



Research Paper

Relationship of treatment satisfaction to health-related quality of life among Palestinian patients with type 2 diabetes mellitus: Findings from a cross-sectional study



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ABSTRACT

Objectives: The aims of the current study were to assess the association between health-related quality of life (HRQoL) and treatment satisfaction in a sample of diabetic patients from Palestine, and to determine the influence of socio-demographic and clinical factors on HRQoL.

Methods: It was a cross-sectional study performed during the period June 2013 to October 2013. The Arabic version of Treatment Satisfaction Questionnaire for Medication (TSQM 1.4) was used to assess treatment satisfaction, and the Arabic version of European Quality of Life scale (EQ-5D-5L) was used to assess HRQoL. Multiple linear regression was used to estimate which variables were the most important related to HRQoL.

Results: A total of 385 diabetic patients were included. There were modest positive correlations between the total score on the Overall Satisfaction domain and EQ-5D-5L ($r = 0.14$; $p = 0.005$). After adjusting multiple covariates by multiple linear regression, the association between the Overall Satisfaction and HRQoL was not statistically significant ($p = 0.075$); ($R = 0.495$; adjusted $R^2 = 0.245$; $F = 10.3$; $df = 12$; $p < 0.001$). The results showed that elderly patients, being unemployed, and number of comorbid diseases, were significantly associated with HRQoL.

Conclusions: Overall, these results indicate that elderly patients, being unemployed, and those with comorbid diseases, are independent risk factors for poor HRQoL. Furthermore, it emerges that HRQoL and treatment satisfaction are both probably influenced by socio-demographic and clinical characteristics. In fact, to improve diabetic patients' quality of life, elderly patients were recommended to receive more attention in their health and economic status.

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Introduction

Type 2 diabetes mellitus (DM) is a common chronic metabolic disorder causing a significant burden of many complications that are associated with high morbidity and mortality. The total number

of patients with DM worldwide is expected to increase from about 170 million in 2000 to about 370 million in 2030 [1]. In addition to diabetes-related complications, with their substantial impact on health, life style changes (e.g. physical function, social interaction, and mental well-being) are considered the most important cause of impairing health-related quality of life (HRQoL) [2–5].

Treatment satisfaction and HRQoL concepts are commonly used in clinical and policy research to improve treatment outcomes related to pharmaceutical care [6,7]. It has been found that higher patient treatment satisfaction was associated with improving HRQoL [4,8,9]. In addition, HRQoL refers to self-reported measures

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of physical and mental health that are affected by a person's beliefs, perceptions, experiences, and expectations [10]. Reducing the risk of hypoglycemia by individualized care may improve glycemic control by enhancing treatment satisfaction and patients' quality of life [11]. Therefore, assessment of the association between treatment satisfaction and HRQoL may help healthcare providers to recognize the causes that affect quality of life and to identify the aspects of DM management that needs to be enhanced to improve treatment outcomes. Although many studies were done to evaluate of the relationship between HRQoL and treatment satisfaction [6–8], no study in the Arab world has been conducted to assess the association between treatment satisfaction and HRQoL among patients with type 2 DM. The aims of the current study were to assess the association between treatment satisfaction and HRQoL in a sample of diabetic patients from Palestine, and to determine the influence of socio-demographic and clinical factors on the quality of life.

Materials and methods

Study design and study area

A cross-sectional descriptive study was carried out between June 2013 and October 2013. Patients from two outpatient clinics, Al-Watani Hospital and Al-Makhfyah primary health care clinic, Nablus, West Bank, Palestine.

Participants and setting

The estimated sample size was 379 patients out of the 25,752 eligible diabetic patients who attend the primary clinic in Nablus district [12]. Patients were included if they were: (1) 18 years old and above; (2) diagnosed with type 2 DM; (3) initiated on treatment at least six months before enrollment into the current study; (4) able to recognize their medications and understand their use; and (5) agreed to participate in the study.

Data collection instrument

The method was chosen as it was used in previous similar studies developed by the principle investigators in different populations [13–15]. Data collection was done using a structured, written questionnaire. Four main domains of variables were used: (1) HRQoL profile of patients with type 2 DM (2) treatment satisfaction profile of those patients (3) socio-demographic data such as age, gender, residency (village, city, and Palestinian refugee camps), occupation (employed or unemployed), marital status (single, married, divorced, and widowed), income (low, moderate, and high), educational level (no formal, primary or secondary school, and university), and height and weight information were provided by participants with body mass indexes (underweight, normal, overweight, and obese) calculated later based on this information by study personnel; and (4) clinical DM related data such as duration of disease per year (<1, 1–3, 4–5, and >5), type of therapy (monotherapy versus combination therapy), Insulin use (i.e. yes or no), total number of chronic co-morbidities (0, 1, 2, 3, ≥4), and total number of medications used (1–3, 4–6, and ≥7) (Table 1). We developed the data collection form based on several published studies [2–4,16–18]. The HRQoL in diabetic patients was measured using the EQ-5D-5L scale. This scale consists of two instruments: the descriptive EQ-5D-5L system, and the EQ visual analogue scale (EQ-VAS). The Arabic (national language of Palestine) version of the EQ-5D was offered by EuroQoL Group. The study was registered with EuroQoL who granted permission for its conduct. Treatment satisfaction among diabetic patients was evaluated using the Arabic

version of the Treatment Satisfaction Questionnaire for Medication (TSQM 1.4), which was permitted for use by Quintiles Strategic Research Services. This scale is a 14-item, reliable and valid instrument providing scores on four domains which are Effectiveness, Side effects, Convenience, and Overall Satisfaction [7]. The TSQM 1.4 domains were scored and calculated as recommended by the instrument's authors and as explained in previous studies [19,20]. A detailed description is provided in [Supplemental Methods and Materials in Additional file 1](#). Data were collected by clinical pharmacists in face-to-face interviews with the diabetic patients. A convenience sample of 385 eligible patients with type 2 DM was included in the final analysis. The data collection form was pre-tested by a pilot sample of 30 patients who were excluded from the main study and the form was modified accordingly; the last modified version was evaluated by a panel of experts to assess its content and construct validity.

Ethical approval

All study aspects, including patient information use, were approved by the local institutional review board (IRB) and the local health authorities before the beginning of this study. Informed verbal consent from each eligible patient was obtained before beginning the interviews; however, and the requirement for written informed consent was waived.

Statistical analysis

The data collected were entered into and analyzed using the Statistical Package for Social Sciences (SPSS), (SPSS Inc., Chicago, IL, USA) program version 15. Internal consistency was assessed using Cronbach's alpha. Continuous variable was presented as mean ± standard deviation (SD), whereas the categorical variable was presented as frequency and percentage. Data that are not normally distributed were expressed as a median with a range of values (lower-upper quartiles). Data were not normally distributed and analyzed by the Mann–Whitney *U* test or Kruskal–Wallis test. Variables were evaluated if they are normally distributed by the Kolmogorov–Smirnov test. In addition, Spearman's correlation coefficient was used to assess if there was a correlation between the reported EQ-VAS scores, EQ-5D-5L index values and TSQM scores. Multiple linear regression was used to estimate which variables were the most important related to HRQoL (dependent variable). The independent variables were socio-demographic variables, DM related clinical variables, and reported TSQM scores. All statistical tests were performed using a level of significance of 0.05.

Results

Demographic and diabetes related data

A total of 408 diabetic patients were met, among them 23 patients were excluded after data collection due to insufficient information about treatment satisfaction or quality of life. The patients' mean age was 59.3 ± 11.2 years, ranging from 19 to 83 years, with 55.1% females. Their mean duration of DM was 12 ± 8.8 years. About 78.4% were married and 60.0% used combination therapy to control diabetes. The median number of total medications per day was 5.0 (interquartile range: 4.0–6.0). Table 1 describes the socio-demographic characteristics of the study population.

Table 1
Socio-demographic and disease-related characteristics of the study patients with differences in health-related quality of life (HRQoL) total scores (N = 385)

Variable	Frequency (%) N = 385	Overall satisfaction score		p-Value	EQ-5D index score		p-Value
		Median [interquartile range]	Mean ± SD		Median [interquartile range]	Mean ± SD	
Age category							
<38	6 (1.6)	70 [59–79]	69 ± 11.9	0.791 ^a	0.82 [0.72–0.84]	0.78 ± 0.10	0.001 ^a
38–47	52 (13.5)	69 [61–75]	64.5 ± 18.1		0.83 [0.58–1.00]	0.74 ± 0.27	
48–57	107 (27.8)	69 [56–69]	62.3 ± 18.3		0.81 [0.68–1.00]	0.79 ± 0.19	
58–67	115 (29.9)	69 [53–69]	61.7 ± 22.4		0.75 [0.60–0.85]	0.70 ± 0.24	
68–77	87 (22.6)	69 [53–69]	64.5 ± 16.0		0.64 [0.43–0.78]	0.58 ± 0.26	
≥78	18 (4.7)	62 [46–76]	60.2 ± 14.3		0.36 [0.27–0.71]	0.47 ± 0.25	
Gender							
Male	173 (44.9)	69 [54–69]	64.4 ± 15.9	0.764 ^b	0.80 [0.62–0.88]	0.73 ± 0.25	0.000 ^b
Female	212 (55.1)	69 [53–76]	61.8 ± 20.9		0.69 [0.58–0.85]	0.67 ± 0.25	
Smoking status							
Non smoker	284 (73.8)	69 [53–76]	63.2 ± 19.7	0.468 ^a	0.72 [0.59–0.85]	0.68 ± 0.26	0.365 ^a
Heavy	8 (2.1)	69 [54–69]	66.3 ± 8.5		0.82 [0.54–0.89]	0.76 ± 0.18	
Moderate	56 (14.5)	69 [53–69]	61.1 ± 15.6		0.79 [0.65–0.97]	0.75 ± 0.21	
Light	37 (9.6)	69 [58–69]	63.1 ± 19.0		0.80 [0.61–0.94]	0.75 ± 0.21	
BMI							
Underweight	4 (1.0)	58 [18–92]	55.9 ± 38.7	0.095 ^a	0.61 [0.35–0.94]	0.63 ± 0.31	0.000 ^a
Normal	65 (16.9)	69 [68–76]	66.4 ± 15.8		0.69 [0.50–0.85]	0.66 ± 0.26	
Overweight	184 (47.8)	69 [55–69]	65.0 ± 15.1		0.80 [0.66–0.88]	0.73 ± 0.25	
Obese	132 (34.3)	69 [53–75]	58.5 ± 23.1		0.68 [0.54–0.83]	0.66 ± 0.25	
Residency							
Village	174 (45.2)	69 [53–76]	62.1 ± 20.3	0.522 ^a	0.72 [0.60–0.86]	0.69 ± 0.25	0.005 ^a
City	185 (48.0)	69 [61–69]	64.3 ± 17.0		0.79 [0.60–0.88]	0.71 ± 0.26	
Palestinian Refugee camps	26 (6.8)	69 [43–71]	58.0 ± 20.6		0.66 [0.45–0.80]	0.60 ± 0.23	
Occupation							
Employed	105 (27.3)	69 [53–75]	63.4 ± 18	0.887 ^b	0.86 [0.80–1.00]	0.82 ± 0.22	0.000 ^b
Unemployed	280 (72.7)	69 [61–69]	62.8 ± 19.2		0.68 [0.53–0.82]	0.65 ± 0.25	
Marital status							
Married	302 (78.4)	69 (56–69)	63.1 ± 19.3	0.433 ^b	0.80 [0.63–0.88]	0.72 ± 0.24	0.000 ^b
Single, divorced, widowed	83 (21.6)	69 (53–76)	62.4 ± 17.2		0.64 [0.43–0.80]	0.59 ± 0.25	
Income							
Moderate to high	156 (40.5)	69 [61–76]	59.7 ± 20.3	0.016 ^b	0.80 [0.64–0.88]	0.74 ± 0.23	0.000 ^b
Low	229 (59.5)	69 [49–69]	65.1 ± 17.5		0.67 [0.50–0.82]	0.63 ± 0.26	
Education							
No formal	85 (22.1)	69 [53–69]	62.0 ± 14.1	0.157 ^a	0.65 [0.37–0.73]	0.58 ± 0.26	0.000 ^a
Primary or secondary school	235 (61.0)	69 [54–76]	63.1 ± 19.9		0.76 [0.59–0.85]	0.70 ± 0.23	
University	65 (16.9)	69 [61–76]	63.4 ± 20.5		0.85 [0.79–1.00]	0.80 ± 0.24	
Duration of the disease (years)							
<1	8 (2.1)	69 [69–69]	60.7 ± 24.5	0.718 ^a	0.87 [0.81–1.00]	0.86 ± 0.17	0.098 ^a
1–3	64 (16.6)	69 [54–76]	59.8 ± 23.9		0.76 [0.63–0.86]	0.73 ± 0.20	
4–5	41 (10.6)	69 [61–76]	66.2 ± 14.8		0.82 [0.77–0.94]	0.78 ± 0.23	
>5	272 (70.7)	69 [53–69]	63.2 ± 17.9		0.71 [0.54–0.85]	0.67 ± 0.26	
Total number of comorbid diseases							
0	58 (15.1)	69 [61–71]	66.9 ± 11.3	0.502 ^a	0.88 [0.72–1.00]	0.83 ± 0.18	0.000 ^a
1	100 (26.0)	69 [60–69]	65.1 ± 15.5		0.80 [0.66–0.85]	0.73 ± 0.23	
2	113 (29.4)	69 [54–69]	61.3 ± 22.6		0.77 [0.64–0.88]	0.72 ± 0.24	
3	71 (18.4)	69 [53–69]	59.0 ± 19.9		0.63 [0.50–0.81]	0.63 ± 0.22	
≥4	43 (11.2)	69 [48–76]	63.3 ± 20.6		0.59 [0.21–0.71]	0.48 ± 0.30	
Therapy type							
Mono Therapy	154 (40.0)	69 [54–71]	64.6 ± 16.4	0.669 ^b	0.80 [0.59–0.88]	0.69 ± 0.29	0.231 ^b
Combination therapy	231 (60.0)	69 [53–69]	61.8 ± 20.3		0.71 [0.60–0.85]	0.69 ± 0.22	
Insulin use							
Yes	201 (52.2)	69 [53–69]	62.1 ± 17.0	0.020 ^b	0.73 [0.54–0.85]	0.67 ± 0.27	0.037 ^b
No	184 (47.8)	69 [61–75]	63.8 ± 20.7		0.79 [0.63–0.87]	0.73 ± 0.23	
Total number of diabetic drugs							
1	154 (40.0)	69 [54–71]	64.7 ± 16.4	0.010 ^a	0.80 [0.59–0.88]	0.69 ± 0.29	0.377 ^a
2	211 (54.8)	69 [53–69]	61.2 ± 20.1		0.71 [0.66–0.85]	0.70 ± 0.22	
3	20 (5.2)	76 [69–83]	68.3 ± 21.7		0.73 [0.47–0.81]	0.65 ± 0.25	
Total number of medications							
1–3	91 (23.6)	69 [61–69]	65.2 ± 12.1	0.900 ^a	0.85 [0.71–1.00]	0.81 ± 0.20	0.000 ^a
4–6	211 (54.8)	69 [53–69]	62.6 ± 20.3		0.76 [0.59–0.85]	0.68 ± 0.26	
≥7	83 (21.6)	69 [46–76]	61.4 ± 20.8		0.64 [0.44–0.77]	0.59 ± 0.23	

BM = body mass index, EQ-5D = European Quality of Life scale, EQ-VAS = European Quality visual analogue scale, NIS = New Israeli Shekel.

^a Statistical significance of differences calculated using the Kruskal–Wallis test.

^b Statistical significance of differences calculated using the Mann–Whitney U test.

Treatment satisfaction

The mean satisfaction score was 64.1 ± 15.1 for Effectiveness domain, 49.4 ± 26.5 for Side Effects domain, 67.6 ± 11.9 for

Convenience domain, and 62.9 ± 18.9 for the Overall Satisfaction domain. Furthermore, the median satisfaction scores in the Effectiveness, Side Effects, Convenience, and Overall Satisfaction domains were 66.7 (interquartile range: 61.1–66.7), 50.6

Table 2
Correlation coefficient between treatment satisfaction and HRQoL

Satisfaction domain	Spearman's Rho	EQ-5D score ^a	EQ-VAS score ^a
Effectiveness	Correlation coefficient	0.091	0.173
	Significance (2-tailed)	0.076	0.001
Side Effects	Correlation coefficient	0.409	0.460
	Significance (2-tailed)	0.000	0.000
Convenience	Correlation coefficient	0.071	0.197
	Significance (2-tailed)	0.165	0.000
Overall satisfaction	Correlation coefficient	0.143	0.193
	Significance (2-tailed)	0.005	0.000

HRQoL = Health-related quality of life, EQ-5D = European quality of life scale, EQ-VAS = European quality visual analogue scale.

^a Correlation significant at the 0.01 level.

(interquartile range: 26.6–68.8), 66.7 (interquartile range: 61.1–72.2), and 69.4 (interquartile range: 52.8–69.4), respectively. The results also indicated a significant positive correlation between the Overall Satisfaction score and Effectiveness domain ($r = 0.62$; $p < 0.001$), Side Effects domain ($r = 0.29$; $p = 0.002$), and Convenience domain ($r = 0.41$; $p < 0.001$). The Overall Satisfaction score was significantly associated with total number of diabetic medications, as well as income and insulin use (p -value < 0.05) as shown in Table 1.

EQ-5D-5L index values and EQ-VAS score

The mean values were 0.7 ± 0.20 for EQ-5D-5L index and 63.7 ± 19.2 for EQ-VAS scores. Furthermore, the median values of EQ-5D-5L index and EQ-VAS score were 0.76 (interquartile range: 0.59–0.85) and 65 (interquartile range: 50–80), respectively. The health status reported by the EQ-5D-5L index values was similar to that reported by EQ-VAS scores, and there was a statistically significant positive correlation between EQ-5D score and VAS score ($r = 0.59$; $p < 0.001$). As shown in Table 1, EQ-5D-5L index values were significantly associated with age, BMI, residency, educational level, total number of medications, and total number of comorbid diseases ($p < 0.05$), as well as insulin use, gender, occupation, marital status, and income ($p < 0.05$).

Relationship between HRQoL and treatment satisfaction

The Spearman's correlation coefficient values between the total scores of Effectiveness, Side Effects, Convenience, and Overall Satisfaction domains, and the EQ-5D-5L score were 0.09, 0.41, 0.07, and 0.14, respectively; and for the EQ-VAS scores were 0.17, 0.46,

Table 3
Multiple linear regression analysis of association between factors and EQ-5D score

Variable	Unstandardized coefficients	SE	Standardized coefficients	t	p value
Age	−0.03	0.01	−0.15	−2.93	0.004
Gender	0.01	0.03	0.01	0.21	0.836
BMI	0.00	0.02	0.00	−0.07	0.943
Residency	−0.03	0.02	−0.07	−1.42	0.157
Occupational status	0.10	0.03	0.18	3.18	0.002
Marital status	0.05	0.03	0.08	1.60	0.110
Income	0.05	0.03	0.09	1.83	0.068
Educational level	−0.02	0.01	−0.08	−1.53	0.126
Number of chronic diseases	−0.03	0.01	−0.16	−2.68	0.008
Insulin use	0.04	0.02	0.07	1.57	0.116
Number of medications	−0.01	0.02	−0.04	−0.58	0.565
Overall treatment satisfaction	0.00	0.00	0.08	1.79	0.075

EQ-5D = European quality of life scale; SE = standard error.

0.20, and 0.19, respectively (Table 2). Thus, the results of the current study indicated significant modest positive correlations between all treatment satisfaction domains and EQ-VAS scores, and significant modest positive correlations between Side Effects, Overall Satisfaction domains, and EQ-5D-5L score (Table 2).

Multiple linear regression analysis has been undertaken in all cases to control for the potential confounding effects from the patient socio-demographic and diabetes related data in univariate analysis. In the current study, only the dependent variable EQ-5D index score was included in the multiple linear regression model as there was a statistically significant positive correlation between this score and the EQ-VAS score. As recommended in a previous study, the independent variables included in multiple linear regression should not be strongly related to each other, but to the dependent variable [21]. In our study, because there were inter-correlations between domains of TSQM, only the Overall satisfaction with treatment domain was the only the independent variable integrated in the multiple linear regression model, while the other TSQM domains were excluded (Table 3). After adjusting the multiple covariates using multiple linear regression, the association between the Overall Satisfaction and EQ-5D index score was not statistically significant ($p = 0.075$); ($R = 0.495$; adjusted $R^2 = 0.245$; $F = 10.3$; $df = 12$; $p < 0.001$). As indicated in Table 3, age, employment status, and number of comorbid diseases were significantly associated with EQ-5D index score.

Collinearity diagnostics were carried out and evaluated based on the variance inflation factor (VIF) and tolerance. Values of less than 1.87 (VIF) and greater than 1.04 (minimum tolerance) indicated no multicollinearity problems were found among the independent variables in the current study.

Discussion

To the best of our knowledge, this study is the first of its kind to address the association between treatment satisfaction and HRQoL particularly in Palestine and in the Arab diabetic patients in general. An improved understanding of the risk factors related to HRQoL has become a key important outcome in DM management plans [9,22–25]. This type of study may help healthcare providers to recognize patients' perceptions about their illness and predict different dimensions within the diabetic patient's life.

In the current study, we found that older age, being unemployed, and presence of comorbid diseases were linked to lower HRQoL. The results of the current study are consistent with those of Rubin et al. who systematically analyzed the most recent literature related to DM and quality of life [26]. An Iranian study, conducted by Javanbakht et al. [3], assessed the relation between DM and quality of life in a sample of Iranian patients. This Iranian study found that increased age was related to lower HRQoL. Furthermore, a Korean study conducted by Lee et al. [17] using EQ-5D found that age was an important factor determining HRQoL of Korean type 2 diabetic patients. In this Korean study, younger patients (< 40 years) reported to have a better quality of life, most likely due to the short DM duration and the presence of minor complications. In the current study, the duration of DM was not related to quality of life after adjustment for other patient socio-demographic and clinical characteristics. These results match those observed in an earlier study conducted by Redekop et al. [4].

Our results showed that being unemployed was significantly related to lower EQ-5D scores. These findings are in agreement with the previous results reported by Javanbakht and colleagues using EQ-VAS scores and EQ-5D-5L index values that showed unemployment was associated with a higher possibility to report 'some or extreme problems' in most dimensions of the EQ-5D [3]. Another study conducted in Malaysia by Cheah et al. [27] that aimed to

examine the relationship between DM and HRQoL found that those who were unemployed had a significantly lower HRQoL compared to those employed in the private sector. This Malaysian study suggested that unemployed people may have lower income, and this may clarify its relation with lower HRQoL [27].

An Italian study conducted by Nicolucci et al. [8] aimed to evaluate the HRQoL and satisfaction to treatment in a large group of type 2 diabetic patients. The authors reported that diabetic patients' health perceptions were influenced not only by underlying socio-economic status but also by clinical conditions severity. Being unemployed was associated with significantly lower score levels in each dimension of HRQoL and with treatment satisfaction [8].

Another important finding was that the presence of comorbid diseases among diabetic patients was related to lower HRQoL. This relationship among diabetic patients is well-known and presented in the literature [3,8,28–30]. In 2007, a study conducted by Papadopoulos et al. [28] that aimed to assess the factors associated with HRQoL of Greek type 2 DM patients, found that coexistence of non-diabetic comorbidity, such as hypertension and hyperlipidemia, generally resulted in lower scale scores. Another study conducted in Italy by Nicolucci et al. [8] reported that having a number of comorbid conditions deteriorates HRQoL among people with DM. Furthermore, another study conducted in the USA by Wexler and colleagues [30] to assess the effect of medical comorbidities on HRQoL in diabetic patients, found that the presence of comorbid diseases is associated with a significantly lower HRQoL.

In the current study, overall, patients reported considerable levels of HRQoL as well as treatment satisfaction. A low positive correlation between HRQoL and treatment satisfaction was found among the study sample. In addition, it is found that treatment satisfaction was not associated with HRQoL after adjusting others patient socio-demographic and clinical characteristics. However, previous studies conducted in different populations such as diabetic or hypertensive patients have linked low correlation between HRQoL and treatment satisfaction [4,14,31]. In our study, the low correlations between HRQoL and treatment satisfaction seem to be consistent with a previous study which indicated that HRQoL and treatment satisfaction are two fairly different phenomena [4]. Previous similar studies reported that patient treatment satisfaction mainly depended on the attitude of physicians toward patients and the extent of communication between general practitioners and patients [4,32]. Furthermore, the lack of a correlation between HRQoL and treatment satisfaction has been documented by another previous study [33]. In contrast, HRQoL may be linked to treatment satisfaction due to patients' beliefs and attitudes towards taking medications [34]. On the other hand, Diabetes Attitudes, Wishes and Needs second study (DAWN2™) is a large-scale study that focused on the psychological impact of DM and the suggestion for best practices to improve diabetic patients' outcomes [35]. DAWN2™ study indicated the need of good resources, training, education, counseling, and collaboration between health care providers and diabetic patients [36]. Furthermore, DAWN2™ highlighted that better outcomes including quality of life were related with psychosocial support from others [37]. Health care providers have also recognized the importance of making diabetic patients to be more actively engaged in self-care and self-management [36].

Strengths and limitations

As a strength point, the current study is considered the first study to assess the association between HRQoL and treatment satisfaction specifically in Palestine and among Arab diabetic patients in general. Another strength of this study is the large sample size. The large number of diabetic patients included enabled the study of relatively different associated factors with good statistical

power. In fact, the current study might even be considered to be population-based, since most diabetic patients are referred to these two outpatient clinics [12]. Furthermore, two cross-sectional studies conducted in Palestine showed a higher rate of DM in a village community (12.0%) than in a city community (9.8%) at patients aged between 30 and 65 [38,39]. The rate of reported DM in our study had higher rate among females and elderly patients at age 50 years and older. Similar findings were reported by other researchers [40–43]. Still, some limitations related to our study should be documented. First, it is a cross-sectional study design where the diabetic patients were assessed only once, and it is therefore difficult to determine the cause–effect associations between HRQoL and socio-demographic and clinical characteristics. Second, the diabetic patients were recruited from one district, and thus, our conclusions cannot be generalized to the whole diabetic population in Palestine.

Conclusions

Overall, these results indicate that elderly patients, being unemployed, and those with comorbid diseases, are independent risk factors for poor HRQoL. Furthermore, it emerges that HRQoL and treatment satisfaction are both probably influenced by socio-demographic and clinical characteristics. In fact, to improve diabetic patients' quality of life, elderly patients were recommended to receive more attention in their health and economic status.

Conflict of interest

The authors declare they have no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data related to this article can be found online at <http://dx.doi.org/10.1016/j.jcte.2015.03.002>.

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