International Research Journal of Medicine and Medical Sciences
Vol. 4(1), pp. 7-16, March 2016
ISSN: 2354-211X
Full Length Research Paper

Physical and psychological health domains of quality of life in type 2 diabetic patients in relation to clinical factors of diabetes mellitus in Egypt

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Accepted 16 March, 2016

ABSTRACT

Quality of life is an important aspect in diabetes because the poor quality of life leads to diminished self-care, which in turn leads to worsened glycemic control, increased risks for complications, and exacerbation of diabetes overwhelming in both the short run and the long run. The aim of the study was to assess physical and psychological health domains of the quality of life in type 2 diabetic patients in relation to clinical factors of diabetes mellitus in Egypt. A cross-sectional analytic study design was utilized in this study. This study was conducted at the Family Medicine Outpatient Clinic of Suez Canal University Hospitals in Ismailia city, Egypt. 143 type 2 diabetic patients were included who agreed to participate in this study and were selected using probability systematic sampling technique. Two tools were used to collect data; structured interviewing and World Health Organization Quality of Life Questionnaire abbreviated version were used to collect data. Revealed that the mean age of the study group was 54.74 (SD = 7.32) years and the majority of them were females. Factors related to lower quality of life in the present study were obesity, cigarette smoking, physical inactivity, and poor glycemic control. In conclusion, type 2 DM has negatively affected all domains of quality of life of the study group.

Keywords: Type 2 diabetes mellitus, quality of life, clinical factors.

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INTRODUCTION

According to the World Health Organization (WHO), the burden of diabetes mellitus in developing countries is increased compared to the developed world due to its low awareness among the public in developing countries, it is certain that they will face the impact of diabetes waves in coming years. Nowadays, the number of type 2 diabetes people is increasing in every country, and every 6th one person dies from diabetes. Globally, the majority of the 382 million people with diabetes are aged 40 to 59 years; 80% of them live in low and middle-income countries; and the percentage of people with type 2 diabetes will increase to 55% in 2035 (Saleh et al., 2015).

Approximately one third of mortalities in diabetic patients are due to cardiovascular diseases. It is estimated that more than 50% of diabetic patients die from a cardiovascular event – most likely coronary artery disease. Foot ulceration and infection in diabetic patients are considered two major causes of morbidity, hospitalization and foot amputation. This complication accounts for approximately 20% of hospital admissions in diabetic patients (Zhang, 2014; Mehta et al., 2014). Diabetes Mellitus (DM) negatively impacts HRQoL. This negative impact affects many aspects of a person's life, including the psychological impact of being chronically ill, dietary restrictions, changes in social life, symptoms of inadequate metabolic control, chronic complications and

ultimately lifelong disabilities (Pichon-Riviere et al., 2015).

Diabetic care mainly consists of self-care. Diabetic patients themselves have to control their blood glucose levels by monitoring their blood glucose levels and by balancing their food intake, physical activities and their intake of oral hypoglycemic agents and/or insulin. The overall treatment goal is to prevent acute and chronic complications while preserving a good quality of life. The quality of life (QoL) is an important health outcome in its right, representing the ultimate goal of all health interventions. People with diabetes have a poor QoL than people with no chronic illness. The objectives of chronic care are not to cure but to enhance functional status, minimize distressing symptoms, prolong life through secondary prevention and improve the quality of life (Ramanath and Santhosh, 2011; Shrivastava et al., 2013).

Several studies have demonstrated that diabetes has a strong negative impact on QoL, especially in the presence of complications. However, most of the studies on diabetes and QoL have been conducted in developed countries where there is access to better health care facilities. In developing countries, the morbidity associated with diabetes and its complications is certainly higher as compared to developed countries, which adversely affects the QoL of these patients. Moreover, studies of the QoL in diabetic patients in developing countries are rare (Jain et al., 2014) so; we conducted this study which was aimed to assess physical and psychological health domains of the quality of life of type 2 diabetic patients in relation to clinical factors of diabetes mellitus in Egypt.

SUBJECTS AND METHODS

The present study was conducted at the family medicine outpatient clinic of Suez Canal University Hospitals in Ismailia city, Egypt. 143 type 2 diabetic patients were included who agreed to participate in this study and were selected using probability systematic sampling technique. Data was collected through the use of two tools: *Tool 1:* A structured- interview questionnaire was developed by the researcher and included three parts: *Part I:* Socio-demographic data: It was constructed by the researcher and included socio-demographic characteristics of the study group such as gender, age, marital status, educational level, occupational status, family income, type of family and residence. *Part II:* Case History taking questionnaire and medical data: It was constructed by the researcher to collect data regarding family history of DM, hypertension, previous surgical history, smoking status, physical activity, medical nutrition therapy and glycemic control. *Part IV:* Bio-physiological measurement: This was included body mass index (BMI). *Tool 2:* World Health Organization Quality of Life Questionnaire abbreviated version (WHOQoL-Bref): This questionnaire consisted of 26 items: two individual items that evaluate overall quality of life and satisfaction with health, and 24 items clustered into four domains (physical health, psychological health, social relationships, and environment which were rated on a 5 – point likert scale (WHO, 1997). It was adopted from Abdel Hai et al. (2004) who carried out the translation into Arabic and a written approval for its use was obtained from the department of mental health, WHO-Geneva. All questions were concerned with the past two weeks.

Scoring system

The WHOQOL-BREF (Field Trial Version) produces four domain scores. There are also two items that are examined separately: question 1 asks about an individual's overall perception of quality of life and question 2 asks about an individual's overall perception of his or her health. Domain scores are scaled in a positive direction (that is, higher scores denote higher quality of life). The mean score of items within each domain is used to calculate the domain score. Mean scores are then multiplied by 4 in order to make domain scores comparable with the scores used in the WHOQOL-100. The method for converting raw scores to transformed scores are the first transformation method converts scores to range between 4 and 20, comparable with the WHOQOL-100 and the second transformation method converts domain scores to a 0 to 100 scale, using the formula shown as follows:

Transformed scale = ([score – 4] × 100/16).

Where more than 20% of data are missing from an assessment, the assessment should be discarded. Where up to two items are missing, the mean of other items in the domain is substituted. Where more than two items are missing from the domain, the domain score should not be calculated (with the exception of domain 3, where the domain should only be calculated if < 1 item is missing) (WHOQOL Group, 1998). A total score was determined by summing scores across all items. The following values of scores were extracted from the reviewed studies and were applied in the current study: score ≤ 45, low QOL; score 46 to 65, moderate QOL; and score > 65, relatively high QoL (Bani-Issa, 2011).

Data entry and analysis were done using the Statistical Package for Social Sciences version 22, (SPSS Inc., and Chicago, IL). Data collected were coded and analyzed. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables as well as inferential statistics. Values were considered as statistically significant at $P < 0.05$.

RESULTS

The majority of the study group (86%) were females, less than half of them (46.2%) were in age group 50 to 60 years and their mean age was 54.74 years (Standard deviation (SD) = 7.32). Regarding marital status, less than three quarters (72.7%) of them were married, more than half (57.3%) of them were illiterate, the majority of them (83.9%) were unemployed (non-working) and more than half (54.5%) of them had just a sufficient income. As regard to their family type, the results revealed that less than two thirds (65%) of them were nuclear family and more than half (52%) of them were living in urban areas, as shown in Table 1.

Table 2 showed that less than three quarters (71.3%) of the study group had a family history of diabetes; more than one third (38.6%) of them had a family history of diabetes in 1st degree relatives, the majority of them (81.1%) had hypertension; less than two thirds (64.3%) of them had uncontrolled blood pressure, more than two thirds (67.3%) of them had previous surgical history, less than one third (30.8%) of them were smokers, the

Table 1. Frequency distribution of Socio-demographic characteristics of the study group (n = 143).

Socio-demographic characteristics		Total population (n = 143)	
		No.	%
Gender	Male	20	14
	Female	123	86
Age (years)	<50 years	47	32.9
	50 - 60 years	66	46.2
	>60 years	21	21
Marital status	Single	2	1.4
	Married	104	72.7
	Divorced	8	5.6
	Widowed	29	20.3
Educational level	Illiterate	82	57.3
	Read and write	4	2.8
	Primary education	42	29.4
	Secondary education	11	7.7
	High education	4	2.8
Occupational status	Non-working	120	83.9
	Working	23	16.1
Family income	Insufficient income	48	33.6
	Just sufficient income	78	54.5
	Sufficient and more	17	11.9
Type of family	Nuclear	93	65
	Extended	50	35
Residence	Rural	68	47.6
	Urban	75	52.4

minority of them (18.9%) did not do physical activity and the vast majority of them (92.3%) were not following medical nutrition therapy. Approximately less than half (47.6%) of them have taken oral hypoglycemic agents by themselves.

As shown in Figure 1, the vast majority of the study group (91.8%) had poor glycemic control (HbA1c ≥ 7%). It should be noted that HbA1c results were conducted only on 61 patients from 143 (study group).

Figure 2 showed that more than three quarters (77.7%) of the study group were obese (BMI ≥30 kg/m^2); more than one third (39.2%) of them were Obese class I (BMI = 30 to 34.9 kg/m^2) while the minority of them (4.2%) were normal weight (20 to 24.9 kg/m^2).

Regarding quality of life domains, the current study revealed that physical health domain less than half (48.3%) of the study group was rated at low level, while psychological health domain (51.7%) of them were rated at moderate level (Table 3).

Table 4 showed that the statistical significant independent negative predictors in the model were physical health domain of the quality of life (P = 0.025) and marital status (P = 0.047). As regard to the regression coefficients for the significant predictors, the change in Physical health domain with a single unit will change the dependent variable, HbA1c with a -0.046 units. This means that there was a negative dependency between HbA1c and Physical health domain.

Table 5 demonstrated that the statistical significant independent positive predictor in the model was physical activity (P = 0.004). Conversely body mass index (P = 0.024) was statistically significant independent negative predictor in the model.

Table 6 indicated that the statistical significant independent positive predictor in the model was age (P = 0.004). Conversely smoking status (P = 0.021) and body mass index (P = 0.021) were statistically significant independent negative predictors in the model.

Table 2. Frequency distribution of the study group according to risk factors and current status of diabetes mellitus (n = 143).

Risk factors and current status of diabetes mellitus		Total population (n=143)	
		No.	%
Family history of diabetes*	Family History in 1st degree relatives	73	38.6
	Family History in 2nd degree relatives	51	27.0
	Family History in 3rd degree relatives	24	12.7
	No Family History of Diabetes	41	21.7
Co-morbidity (hypertension)	Controlled blood pressure	24	16.8
	Uncontrolled blood pressure	92	64.3
	Without co- morbid condition (No hypertension)	27	18.9
Previous surgical history	Present	97	67.8
	Absent	46	32.2
Smoking status	Smoker	44	30.8
	Non smoker	99	69.2
Physical activity	Done regular	71	49.7
	Done irregular	45	31.5
	Not done	27	18.9
Medical nutrition therapy	Yes	11	7.7
	No	132	92.3
Pharmacological treatment	Oral hypoglycemic agents	68	47.6
	Insulin	24	16.8
	Oral hypoglycemic agents and insulin	51	35.7

*; Family history of diabetes results based on the number of responses (n= 189).

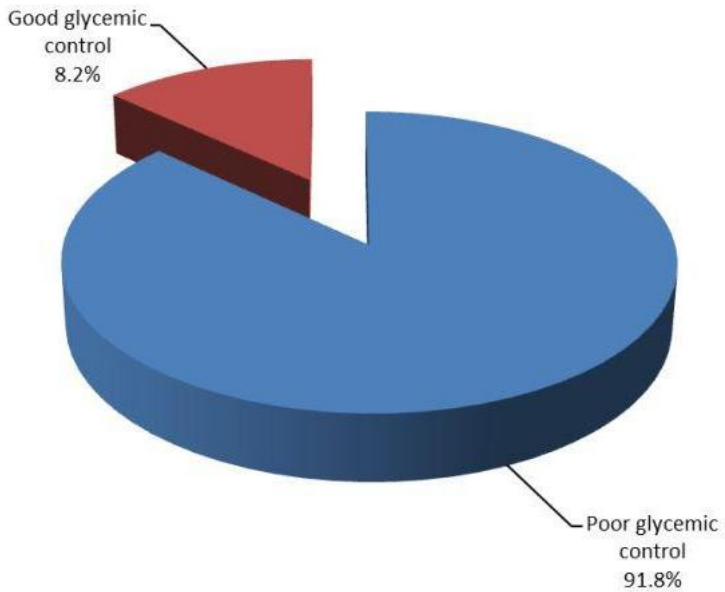

Figure 1. Distribution of the study group according to glycemic control (HbA1c level) (n = 61).

DISCUSSION

Type 2 DM is developing into an international public health problem with a significant increase in the Middle East Region. Quality of life is an important aspect in diabetes because poor quality of life leads to diminished self-care, which in turn leads to worsened glycemic control, increased risks for complications, and

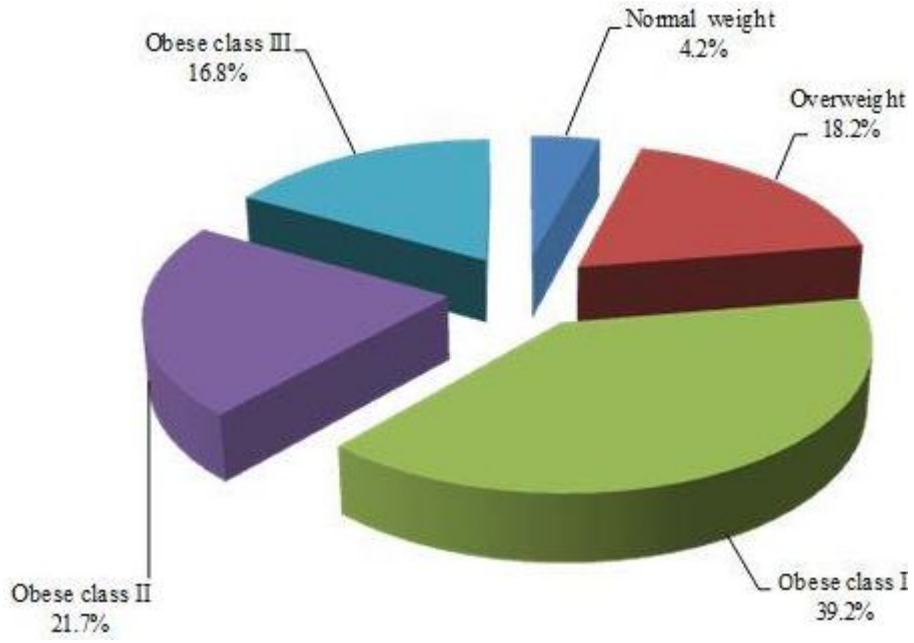

Figure 2. Distribution of the study group according to body mass index (n = 143).

Table 3. Distribution of the study group according to quality of life domains (n = 143).

Quality of life domains	Low quality of life		Moderate quality of life		High quality of life	
	No.	%	No.	%	No.	%
Physical health domain	69	48.3	57	39.9	17	11.9
Psychological health domain	62	43.4	74	51.7	7	4.9

N.B: score ≤ 45, low QOL; score 46–65, moderate QOL; and score > 65, relatively high QOL.

Table 4. Multiple linear regression analysis: The predictors of glyclated hemoglobin level (HbA1c) in the study group (n= 61).

Variables	Glycated hemoglobin level (HbA1c)				
	Unstandardized coefficients		Standardized coefficients	t-test	p-value
	B	Std. error	Beta		
(Constant)	9.658	2.598		3.717	0.000**
Physical health domain	-0.046	0.020	-0.356	-2.306	0.025*
Psychological health domain	0.024	0.028	0.152	0.834	0.408
Sex	-0.599	0.797	-0.099	-0.752	0.456
Age	0.023	0.034	0.094	0.684	0.497
Marital status	-1.239	0.609	-0.270	-2.035	0.047*

***Significant at p value <0.05 level (2-tailed).
**Highly significant at p value <0.01 level (2-tailed).

exacerbation of diabetes overwhelming in both the short run and the long run. Several studies showed that adult with type 2 diabetes mellitus rate their QoL lower than the general population (Shrestha and Ghimire, 2012; Vigneshwaran et al., 2013; and D'Souza et al., 2015) so this study aimed to assess physical and psychological health domains of the quality of life of type 2 diabetic patients in relation to clinical factors of diabetes mellitus in Egypt.

The current study revealed that the age of the study group ranged between 41 and 72 years old, less than half of them were in age group (50 to 60) years and the mean age was 54.74 years (SD = 7.32). This result agreed with Abd Elaziz et al. (2014) reported similar mean age of the

Table 5. Multiple linear regression analysis: The predictors of physical health domain in the study group (n = 143).

Variables	Physical health domain				
	Unstandardized coefficients		Standardized Coefficients	t-test	p-value
	B	Std. Error	Beta		
(Constant)	50.930	9.058		5.623	0.000**
Body mass index (kg/m^2)	-0.466	0.204	-0.174	-2.285	0.024*
Medical nutrition therapy	0.606	4.733	0.010	0.128	0.898
Physical activity	9.249	3.199	0.220	2.891	0.004**

*****Significant at p value <0.05 level (2-tailed).
**Highly significant at p value <0.01 level (2-tailed).

Table 6. Multiple linear regression analysis: The predictors of psychological health domain in the study group (n = 143).

Variables	Psychological health domain				
	Unstandardized coefficients		Standardized coefficients	t-test	p-value
	B	Std. error	Beta		
(Constant)	39.732	9.204		4.317	0.000**
Age (years)	0.341	0.116	0.209	2.933	0.004**
Smoking status	-4.313	1.853	-0.167	-2.327	0.021*
Body mass index (kg/m^2)	-0.320	.137	-0.165	-2.334	0.021*
Medical nutrition therapy	1.335	3.221	0.030	0.415	0.679
Physical activity	3.535	2.160	0.116	1.637	0.104

*****Significant at p value <0.05 level (2-tailed).
**Highly significant at p value <0.01 level (2-tailed).

study group which was 53.2 years (SD = 10.8) years. This result was in agreement with Al-Byati et al. (2014) who found that the mean age of both study groups was close around 55.99 years (SD = 9.27). This indicates that type 2 diabetes is more commonly observed among the middle-aged. From the researcher point of view, this could be explained as diabetes can go silently, undetected for a long time, without symptoms and many people first became aware that they had diabetes when they developed one of its potentially life-threatening complications, such as heart disease.

The majority of the study group were females. This reflects the fact that the females' attendance to family medicine outpatient clinic is higher than males' and this finding is supported by the study conducted in Egypt by Arafa and Amin (2010) who found that the prevalence of diabetes increased with age, and was higher among females aged (50-59). This result agreed with Abd Elaziz et al. (2014) who reported that females represented more than two third of their study group. This result also was in agreement with Al-Byati et al. (2014) and Genga et al. (2014) who found that females represented more than half of their study group. On the contrary to this finding Anumol Mathew et al. (2014) in their study found that more than half of the study group were males. From the researcher point of view, this could be due to their low family income which made them depending on regular treatment in governmental hospitals.

Regarding marital status, less than three quarters of the study group were married; more than half of them were illiterate and more than half of them had just sufficient income. The prevalence of illiteracy or low education was high among female diabetic patients and these findings were in agreement with a study done on the prevalence of diabetes mellitus in Egypt based on Egypt Demographic and Health Survey 2008 (Arafa and Amin, 2010). These results were in agreement with El-Said (2014) who found that the majority of their study group were married, and three quarters of them were illiterate and more than half of them had just a sufficient income. These results were consistent with the study conducted in the United Arab Emirates by Bani-Issa (2011) who found that less than three quarters of the participants were married and more than half of them had an average level of income but less than one third of them were illiterate. Also these results were in accordance with the previous study conducted in Oman by Al-Maskari et al. (2011) who found that less than three quarters of the study group were married but more than one third of them were illiterate.

The present study revealed that the majority of the study group were non-working. This was consistent with the study conducted by Al Hayek et al. (2014) and Jain et al. (2014) who found that less than three quarters of

diabetic patients were non-working. Also this finding was in agreement with Al-Shehri (2014) who found that less than two thirds of diabetic patients were non-working. This finding disagreed with Genga et al. (2014) as they reported less than two third of the study group had some employment whether part or full time. From the researcher point of view this may be due to the majority of the study group were females (housewives and unemployed) and their low educational level gave them no chance for employment.

Approximately more than half of the study group were living in urban coming in accordance with (Bakry, 2006; Jain et al., 2014) who found that nearly two thirds of the study group were of urban environment. This result was in agreement with a study done on the prevalence of diabetes mellitus in Egypt which revealed that the prevalence of diabetes was higher in urban than rural areas (Arafa and Amin, 2010). From the researcher point of view, this could be due to their dependence on advanced technology such as different means of transportation rather than walking which leads to insufficient physical exercise and sedentary life.

As concerning to risk factors of diabetes mellitus, it was observed that less than three quarters of the study group had a family history of diabetes. This reflects a high role of inheritance of type 2 DM. This result agreed with Rashed (2012) who found that the majority of the participants had a family history of diabetes. This result agreed with Bakry (2006) and Al-Maskari et al. (2011) who reported more than half of the study group had family history of diabetes. This result partially agreed with El- Said (2014) who reported that only one third of the study group had family history of diabetes. This result agreed with the results of a United Kingdom study showing that first-degree relatives of people with type 2 diabetes consumed diets high in fat and cholesterol, increasing their risk of developing diabetes (Adamson et al., 2001).

Also, the majority of the study group had hypertension coming in accordance with the previous studies conducted by Berraho et al. (2012) and Patel et al. (2014) who reported that less than three quarters of the patients had hypertension. This result agreed with Al-Jarsha and Jasem (2011), Abd Elaziz et al. (2014) and Al-Byati et al. (2014) who found that 39, 45.3 and 48% respectively of the patients had hypertension. This result agreed also with Jahanlou et al. (2011) who concluded that less than one third of the patients who undertakes type 2 DM had hypertension. This result supported previous studies which revealed that patients with hypertension had a 2.5-fold risk of developing diabetes compared to their non-hypertensive counterparts (Weycker et al., 2009).

Regarding smoking status, less than one third of the study group were smokers (active or passive smokers). This may be due to the high proportion of females for whom smoking is culturally considered not acceptable. This result agreed with Rashed (2012) who found that less than one third of the study group were smokers. This result was similar to another study result that was conducted by Arafa and Amin (2010) who reported a prevalence of 37% of smoking among diabetic males in Egypt. This result agreed also with Jain et al. (2014) and Avramopoulos et al. (2015) who found that more than two fifths of the study group were smokers. This result partially agreed with Jahanlou et al. (2011) who found that only14.3% of the study group were currently smoking.

As regard to current status, it was observed that the minority of the study group did not do physical activity. This finding agreed with Avramopoulos et al. (2015) who found that less than one quarter of patients did not do physical activity. This finding agreed also with Bosić-Zivanović et al. (2012) who found that less than one third of patients could not perform daily activities. This finding agreed with Rashed (2012) who found that less than two thirds of the patients were living in a sedentary lifestyle. From the researcher point of view, this could be explained by advanced technology since most of the aged studied group especially females spent their times in watching TV or snacking, and most of them rely on the mean of transportation rather than walking.

Regarding glycemic control, the vast majority of the study group had poor glycemic control. This result agreed with Al-Maskari et al. (2011) who found that more than two thirds of the study group had had poor glycemic control. This result agreed with Avramopoulos et al. (2015) who found that less than one third of the study group had had poor glycemic control. From the researcher point of view, this result was because of their poor adherence to self-monitoring of blood glucose levels where actually more than half of them had no idea what HbA1c was while other common reasons were poor adherence to treatment regimens, lack of access to therapy, their poor adherence to dietary and exercise recommendations.

Also, more than three quarters of the study group were obese; more than one third of them were obese class I. This finding agreed with Ikombele (2011) who found that less than three quarters of the study group were obese; more than two fifths of them were obese class I. This finding agreed with Abd Elaziz et al. (2014) who found that more than half of the study group were obese. This finding agreed with Al-Byati et al. (2014), El-Said (2014) and Avramopoulos et al. (2015) who found that more than two fifths of the study group were obese. This finding agreed also with Sindhu and Jayakumar (2015) who found that less than one quarter of the study group were obese. It may be attributed to consuming foods rich in high saturated fats and refined carbohydrate diets coupled with a low dietary fiber intake which are associated with a steep rise in the prevalence of obesity, which is considered the major risk factor for developing type 2 diabetes, as shown by the relationship between increases in body mass index (BMI) and the risk of

developing type 2 diabetes in Arabic-Speaking Countries (Badran and laher, 2012).

Concerning to the quality of life domains, this study identified that the study group had low QoL in physical health domain and moderate quality of life in relation to the psychological health and environmental domains. These results were partially consistent with Bosić-Zivanović et al. (2012) who found that diabetic patients had low scores in all four domains of quality of life while the physical health domain was the most affected domain. These results were inconsistent with Gholami et al. (2013) who reported that the lowest scores of quality of life for the study group was psychosocial domain. Also, these results contradicted Bakry (2006) who reported that the lowest scores was social relationships domain among type 2 diabetic patients. This could be explained as type 2 diabetic patients had higher rate of complications that affect the Physical function. Physical function limitations especially due to vision difficulties, peripheral neuropathy, and or heart disease can have a negative impact on quality of life.

Concerning to the relation between quality of life domains and age of the study group, this study revealed a significant positive relationship between age and psychological health domain. These finding agreed with O'Reilly et al. (2011) and Al Tukmagi and Moussa (2014) showed that increased age was associated with better HRQoL. These findings disagreed with Gavrić and Grujić-Vujmilović (2014) who found that with increase of age there was a statistically significant decline in the mean score of psychological health domain. These findings disagreed with Genga et al. (2014) who found that age of the participants emerged as a significant association with quality of life, on the social domain and not in the three other domains. This finding disagreed with El-Said (2014) and Spasić et al. (2014) who found that younger patients had better QOL than older patients and this relation was statistically significant. This result confirmed the findings of previous studies that mentioned that older adults may be better at regulating emotion than younger adults because they tend to direct their eyes away from negative events or toward positive events (Isaacowitz and Blanchard-Fields, 2012) and they have fewer responsibilities to think about such as work and family.

As regards to the relation between quality of life and HbA1c values of the study group, multiple linear regression analysis revealed that there was a negative dependency between HbA1c and physical health domain and there was no statistically significance relationship with other domains. Similar results were found in the study conducted by Akinci et al. (2008) and Shim et al. (2012) who found that higher HbA1c levels were negatively associated with QoL. This finding agreed with Wang and Yeh (2013) who found that HbA1c and QoL have a significant association. This finding was in contradictory to Genga et al. (2014) who found that the quality of glycemic control by HbA1c did not influence the HRQoL and its domains among type 2 diabetic patients. This finding disagreed with Abd Elaziz et al. (2014) who found that there was no significant difference statistically between controlled diabetics and uncontrolled diabetics in all parameters of HRQOL. This may be due to poor glycemic controlled to more hyperglycemic symptoms (polyuria, poor vision, etc) which impacted on the quality of life.

Concerning to the relation between quality of life domains and body mass index, this study revealed a significant negative relationship between BMI and physical and psychological health domains. These findings agreed with Hussein et al. (2011) who found that there was statistically significant negative relationship between BMI and physical and psychological health. This finding agreed with El-Said (2014) found that lower BMI was associated with higher QoL in psychological health domain. This finding agreed with Papadopoulos et al. (2007) who observed a relationship between BMI and physical functioning domain. This finding agreed with Wong et al. (2013) who found that lower BMI was associated with higher QoL. This comes in agreement with a French study which demonstrated that body mass index > 30 was independently related with the QOL of diabetics in several statistical models (Bourdel-Marchasson et al., 2013). This comes in agreement with Abd Elaziz et al. (2014) who found that obese diabetic patients had poorer quality of life in all domains compared to normal or overweight patients and the difference was highly significant statistically. These findings disagreed with Kazemi-Galougahi et al. (2012) who found that there was no significantly relationship between BMI and QOL domains. This finding confirmed by Akinci et al. (2008) who found that overweight and obesity have been found both as important negative factors in determining the QoL.

The present study revealed that there was statistically significant positive relationship between physical activity and physical health domain of the study group. This finding agreed with Bakry (2006) who found that patients who had no physical activity or irregular physical activity were at risk to have poor physical status more than those with regular physical activity. This finding was congruent with Al-Shehri et al. (2008) who found that exercise of 30 min for 3 days or more each week produce positive changes in QOL. This finding agreed with Anumol Mathew et al. (2014) who found that quality of life score had significant association with physical activity. This result confirmed by McArdle et al. (2006) who mentioned that physical activity alone can contribute to a significant weight loss with improvement of glycemic control and insulin sensitivity in type 2 DM and in recent studies combination of dietary intervention and regular exercise training was even at great benefit which is reflected on quality of life. The meta-analysis which included 20 studies and 1892 individuals confirmed that patients with diabetes should be physically active to improve disease

control and quality of life (Cochran and Conn, 2008).

Also, there was statistically significant negative relationship between smoking status and psychological health domain of the study group. This finding agreed with Hussein et al. (2011) who found that smoking had a significant effect on the level of independence and spiritual QOL domains. This finding agreed with Al-Byati et al. (2014) who found that there was no significant association between quality of life and smoking. This could be confirmed in other studies which showed that smoking if co-existent with diabetes can worsen all the complications of diabetes and the use of tobacco has often been associated with weak scores for the different dimensions of HRQOL, particularly in patients with diabetes (Gulliford et al., 2003; Kamel et al., 2003).

Based on the findings of the current study, it can be concluded that, type 2 diabetes mellitus associated with a lower quality of life especially physical health domain. Factors related to lower quality of life in the present study were obesity, cigarette smoking, physical inactivity, and poor glycemic control, therefore, implementation of a health education program about life style modification and glycemic control for these patients, and measures to improve quality of life of type 2 diabetic patients are highly needed.

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Citation: Abd El Latif FI, Abd El Wahid HA, Amina Ahmed Mohamed AA, Farg HK, 2016. Physical and psychological health domains of quality of life in type 2 diabetic patients in relation to clinical factors of diabetes mellitus in Egypt. Int Res J Med Med Sci, 4(1): 7-16.