ORIGINAL ARTICLE

Assessment of health-related quality of life among Saudi patients with type 2 diabetes mellitus in Qassim region—Saudi Arabia

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ABSTRACT

Background: Health-related quality of life (HRQOL) is a significant outcome indicator for diabetes mellitus (DM) management. This study was conducted to assess the HRQOL of patients with type 2 DM, and to detect the effects of the associated socioeconomic and disease-specific variables as there has been little research on them in Saudi Arabia.

Methodology: This was a cross-sectional study involving 340 patients attending primary health care centers in Qassim region. For data collection, a structured questionnaire and SF-36 HRQOL tools were used.

Results: The highest total mean HRQOL score was reported for general health perception (52.9%), and the lowest was reported for role-emotional (28.3%). Mean scores for the mental health domains were lower than those for the physical health domains. Of the significant variables in the detection of low HRQOL score, the variable "low education" predominated in the majority of domains. The variables; female and co-morbidities, predominated in the physical health domain of general health (adjusted OR: 9.5) and the domain role-emotional (adjusted OR: 9.5 and 8.9, respectively).

Conclusion: Patients with type-2 DM in Qassim showed low self-perceived HRQOL, and to address this, the study recommended planning and implementation of DM educational programs targeting low educated groups and females with a focus on the risk of co-morbidities.

Keywords: Type-2 diabetes mellitus, health-related quality of life, socioeconomic factors, Saudi Arabia.

Introduction

The data collected in recent studies on the pandemic of diabetes mellitus (DM) have anticipated its continuity in the future. The prevalence of DM has been steadily increasing for the past three decades [1]. According to the 2018 International Diabetes Federation reports, globally, one in eleven adults have DM. In the Middle East and North Africa, almost 40 million people have DM; and if no one will take action this figure will now rise (by 115%) to 86 million by 2045 [2]. Globally, DM was ranked seventh among the leading causes of death in 2016, and it caused 1.6 million people deaths' in 2015, and less than 1 million in 2000 [3]. DM complications include damage to heart, blood vessels, eyes, kidneys, and nerves, leading to disability and premature death, hence threatening people's health and endangering their lives. Recent reports have pointed out that DM has increased the risk of premature death and disability as it is associated with reduced life expectancy at almost all ages and levels of socioeconomic status [4], with DM accounting for almost 12% of global health expenditure. Type-2 DM, which is a common condition in most countries, has increased along

with rapid cultural and social changes [5]. A recent study reported that the average cost of medical health care for each Saudi diabetic patient was 10 times higher than that for a Saudi patient without DM [6].

DM is a chronic health condition and is currently incurable. Assessing the outcome of chronic diseases, health-related quality of life (HRQOL) is considered as a significant tool to evaluate the impact of chronic diseases and to detect the effects of treatment interventions [7]. HRQOL reflects individuals' perception of their

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situation in life within the context of their culture and values. HRQOL is affected by a person's physical, psychological, and social life. It is also affected by a person's beliefs, level of independence, and their relation to the surrounding environment [8]. The negative impact of diabetes on a patient's HRQOL has been established in many global studies [9,10].

This study aimed to measure the HRQOL of patients with type-2 DM, to investigate the associated socioeconomic and disease-specific variables.

Subjects and Methods

This was a cross-sectional study conducted at four primary health care (PHC) centers run by the Ministry of Health in Qassim region during April to June 2018, through structured questionnaire. The participants were Saudi patients who had been diagnosed with type-2 DM at least 1 year before the data collection. While pregnant women and patients who were unable to respond to the identification questions at the start of the interview were excluded.

Using the WHO sample size equation for estimating a population with absolute precision, the estimated sample size was 246. Considering cluster sampling design effect to be 1.5, the required sample size was 370 patients with type-2 DM.

The structured questionnaire included two parts: the first part consisted of the demographic and diabetes-specific variables and the second part was the Rand 36-Item Short-Form Health Survey (SF-36). The validated generic HRQOL instrument, the Arabic version of the RAND 36-Item Short Form Survey version 1, was used [11].

The Statistical Package for Social Sciences (IBM SPSS Statistics 20) software was used for analysis. Descriptive statistics were described for the participants' categorical socio-economic and disease-specific factors with frequency and percentage. For HRQOL SF-36 assessment, the means of domain scores were calculated and bivariate assessment was conducted by participants' socio-economic and disease-specific variables. An unpaired student's *t*-test was used in the analysis. Multivariate logistic regression analysis was applied to explore the contribution of variables associated with low scores (less than 50) in the eight domains of HRQOL. For each domain, the dependent variable and the independent variables (the demographic variables and disease-specific variables) were introduced into the multivariate logistic regression model and the adjusted odds indicated the contribution of each independent variable after controlling others. Statistical significance was accepted at 95% confidence level and *p*-value less than 0.05 was considered as significant.

Results

The present study involved 340 patients with type-2 DM with a response rate of 92.1%. The mean age of participants was 53.9 ± 10.2 years in 30–70 years range; however, majority of the participants were aged 50 years or older (69.7%) and 82.4% were married. Other demographic variables are shown Table 1.

The total mean score for each domain of HRQOL is shown in Figure 1.

The percentage of participants with mean scores lower than median in the eight domains of HRQOL is shown in Figure 2.

The relation of the domains of HRQOL with the participants' demographic characteristics is shown in Table 2.

Table 1. Participant characteristics.

Characteristics	Diabetic patients	
	N = 340	**%**
Demographic variables		
Gender		
Males	234	68.8
Females	106	31.2
Age in years		
30–	16	4.7
50–	87	25.6
50–70	102	30.0
≥60	135	39.7
Education		
Non	43	12.6
Primary school	87	25.6
High School	167	49.1
University	43	12.7
Marital status		
Single	30	11.8
Married	310	88.2
Work status		
Unemployed	201	59.1
Employed	139	40.9
Income		
Low	150	44.1
Moderate	158	46.5
High	32	9.4
Disease specific variables		
Family history		
No	241	70.9
Yes	99	29.1
Diabetes duration (years)		
1–	93	27.4
5–	78	22.9
10+	169	49.7
Co morbidities		
No	252	74.1
Yes	88	25.9
Complications		
No	250	73.5
Yes	90	26.5
Treatment with insulin		
No	255	75.0
Yes	85	25.0
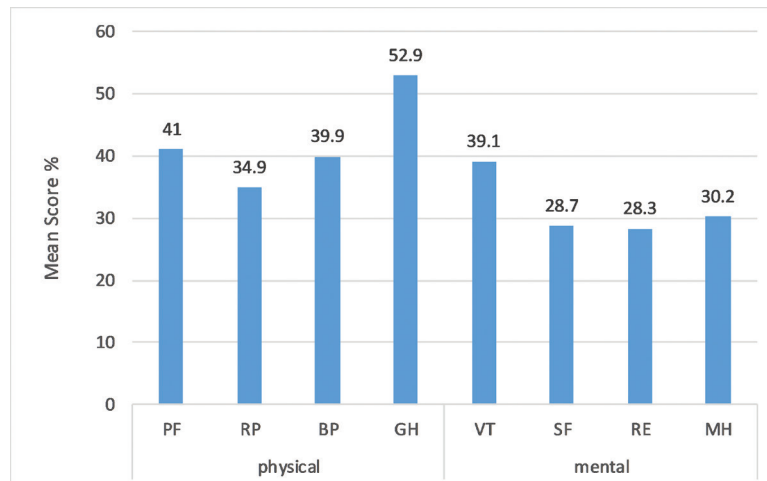
Figure 1. *Mean scores for the HRQOL domains*
*PF: Physical Functioning, RP: Role-Physical, BP: Bodily Pain, GH: General Health,
VT: Vitality, SF: Social Functioning, RE: Role-Emotional, MH: Mental Health.*
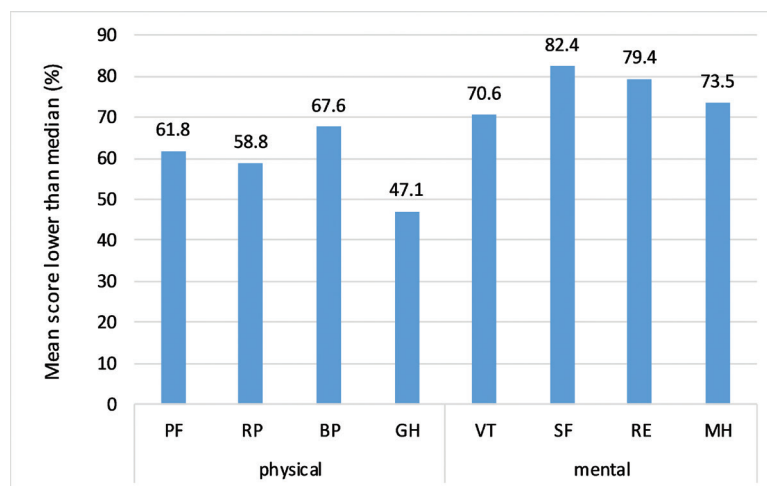
Figure 2. *Percentage of "mean scores" 'lower than median' for the HRQOL
domains*
*PF: Physical Functioning, RP: Role-Physical, BP: Bodily Pain, GH: General Health,
VT: Vitality, SF: Social Functioning, RE: Role-Emotional, MH: Mental Health.*

Results indicated that with increased disease duration, the mean scores in all domains significantly decreased. However, the mean scores in all domains reported by the insulin users were lower than those reported by the non-users; however, the differences were insignificant (Table 3).

Concerning the most significant effective variables with each HRQOL domain, low education significantly predominated in all the domains except the mental health domain role-emotional, which was predominantly affected by the co-morbidities variable. The gender female variable significantly predominated in the physical health domains general health and role-physical (Table 4).

Discussion

The results of this study revealed low mean scores of diabetic patients in most HRQOL domains. These results agree with global studies that have reported the negative impact of chronic diseases on the patients' HRQOL. In Serbia, the results of a cross-sectional study in public pharmacies and PHC centers showed a decrease in quality of life in all domains due to the presence of DM [12]. In refugee camps in Gaza strip, a case-control study reported poor HRQOL among type-2 DM patients compared to non-diabetic controls living under the same conditions [13]. A meta-analysis that investigated quality of life of Iranian patients showed that patients with type-2 DM have a moderate quality of life [14]. In Saudi Arabia,

Table 2. *Mean scores for the HRQOL domains related to subgroups of demographic variables.*

Variables	Physical health domains				Mental health domains			
	PF	RP	BP	GH	VT	SF	RE	MH
Gender								
Male	54.4	60.0	52.1	66.5	52.6	33.9	34.9	39.5
Female	34.9	36.6	34.3	46.7	33.1	26.3	25.3	25.9
p-value	0.004	0.001	0.001	0.001	0.001	0.002	0.001	0.001
Age in years								
<50	43.1	45.8	43.3	55.8	41.7	30.4	29.5	32.3
≥ 50	36.1	39.5	31.9	46.2	33.3	24.8	25.2	25.7
p-value	0.135	0.198	0.011	0.015	0.071	0.082	0.160	0.065
Education								
Non	29.4	30.6	25.9	40.0	25.9	22.4	22.4	23.5
School	32.9	36.8	33.8	46.8	32.4	24.7	25.3	24.6
University	55.1	57.4	52.1	64.9	52.1	35.8	33.9	39.2
p-value	0.001	0.001	0.001	0.001	0.001	0.001	0.006	0.001
Marital status								
Single	38.6	42.3	39.8	42.0	38.2	28.5	28.2	31.4
Married	40.0	43.0	41.3	44.0	37.6	31.1	29.3	30.0
p-value	0.730	0.852	0.689	0.593	0.600	0.429	0.742	0.694
Work status								
Unemployed	32.5	33.6	31.4	46.1	29.3	23.7	23.5	23.9
Employed	46.8	51.0	45.6	57.6	45.8	34.6	31.5	32.0
p-value	0.001	0.001	0.001	0.002	0.001	0.008	0.006	0.001
Income								
Low/Moderate	38.9	41.8	37.7	50.6	37.1	25.4	25.2	26.2
High	43.6	46.6	42.6	55.7	41.6	32.7	32.1	35.1
p-value	0.281	0.298	0.240	0.167	0.295	0.014	0.015	0.007
Family member								
No	39.8	43.5	39.6	52.0	39.4	27.7	28.0	30.7
Yes	44.0	45.0	40.5	55.0	38.5	31.0	29.0	29.0
p-value	0.373	0.759	0.845	0.494	0.851	0.718	0.620	0.631

PF: Physical Functioning, RP: Role-Physical, BP: Bodily Pain, GH: General Health,
VT: Vitality, SF: Social Functioning, RE: Role-Emotional, MH: Mental Health.

a cross-sectional study on type-2 DM patients revealed moderate HRQOL among patients attending tertiary care hospitals in the capital city Riyadh [15].

In the current study, the results showed more distresses in the scores in HRQOL mental health domains in comparison to physical health domains among the type-2 diabetic participants. This could be attributed to the local conservative culture that pays less attention to mental health illnesses in comparison to physical illnesses that are visible and can be diagnosed and attended to, and hence better outcomes and better HRQOL. The same outcome was reported in a cross-sectional study conducted in three public health clinics in Malaysia, which examined HRQOL in adult patients with type-2 DM [10], whereas, a cross-sectional study among Mexican-American diabetic patients that used SF-36 domains revealed that individuals with diabetes had significantly lower scores in the physical composite domain of the SF-36 as compared to persons without diabetes, and reported no significant difference between persons with and without diabetes in the mental composite domain [16].

Females showed a significantly lower HRQOL score in all domains as compared to males and significant predominance in the results of multivariate analysis for the associated factors. These results could be justified by the local social norms [17] and the tendency of women to be more expressive and thus more likely to complain about the poor quality of life [12]. The study results coincided with the reports of two local studies in Riyadh and Al-Khobar [15,18]. In addition, two cross-sectional studies in Serbia and India reported that females had a significantly lower HRQOL as compared to males specifically in the domains vitality and bodily pain, and tended to be more physically inactive than men [12,19]. On the other hand, men were less likely to get depression, anxiety, or stress as compared to women [20]. Multivariate analyses using SF-36 among Greek diabetic patients showed that sex (female) had the most pronounced negative influence on HRQOL [21].

Furthermore, the patients in the older age group had a lower quality of life than those in the younger age group, as is indicated by their scores in the physical health

Table 3. *Mean scores for the HRQOL domains related to disease specific variables.*

Variables	SF-36 Physical health components				SF-36 Mental health Components			
	PF	RP	BP	GH	VT	SF	RE	MH
Duration (years)								
<5	33.7	38.4	33.7	47.9	32.1	25.3	24.7	23.2
5–	35.8	41.8	35.7	46.1	35.8	27.9	26.7	30.9
10+	47.7	48.1	45.4	59.1	44.8	31.0	31.0	33.9
p-value	0.007	0.175	0.034	0.003	0.029	0.259	0.145	0.019
Co morbidities								
No	67.1	61.4	67.1	71.4	62.9	41.4	40.0	44.3
Yes	38.1	41.9	36.8	50.8	36.5	27.3	26.9	28.6
p-value	0.000	0.008	0.000	0.001	0.000	0.004	0.005	0.003
Complications								
No	65.4	65.4	60.0	74.5	61.8	47.2	49.1	45.5
Yes	38.9	42.0	38.1	51.0	37.2	27.1	26.4	28.9
p-value	0.001	0.004	0.004	0.000	0.001	0.000	0.000	0.005
Insulin								
No	38.3	44.0	38.3	49.1	35.4	28.0	26.3	30.3
Yes	41.9	43.8	40.4	54.2	40.3	28.9	28.9	30.2
p-value	0.457	0.982	0.664	0.232	0.312	0.788	0.420	0.982

PF: Physical Functioning, RP: Role-Physical, BP: Bodily Pain, GH: General Health,
VT: Vitality, SF: Social Functioning, RE: Role-Emotional, MH: Mental Health.

Table 4. *Relative odds of low mean scores for the HRQOL domains and significant variables. Results of logistic regression analysis.*

Domains	Significant variables	Adjusted OR (95.0% CI)	*p*-value
Physical			
PF	-Low education -Disease duration ≥ 5 years	3.1 (2.7–3.5) 1.6 (1.4–1.8)	0.005 0.047
RP	-Females -Low education	2.9 (2.4–3.5) 2.4 (2.0–2.8)	0.048 0.026
BP	-Low education	2.5 (2.1–2.9)	0.022
GH	-Females -Low education	9.5 (8.4–10.6) 3.4 (2.8–4.0)	0.046 0.041
Mental			
VT	-Low education -Disease duration ≥5 years	3.2 (2.6–3.6) 1.8 (1.6-2.1)	0.005 0.012
SF	-Low education -No work	4.2 (3.7-4.7) 3.4 (2.8-4.0)	0.005 0.046
RE	-Co morbidities	8.9 (8.1-9.8)	0.012
MH	-Low education -Disease duration ≥ 5 years	2.6 (2.1-3.1) 2.0 (1.7-2.2)	0.038 0.024

PF: Physical Functioning, RP: Role-Physical, BP: Bodily Pain, GH: General Health,
VT: Vitality, SF: Social Functioning, RE: Role-Emotional, MH: Mental Health.

domains general health and bodily pain. The results were in agreement with the Indian study that reported that age strongly affected the HRQOL of diabetic patients in physical health and psychological domains and had almost no effect in control [22]. A meta-analysis revealed that by increasing the age of the samples, the mean of the HRQOL score of the Iranian patients with type-2 DM significantly decreased [23].

The current study revealed a significant association of the level of education and the scores in HRQOL domains, where the participants with lower educational level showed lower HRQOL scores, and those with higher educational level showed higher HRQOL scores. Low level of education significantly predominated as a determinant of low scores in nearly all HRQOL domains. A local study confirmed the study results and reported low HRQOL among patients with education up to high school or below [15]. The current study results were in agreement with many global studies that have reported the positive impact of education on HRQOL

scores. In Iran, the surveillance of risk factors of non-communicable diseases reported that educational level had a linear relationship with quality of life; as the educational level increased, so did the quality of life [24]. A population-based survey of adults with diabetes in Switzerland showed that diabetes-specific and generic quality-of-life measures significantly increased with increasing educational level [25]. In contrast, a cross-sectional survey on quality of life of type-2 DM in Gaza revealed that the education played no independent role concerning HRQOL [13].

Regarding the income status, the current study showed the significant predominance of the low-income group in getting lower scores in the HRQOL mental components, SF, RE, and MH than the high-income group. The results agree with the global studies that have identified the negative relationship of socioeconomic status with mental illness; the lower the socioeconomic conditions are, the higher is the risk of mental disability and psychiatric hospitalization [26]. Recent global studies reported the high impact of economic status on many aspects of HRQOL among diabetic patients. A cross-sectional study in Teheran revealed a direct correlation between family income level, mental health, and the mental health domains score [27].

The study results showed that having no work was a significant variable in reporting low scores in HRQOL domains in comparison to employed participants. Specifically, it significantly predominated in SF domain. This agreed with many global studies that reported a direct relationship between work and quality of life domains in diabetic patients [27].

The current study results revealed a significant lowering of the HRQOL scores with an increase in the duration of the diseases in the physical health domains PF, BP, and GH, and in the mental health domains VT and MH. The negative effect of disease duration on the HRQOL domains of diabetic patients was attributed to the expected increase in the risk of many serious complications with the increase in long-term diabetes duration. In patients with type-2 diabetes, age or age at diagnosis of diabetes and diabetes duration were independently associated with the risk of macro vascular complications and death. By contrast, only diabetes duration was independently associated with the risk of micro vascular complications, and the effects of diabetes duration were greatest at younger rather than older ages [28]. The current study results also reported that the presence of DM complications was associated with significantly lower mean scores in all HRQOL domains. A mail survey of patients with type-2 DM in the USA concluded that the participants had a substantially decreased quality of life in association with symptomatic complications. The data suggest that the prevention of complications has the greatest potential to improve health-related quality of life in type-2 DM [23]. The presence of any of the major diabetic complications was associated with lower HRQOL and health preference score [29].

Conclusion

The study concluded that patients with type-2 DM in Qassim showed low self-perceived HRQOL in all domains. The study recommended planning and implementation of educational programs concerning the physical and mental associated factors of type-2 diabetes and improving the working status and associated morbidities through the promotion of rehabilitation and social centers. Further qualitative studies may be needed to explore patients' needs that reflect their quality of life.

List of Abbreviations
DM   Diabetes mellitus
HRQOL   Health-related quality of life
PHC   Primary health care

Conflict of interest
The author declares that there is no conflict of interest regarding the publication of this article.

Consent for publication
Informed consent was obtained from all the participants.

Ethical approval
The study was approved by the Ethics Committee, Qassim University College of Medicine.

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