

Health-Related Quality of Life and its Determinants Among Women With Diabetes Mellitus: A Cross-Sectional Analysis

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Abstract

Background: Diabetes is a chronic and threatening condition. However, there are controversies on the factors affecting the health related quality of life (HRQOL) in patients with diabetes.

Objectives: The current study aimed to evaluate HRQOL and its determinants among females with type II diabetes referred to Diabetes Clinic of Khoy city, Northwest of Iran.

Patients and Methods: This cross-sectional study was performed on 352 eligible females with diabetes referring to Diabetes Clinic of Khoy. The study data were collected using a three-part instrument including a socio-demographic questionnaire, a questionnaire to assess patients' knowledge on diabetes and the world health organization's quality of life (WHOQOL-BREF) questionnaire. Based on descriptive and inferential statistics, analyses were conducted using frequency, independent samples t-test, correlation coefficient and regression analysis.

Results: The total mean score of QOL was 58.02 ± 17.63 . The lowest and the highest mean scores were observed in physical health and social relationship domains (53.84 ± 17.09) and (65.08 ± 14.87), respectively. The regression models revealed that age, education, duration of disease, and family income were significantly associated with all areas of quality of life ($P < 0.05$). The results also revealed that comorbidity was significantly correlated with the overall quality of life and the physical health domain ($P < 0.01$).

Conclusions: The mean score of quality of life (QOL) in females with diabetes was far from desirable condition. These findings can help physicians and healthcare providers to design suitable interventions to improve the patients QOL.

Keywords: Diabetes Mellitus, Quality of Life, Females

1. Background

During the past decades, many researchers have paid attention to health-related quality of life (HRQOL) and its determinants, especially in people with chronic diseases (1). Diabetes mellitus is one of the chronic diseases which causes a considerable morbidity and mortality worldwide (2). It is estimated that the number of diabetic patients would increase from 171 million in 2000 to 366 million in 2030 (3). It is estimated that 2% of Iran's general population and 7.3% of people over 30 years old have diabetes (4).

Diabetes is accompanied by huge economical costs mainly caused by debilitating micro- and macro-vascular complications and is a burdensome disease that can seriously impair the quality of patient's life (5).

Quality of life (QOL) is defined as the individual's perception of his/her situation in life according to the existing culture and value systems and in relation to his/her objec-

tives, expectations and life standards (6). It is an extensive concept and may be influenced by various physical, psychological, social, and environmental variables (7).

Studying the QOL in patients with chronic diseases is now an important focus of the healthcare investigators (8). Many physicians and healthcare researchers consider the QOL as a marker not only to evaluate the effects of chronic diseases on patients' lives, but also to assess the effectiveness of the treatments and caring programs (9).

Evidence shows that patients with diabetes have lower QOL than non-diabetic individuals (10). In addition to the debilitating complications of diabetes, they are also susceptible to premature aging, weight gain and low levels of physical activity, that negatively affect their QOL (10). In a study on the QOL of patients with type II diabetes in Hamadan, Borzou et al. reported that the disease

significantly reduced patients' general health and well-being, and the overall QOL (11). Mata et al. also studied the QOL of Spanish patients and reported that the majority of patients with diabetes had undesirable QOL in comparison with healthy people (12). There are inconsistencies about determinants of QOL in patients with diabetes mellitus. For example, Aghamolaei et al. showed that female patients with diabetes had lower scores in the physical components of QOL than males. They also reported that among all demographic variables, only age and female gender could significantly predict the patients HRQOL (13). However, Eljedi et al. (14) and Bani-Issa et al. (15) showed that female patients with diabetes mellitus had higher scores than males in some domains of the QOL. Due to high prevalence of diabetes among females compared to males, and their high susceptibility against different diseases because of their multiple roles (as spouse, mother, housewife and probably employee) in the society (16), conducting research works on female can be helpful.

Considering the above conflicts and the lack of sufficient studies in Iran, this question comes to mind that: "What are the determinants of HRQOL of Iranian female patients with diabetes mellitus?"

2. Objectives

The current study aimed to evaluate HRQOL and its determinants among females with type II diabetes referred to Diabetes Clinic of Khoy city, Northwest of Iran.

3. Patients and Methods

This cross-sectional study was carried out on a sample of female patients with type II diabetes in Khoy, Northwest of Iran in 2011. Inclusion criteria were female gender, living in Khoy, having a medical diagnosis of type II diabetes at least for six months, willingness to participate in the study and age 18 - 65 years old.

The sample size was estimated 385 subjects using the results of a previous study (17) and the following parameters: $\alpha = 0.05$, $\delta = 22.7$ and $d = 0.1\delta$. All eligible patients were recruited and participated in the study.

Data collection instrument was a self-reported questionnaire developed through reviewing the related literature. The study questionnaire included three subscales: a) the socio-demographic factors, b) the Diabetes Knowledge Questionnaire, and c) the world health organization's quality of life (WHOQOL-BREF) questionnaire to measure HRQOL.

The socio-demographic information included 12 questions on the patients' age, education level, job status, marital status, household monthly income, duration of the disease, type of treatment, the interval between two medical visits, receiving any education on diabetes, source of information, weight, height, co-morbidity and body mass index (BMI).

The Diabetes Knowledge Questionnaire (DKQ) includ-

ed 11 multiple choice questions on females' knowledge about diabetes. Each question was scored as two or zero for a correct or wrong answer, respectively. A score of one was given to an answer of "I do not know". The lowest knowledge score was zero and the highest was twenty-two.

The WHOQOL-BREF questionnaire consists of 26 items. Two items are related to the overall QOL and general health and the remaining 24 items are in four domains of physical health (seven items), psychological health (six items), social relationships (three items) and environmental health (eight items). All items are scored on a five-point Likert scale ranging from one (very poor, not at all, very dissatisfied, never) to five (very good, extremely, very satisfied, always). The mean score of questions in each domain was used to calculate the domain score and finally they were transformed linearly to a 0 - 100-scale (18). Higher scores indicate higher levels of QOL. The Farsi version of WHOQOL-BREF questionnaire was previously validated by Nejat et al. (18). A panel of experts also confirmed the content validity of the whole instrument in the present study. They appraised all items in terms of their distinctiveness, understandability, and appropriateness for the aim of the study, and the required revisions were performed in the knowledge section based on their suggestions. To test the reliability of the whole instrument, it was filled out by a trained nurse through interviewing 352 diabetic patients. Then, Cronbach's alpha coefficient was calculated. Internal consistency of the knowledge and HRQOL questionnaires were 0.77 and 0.92, respectively. Moreover, the Cronbach's alpha coefficient of different domains of QOL ranged from 0.76 to 0.88. To complete the study questionnaires, the clinic nurse was trained to fill out the questionnaires. Then on certain days, the referred subjects to the clinic were recruited by the trained nurse and questionnaires were filled out by the nurse through guiding and interviewing all patients in the educational room of Madani Hospital of Khoy city. Finally the trained nurse gathered 352 completed questionnaires and posted them to the researcher.

3.1. Ethical Considerations

The study protocol was approved by the Ethics Committee of Tehran University of Medical Sciences. All ethical issues such as obtaining informed (oral) consent and presenting the study objectives for subjects were followed. The questionnaires were anonymous and all the information was kept confidential in this study.

3.2. Data Analysis

To analyze the data, descriptive and inferential statistics were applied; distribution frequency and percentage in terms of demographic characteristics and diabetes-related variables were expressed. Independent samples t-test was used to examine the differences in

overall QOL and its domains in terms of demographic variables. Pearson correlation coefficient was used to assess the association between overall QOL and its domains. Multiple linear regression analysis was applied to determine factors influencing QOL and its domains. SPSS software version 13.0 (SPSS Inc., Chicago, IL, USA) was utilized for data analysis. $P < 0.05$ was considered as significant in all tests.

4. Results

From 385 subjects, 352 completed and returned their questionnaires (response rate: 91.42%). The mean age of subjects was 43.00 ± 16.02 years. The mean BMI in samples was 29.03 ± 4.53 . Table 1 presents the characteristics of the study subjects. The mean score of subjects' diabetes knowledge was 7.40 ± 3.50 . In other words, subjects obtained 33.36% (SD: 15.9%) of the total knowledge score. Table 2 displays correlations between the overall QOL, the general health, and four domains of HRQOL. As observed, there were significant correlations between all domains ($P < 0.01$). Based on the results of Table 2, knowledge of subjects only had a significant association with their physical health and social relationship ($P < 0.01$). Based on the results of the independent t-test, significant relationships were observed between demographic factors (such as age, education level, family monthly income, duration of disease and co-morbidity) and QOL and its domains ($P < 0.05$) (Table 3). Table 3 shows that the total mean score of HRQOL was 58.02 ± 17.63 and among its domains, the highest and lowest mean were observed in the domains of social relationship and physical health, respectively.

Results of multiple linear regression models revealed that age, education level, household income, duration of disease and co-morbidity were significantly associated with overall QOL of patients with diabetes ($P < 0.05$). These variables accounted for 27.3% of variance of the total HRQOL. Also these factors had significant relationship with physical health domain of QOL ($P < 0.01$). Age, education level, family monthly income and duration of condition were also associated with four domains of HRQOL (Table 4).

Table 1. The Distribution Frequency of Demographic Factors of the Study Population

Characteristics	No. (%)
Age, y	
≤ 30	111 (31.5)
> 30	241 (68.5)
Education level	
Illiterate	187 (53.1)
Elementary and higher	165 (46.9)
Job status	
Employment	24 (6.8)
Unemployment	328 (93.2)
Marital status	
Single/widow/divorced	32 (9.1)
Married	320 (90.9)
Household monthly income, USD	
≤ 185	171 (48.6)
> 185	181 (51.4)
Duration of disease, y	
≤ 10	252 (71.6)
> 10	100 (28.4)
Treatment type	
Insulin injection/oral medication/both	340 (96.6)
none	12 (3.4)
Visit interval of patients by physician, m	
≤ 3	263 (74.7)
> 3	89 (25.3)
Experiencing educational sessions	
Yes	77 (21.9)
No	275 (78.1)
Co-morbidity	
Yes	285 (81)
No	67 (19)
Information source	
Health personnel	255 (72.4)
Other	97 (27.6)
BMI, kg/m²	
< 25	64 (18.2)
≥ 25	288 (81.8)

Table 2. Correlation Coefficients of General Health, the Total WHOQOL-BREF and its Four Domains

	Overall QOL	General Health	PH	PSH	SR	EH	DK
Overall QOL	1						
General health	0.290	1					
Physical health (PH)	0.361	0.552	1				
Psychological health (PSH)	0.382	0.560	0.712	1			
Social relationships (SR)	0.372	0.361	0.489	0.566	1		
Environment health (EH)	0.371	0.421	0.603	0.690	0.588	1	
Diabetes Knowledge (DK)	0.076	0.055	0.143	0.103	0.154	0.086	1

Abbreviation: PH, Physical Health; PSH, Psychological Health; SR, Social Relationships; EH, Environment Health; DK, Diabetes Knowledge.

Table 3. Relationship Between Different Dimensions of Quality of Life and Other Clinical and Demographic Variables^a

Domain	PH	PSH	SR	EH	Total QOL
Total score of QOL and its domains	53.84 ± 17.09	56.54 ± 15.63	65.08 ± 14.87	55.93 ± 13.21	58.02 ± 17.63
Age, y					
≤ 30	71.42 ± 12.67	70.45 ± 13.49	88.63 ± 7.70	70.4 ± 13.49	79.54 ± 18.76
> 30	53.27 ± 16.92	56.09 ± 15.50	64.32 ± 14.42	56.09 ± 15.50	57.33 ± 17.18
P Value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Education level					
Illiterate	48.10 ± 18.83	52.33 ± 17.59	59.71 ± 15.76	52.23 ± 14.10	53.34 ± 18.66
Elementary and higher	60.25 ± 11.93	61.33 ± 11.37	71.18 ± 11.05	60.09 ± 10.75	63.26 ± 14.76
P Value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Job status					
Employment	63.24 ± 13.66	60.76 ± 10.27	72.91 ± 11.32	59.24 ± 9.90	65.62 ± 14.39
Unemployment	53.15 ± 17.13	56.23 ± 15.92	64.50 ± 14.95	55.68 ± 13.40	57.46 ± 17.74
P Value	0.005	0.171	0.007	0.203	0.029
Marital status:					
Single/widow/divorced	49.88 ± 18.19	51.88 ± 18.50	62.90 ± 15.03	54.23 ± 15.61	51.61 ± 22.30
Married	54.27 ± 16.91	56.98 ± 15.31	65.22 ± 14.87	56.05 ± 12.99	58.62 ± 17.05
P Value	0.171	0.083	0.407	0.466	0.035
Household monthly income, USD					
≤ 185	52.02 ± 17.49	55.38 ± 15.88	63.88 ± 15.18	54.50 ± 13.17	54.85 ± 17.33
> 185	60.12 ± 13.97	60.54 ± 14.08	69.19 ± 13.03	60.83 ± 12.22	68.98 ± 13.99
P Value	< 0.001	0.006	0.005	< 0.001	< 0.001
Duration of disease, y					
≤ 10	57.50 ± 16.68	60.38 ± 15.21	67.39 ± 15.45	58.46 ± 12.79	60.64 ± 17.99
> 10	51.19 ± 16.92	53.75 ± 15.37	63.39 ± 14.23	54.09 ± 13.23	56.12 ± 17.16
P Value	< 0.001	< 0.001	0.013	0.002	0.018
Treatment type					
Insulin injection/oral medication/both	53.81 ± 17.28	56.40 ± 15.76	64.87 ± 14.99	55.88 ± 13.42	57.64 ± 17.71
None	54.76 ± 10.80	60.41 ± 11.16	70.83 ± 9.73	57.28 ± 3.62	68.75 ± 11.30
P Value	0.850	0.384	0.173	0.719	0.032
Visit interval of patients by physician, m					
≤ 3	53.62 ± 17.50	56.35 ± 15.91	64.50 ± 14.82	55.81 ± 13.54	57.51 ± 17.50
> 3	55.75 ± 12.89	58.21 ± 13.00	70.13 ± 14.55	56.94 ± 9.99	62.50 ± 18.41
P Value	0.480	0.499	0.031	0.628	0.108
Experiencing educational sessions					
Yes	54.73 ± 16.57	56.43 ± 14.55	65.69 ± 15.99	56.57 ± 13.58	62.01 ± 17.95
No	53.59 ± 17.25	56.57 ± 15.94	64.90 ± 14.57	55.74 ± 13.12	56.90 ± 17.41
P Value	0.608	0.946	0.683	0.629	0.025
Co-morbidity					
Yes	52.14 ± 16.81	55.32 ± 15.65	63.85 ± 15.20	55.01 ± 13.51	55.61 ± 17.14
No	61.08 ± 16.45	61.75 ± 14.50	70.27 ± 12.15	59.84 ± 11.13	68.28 ± 16.03
P Value	< 0.001	0.002	< 0.001	0.007	< 0.001
Information source					
Health personnel	52.43 ± 16.97	55.53 ± 15.87	64.11 ± 15.51	54.74 ± 13.73	57.64 ± 17.89
Other	57.54 ± 16.92	59.19 ± 14.71	67.61 ± 12.77	59.05 ± 11.21	59.02 ± 16.99
P value	0.012	0.050	0.049	0.006	0.515
BMI					
< 25	55.91 ± 14.98	57.03 ± 14.52	64.19 ± 17.67	56.68 ± 15.54	58.98 ± 16.28
≥ 25	53.38 ± 17.51	56.43 ± 15.88	65.27 ± 14.20	55.76 ± 12.66	57.81 ± 17.94
P value	0.285	0.784	0.598	0.612	0.631

Abbreviation: PH, Physical Health; PSH, Psychological Health; SR, Social Relationships; EH, Environment Health; Total QOL, Total Quality of Life.

^aAll data are presented as mean ± SD.

Table 4. Multiple Linear Regression Analyses of Significant Factors Associated With Quality of Life and its Domains

Quality of Life and its Domains Variables	Unstandardized Coefficients (β)	Std. Error	Standardized Coefficients (Beta)	t	P Value
Overall QOL					
Age	-17.530	4.706	-0.173	-3.725	< 0.001
Education level	4.790	1.697	0.137	2.822	0.005
Household Income	14.044	2.032	0.333	6.913	< 0.001
Duration of disease	-3.806	1.661	-0.107	-2.291	0.023
Co-morbidity	11.356	2.131	0.253	5.328	< 0.001
Physical health (PH)					
Age	-12.644	4.741	-0.129	-2.667	0.008
Education level	9.607	1.710	0.284	5.618	< 0.001
Household Income	6.168	2.047	0.151	3.013	0.003
Duration of disease	-5.798	1.674	-0.168	-3.464	< 0.001
Co-morbidity	5.840	2.148	0.134	2.719	< 0.007
Psychological health (PSH)					
Age	-10.201	4.500	-0.114	-2.267	0.024
Education level	7.059	1.623	0.228	4.349	< 0.001
Household Income	3.900	1.943	0.104	2.007	0.046
Duration of disease	-6.273	1.589	-0.198	-3.949	< 0.001
Co-morbidity	3.642	2.038	0.092	1.787	0.075
Social relationships (SR)					
Age	-19.810	4.088	-0.232	-4.846	< 0.001
Education level	9.309	1.474	0.316	6.314	< 0.001
Household Income	3.980	1.765	0.116	2.142	0.042
Duration of disease	-3.484	1.443	-0.116	-2.415	0.016
Co-morbidity	3.157	1.851	0.083	1.705	0.089
Environment health (EH)					
Age	-7.639	3.806	-0.101	-2.007	0.046
Education level	5.965	1.373	0.228	4.345	< 0.001
Household Income	5.135	1.643	0.162	3.125	0.002
Duration of disease	-4.245	1.344	-0.159	-3.159	0.002
Co-morbidity	2.907	1.724	0.086	1.686	0.093

5. Discussion

The current study examined the QOL of a sample of Iranian females with type 2 diabetes and explored the socio-demographic and disease-related variables that significantly affected their QOL. The results revealed that the studied subjects had a low to moderate level of HRQOL, as illustrated by the mean score of overall QOL and its subscales. Consistent with the current study, Gholami et al. used the WHOQOL-BREF to investigate the QOL in patients with type II diabetes and reported that the overall QOL in the patients was at moderate to low level (6). Imayama et al. in a study on determinants of QOL in adults with diabetes also reported similar findings (20). In contrast, studies in United Arab Emirates (15) and Den-

mark (21) revealed that the mean scores of HRQOL in people with diabetes were higher than that of the present study. However, the mean HRQOL score of people with diabetes in Gaza (14) was lower than that of the current study. Females with diabetes in the current study scored highest on social relationship and lowest on physical health. Some previous studies support these findings. For instance, people with diabetes in the United Arab Emirates and Gaza attained the highest scores on the social relationship domain (14, 15). A variety of reasons might influence the differences in results of different studies. Cultural and contextual issues, different roles of females in different areas and countries, differences in peoples'

socio-demographic characteristics, the different features of the disease in different people, and the differences in the instruments used in different studies were among the most important reasons for controversies between the studies (22-24).

The results of the current study revealed a significant difference between QOL of the study subjects in terms of their age, education level, disease duration, monthly income, and co-morbidity. For example, a negative significant relationship was observed between the disease duration and the QOL in females with diabetes. In other words, as the duration of the disease increases, the patients QOL decreases. Perhaps, the incidence of diabetes complications rises with the increase in the disease duration, which in turn, negatively affects the patients QOL. Some previous studies also showed that the QOL of patients with diabetes decreases with the increase in their disease duration (25, 26). Sadeghie Ahari et al. (2) and Senz et al. (27) found that the QOL of people with diabetes is inversely affected by their age. Several other studies report that younger patients with diabetes have a better QOL than the aged people ones (28-30). Such a decrease in QOL with aging might be explained by the progressive nature of the disease complications that gradually decreases the patients' physical and emotional capabilities due to the increase in cardiac-vascular, neural, visual, and renal complications of diabetes.

In the present study, literate females had a better QOL compared with illiterate subjects. This finding can be attributed to the fact that literate patients have a better access to information and are more apt to adjust their lives in accordance to the healthcare recommendations they receive (31-33). The study also suggests that income was significantly associated with life satisfaction in the subjects. This finding is also consistent with some previous studies (15, 34, 35). Favorable economic status facilitates patients' access to better health services and care. These patients usually have fewer concerns for the treatment costs.

The current study results also showed that females with diabetes and co-morbid conditions (ie, hypertension, hyperlipidemia, obesity) experienced lower overall QOL and physical health compared to other subjects. This finding was in line with the results of Wasem et al. who reported that patients with diabetes and a history of coronary artery disease, stroke/transitory ischemic attack, peripheral artery disease, heart failure and peripheral neuropathy had lower levels of QOL (36). Ultimately, the study results highlighted that females with diabetes and high knowledge regarding diabetes experienced high physical health and social relationship in comparison with others. The study by Kooshyar et al. showed a significant relationship between health literacy and physical and psychological dimensions of quality of life among diabetic patients ($P < 0.05$) (37). Some previous studies found linkage between patients' knowledge and quality of life among congestive heart failure (CHF) and prostatic patients (38, 39). These results supported and confirmed

the current study findings. It seems that knowledge of diabetics may play the main role to improve the quality of life of patients with diabetes especially on its domains of physical health and social relationships.

The current study had a number of limitations. First, the cross-sectional nature of the present study precluded examination of causality. Second, the results of this study can be generalized only to similar samples and not beyond. Finally, utilizing self-reported questionnaires in surveys may lead to respondents' underestimation or overestimation of their health-related quality of life, in turn, may affect the study findings.

The study findings indicated that HRQOL of females with diabetes was far from desirable condition. Authors also explored some of the important determinants of HRQOL in females with diabetes. The results documented that age, duration of diabetes, family monthly income, education level and co-morbidities were the most important factors affecting the quality of life of females with type II diabetes. These findings can help physicians and healthcare providers to design suitable interventions to improve the patients QOL. At the end, it is suggested that other researchers conduct this study with greater sample size to find the factors affecting the QOL of male and female patients with diabetes. It is also recommended that researchers use and test cohort studies to explore causative relationship between important factors and quality of life of people with type II diabetes.

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Footnotes

Authors' Contribution:Alireza Didarloo designed the study and conducted data collection, data analysis and the manuscript writing. Mohammad Alizadeh interpreted data and revised the paper.

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References

1. Kiadaliri AA, Najafi B, Mirmalek-Sani M. Quality of life in people with diabetes: a systematic review of studies in Iran. *J Diabetes Metab Disord*. 2013;**12**(1):54. doi: 10.1186/2251-6581-12-54. [PubMed: 24354933]
2. Sadeghie Ahari S, Arshi S, Iranparvar M, Amani F, Siahpoosh H. The Effect of Complications of Type II Diabetes on Patients' Quality of Life. [in Persian]. *J Ardabil Univ Med Sci*. 2008;**8**(4):394-402.
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care*. 2004;**27**(5):1047-53. [PubMed: 15111519]
4. Didarloo A, Shojaeizadeh D, Ardebili HE, Niknami S, Hajizadeh E, Alizadeh M. Factors Influencing Physical Activity Behavior

- among Iranian Women with Type 2 Diabetes Using the Extended Theory of Reasoned Action. *Diabetes Metab J*. 2011;**35**(5):513-22. doi:10.4093/dmj.2011.35.5.513. [PubMed: 22111043]
5. Davies MJ, Heller S, Skinner TC, Campbell MJ, Carey ME, Craddock S, et al. Effectiveness of the diabetes education and self management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cluster randomised controlled trial. *BMJ*. 2008;**336**(7642):491-5. doi:10.1136/bmj.39474.922025.BE. [PubMed: 18276664]
 6. Gholami A, Azini M, Borji A, Shirazi F, Sharafi Z, Zarei E. Quality of Life in Patients with Type 2 Diabetes: Application of WHOQoL-BREF Scale. [in Persian]. *Shiraz E-Med J*. 2013;**14**(3):162-71.
 7. Alavi NM, Ghofranipour F, Ahmadi F, Emami A. Developing a culturally valid and reliable quality of life questionnaire for diabetes mellitus. *East Mediterr Health J*. 2007;**13**(1):177-85. [PubMed: 17546920]
 8. Crakowski MS. Health-related quality of life outcomes in clinical research. *Am J of Epidemiology*. 1999;**283**:215.
 9. Aghakoochak A, Shojaoddiny-Ardekani A, Vakili M, Namiranian N. Quality of Life in Diabetic Patients: A Case-Control Study. *Iranian J Diabetes Obes*. 6(1):28-33.
 10. Thommasen HV, Berkowitz J, Thommasen AT, Michalos AC. Understanding relationships between diabetes mellitus and health-related quality of life in a rural community. *Rural Remote Health*. 2005;**5**(3):441. [PubMed: 16120021]
 11. Borzou SR, Salavati M, Safari M, Hadadinejad S, Zandieh M, Torkaman B. Quality of life in type II diabetic patients referred to Sina Hospital, Hamadan. [in Persian]. *Zahedan J Res Med Sci*. 2011;**13**(4):43-6.
 12. Mata CM, Roset GM, Badia LX, Antoñanzas VF, Ragel AJ. [Effect of type-2 diabetes mellitus on the quality of life of patients treated at primary care consultations in Spain]. *Aten Primaria*. 2003;**31**(8):493-9. [PubMed: 12765587]
 13. Aghamolaei T, Tavafian SS, Zare S. Determinants of health related quality of life on people living in bandar abbas, iran. *Iran J Public Health*. 2011;**40**(3):128-35. [PubMed: 23113095]
 14. Eljedi A, Mikolajczyk RT, Kraemer A, Laaser U. Health-related quality of life in diabetic patients and controls without diabetes in refugee camps in the Gaza strip: a cross-sectional study. *BMC Public Health*. 2006;**6**:268. doi:10.1186/1471-2458-6-268. [PubMed: 17074088]
 15. Bani-Issa W. Evaluation of the health-related quality of life of Emirati people with diabetes: integration of sociodemographic and disease-related variables. *EMHJ*. 2011;**17**(11).
 16. Azizi F. Tehran, Iran: 1999. Epidemiology of diabetes in Iran. Summary of papers realting to Seminar on new approaches in treatment and education of diabetes; pp. 7-9.
 17. Timareh M, Rhimi M, Abbasi P, Rezaei M, Hyaidarpoor S. Quality of life in diabetic patients referred to the Diabete research Center in Kermanshah. *J Kermanshah Univ Med Sci*. 2012;**16**(1):63-9.
 18. Nejat S, Montazeri A, Holakouie Naieni K, Mohammad K, Majdzadeh SR. The World Health Organization quality of Life (WHOQOL-BREF) questionnaire: Translation and validation study of the Iranian version. *J School Public Health Instit Public Health Res*. 2006;**4**(4):1-12.
 19. Luyster FS, Dunbar-Jacob J. Sleep quality and quality of life in adults with type 2 diabetes. *Diabetes Educ*. 2011;**37**(3):347-55. doi:10.1177/0145721711400663. [PubMed: 21467248]
 20. Imayama I, Plotnikoff RC, Courneya KS, Johnson JA. Determinants of quality of life in adults with type 1 and type 2 diabetes. *Health Qual Life Outcomes*. 2011;**9**:115. doi:10.1186/1477-7525-9-115. [PubMed: 22182307]
 21. Bech VNP. The WHO Quality of Life (WHOQOL) Questionnaire: Danish validation study. *Nordic Psychiatry*. 2001;**55**(4):229-35. doi:10.1080/080394801681019075.
 22. Al-Shehri AH, Taha AZ, Bahnassy AA, Salah M. Health-related quality of life in type 2 diabetic patients. *Ann Saudi Med*. 2008;**28**(5):352-60. [PubMed: 18779640]
 23. Verma SK, Luo N, Subramaniam M, Sum CF, Stahl D, Liow PH, et al. Impact of depression on health related quality of life in patients with diabetes. *Ann Acad Med Singapore*. 2010;**39**(12):913-7. [PubMed: 21274488]
 24. Quah JH, Luo N, Ng WY, How CH, Tay EG. Health-related quality of life is associated with diabetic complications, but not with short-term diabetic control in primary care. *Ann Acad Med Singapore*. 2011;**40**(6):276-86. [PubMed: 21779616]
 25. Eren I, Erdi O, Sahin M. The effect of depression on quality of life of patients with type II diabetes mellitus. *Depress Anxiety*. 2008;**25**(2):98-106. doi:10.1002/da.20288. [PubMed: 17311266]
 26. Hashemi Hefz Abad F, Shabany Hamedan M. Comparison of Attitudes Regarding Quality of Life between Insulin-Treated Subjects with Diabetes Mellitus and Healthy Populations. *Diabetes Metab J*. 2011;**35**(4):397-403. doi:10.4093/dmj.2011.35.4.397. [PubMed: 21977460]
 27. Senez B, Felicioli P, Moreau A, Le Goaziou MF. Évaluation de la qualité de vie des patients diabétiques de type 2 en médecine générale. *La Presse Médicale*. 2004;**33**(3):161-6. doi:10.1016/s0755-4982(04)98513-2. [PubMed: 15029027]
 28. Redekop WK, Koopmanschap MA, Stolk RP, Rutten GE, Wolffenbuttel BH, Niessen LW. Health-related quality of life and treatment satisfaction in Dutch patients with type 2 diabetes. *Diabetes Care*. 2002;**25**(3):458-63. [PubMed: 11874930]
 29. Al-Maskari MY, Al-Shookri AO, Al-Adawi SH, Lin KG. Assessment of quality of life in patients with type 2 diabetes mellitus in Oman. *Saudi Med J*. 2011;**32**(12):1285-90. [PubMed: 22159385]
 30. Nyanzi R, Wamala R, Atuhairie LK. Diabetes and quality of life: a Ugandan perspective. *J Diabetes Res*. 2014;**2014**:402012. doi:10.1155/2014/402012. [PubMed: 24724107]
 31. Issa BA, Baiyewu O. Quality of life of patients with diabetes mellitus in a Nigerian teaching hospital. *Hong Kong J Psychiatry*. 2006;**16**(1):27.
 32. Salome GM, Maria de Souza Pellegrino D, Blanes L, Ferreira LM. Self-esteem in patients with diabetes mellitus and foot ulcers. *J Tissue Viability*. 2011;**20**(3):100-6. doi:10.1016/j.jtv.2010.12.004. [PubMed: 21251830]
 33. Urzúa MA, Chirino A, Valladares G. Autoreporte de la calidad de vida relacionada con la salud en diabetes mellitus tipo 2. *Revista médica de Chile*. 2011;**139**(3):313-20. doi:10.4067/s0034-98872011000300005. [PubMed: 21879162]
 34. Garcia-Morales E, Lazaro-Martinez JL, Martinez-Hernandez D, Aragon-Sanchez J, Beneit-Montesinos JV, Gonzalez-Jurado MA. Impact of diabetic foot related complications on the Health Related Quality of Life (HRQoL) of patients—a regional study in Spain. *Int J Low Extrem Wounds*. 2011;**10**(1):6-11. doi:10.1177/1534734611400257. [PubMed: 21444605]
 35. Owayolu O, Owayolu N, İgde S, Kılıç SP. Health-Related Quality of Life Patients with Diabetes Mellitus and Diabetic Foot in the South-eastern Anatolia Region of Turkey. *Int J Caring Sci*. 2014;**7**(1):176.
 36. Wasem J, Bramlage P, Gitt AK, Binz C, Krekler M, Deeg E, et al. Co-morbidity but not dysglycaemia reduces quality of life in patients with type-2 diabetes treated with oral mono- or dual combination therapy—an analysis of the DiaRegis registry. *Cardiovasc Diabetol*. 2013;**12**:47. doi:10.1186/1475-2840-12-47. [PubMed: 23510200]
 37. Kooshyar H, Shoorvazi M, Dalir Z, Hosseini M. Health Literacy and its Relationship with Medical Adherence and Health-Related Quality of Life in Diabetic Community-Residing Elderly. *J Mazandaran Univ Med Sci*. 2014;**23**.
 38. Macabasco-O'Connell A, DeWalt DA, Broucksou KA, Hawk V, Baker DW, Schillinger D, et al. Relationship between literacy, knowledge, self-care behaviors, and heart failure-related quality of life among patients with heart failure. *J Gen Intern Med*. 2011;**26**(9):979-86. doi:10.1007/s11606-011-1668-y. [PubMed: 21369770]
 39. Song L, Mishel M, Bensen JT, Chen RC, Knafel GJ, Blackard B, et al. How does health literacy affect quality of life among men with newly diagnosed clinically localized prostate cancer? Findings from the North Carolina-Louisiana Prostate Cancer Project (PCaP). *Cancer*. 2012;**118**(15):3842-51. doi:10.1002/cncr.26713. [PubMed: 22180041]