current study is, however consistent with the finding

of Al-Asani et al. (13). These findings might be attribute to the fact that health education programs are poor in Libya (20), similarly to Kuwait (13) and diabetic patients gained knowledge from experience obtained over their long duration of diabetes and complications. It is also supports the idea that although knowledge is very important, it is not enough in itself to improve patient's diabetes management (13,21,22). The present study also indicated that on average the participants answered 48.6 % of the total DKT questionnaire correctly. Studies (20,23,24) from both developed and developing countries have shown that diabetes knowledge is generally poor. A study conducted in Kuwait (13) which also used the diabetes knowledge test (DKT) with 5114 adults with type2 diabetes found that only 58.9 % were able to correctly answer the questionnaire. Murata et al. (24) assessed diabetes knowledge in 248 veterans with type 2 diabetes in the USA using DKT. They also found that only 65% were able to answer the questions correctly. In the general diabetes knowledge part (14 items) the current study found that nearly 60% of participants have average knowledge and over a third of the sample have poor knowledge. Alternatively, the study found that most of participants have poor knowledge in the insulin use related knowledge (9 items).

In the present study comparing males with females showed that, the female participants were found to be less knowledgeable about diabetes than the male participants according to the general diabetes knowledge section. This might be due to the fact that a much higher proportion of females were illiterate compared to male participants (68.4 % versus 31.6 %). However, there was no significant difference between male and females in the insulin use related knowledge; this might be something which warrants further exploration. Another important finding was that, this study did not show any significant difference between type1 and type2 diabetics in the level of knowledge. One possible explanation for this could be due to the fact that 84.5 % of type2 diabetics were using insulin as a form of treatment. The study also found a significant difference between level of knowledge and level of education. The study indicates that illiterate people (over of a third of the sample) have a lower level of knowledge than educated people. However, this finding is different to those reported by other studies for example a study by Sircar et al. (25) in the southern part of India have found that levels of education had no bearing on the level of knowledge. The significant difference found in the current study, is however consist with the finding of the Al-Adsani et al. study in Kuwait (13). This might be due the fact that the number of patients with low level of literacy in these countries was higher than those in Sircar et al. study (25). A strong positive relationship between self-efficacy and good adherence to medical advice has been reported in the literature (26,27). The finding in this study supports previous research (28, 29) which confirms that those who reported higher level of self-efficacy had lower HbA_{1c} level. Overall, the participants in the current study reported a moderate level of self-efficacy (3.2 ± 1.1). The study has also shown that a family history of diabetes has a positive impact on diabetes knowledge, which suggests that knowledge is being passed down from the experience of their family. Although the range of annual income is very large (Mean = 3327, SD = 2584 Libyan Dinars), (1 Libyan Dinar = 0.50 GBP); the present study did not find any difference between low and high family income in the level of diabetes knowledge or HbA_{1c}. A possible explanation for this result might be related to the fact that people with diabetes in Libya are provided with all medical services and medication free of charge (30).

In conclusion, the results of this study show that HbA_{1c} was higher than the recommended levels by ADA (1) and DCCT (2). Diabetes knowledge is very poor among both types of diabetes especially among those classed as illiterate and the female sample. Based on the above findings two different programmes of diabetes education would be recommended. The first programme of education would focus primarily on those with inadequate levels of knowledge about diabetes, particularly people with long duration diabetes. The second programme would be for both healthcare professionals and people with diabetes, which would consider the psychological factors that are involved in the process of diabetes management. Qualitative research is also needed to more fully understand the problem of non-adherence to the health advice.

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