Clinico-epidemiological factors of health related quality of life among people with type 2 diabetes

Azra Mamaghanian, Seyed Morteza Shamshirgaran, Nayyereh Aiminisani, Akbar Aliasgarzadeh

AIM
To investigate the quality of life (QOL) and its clinical and epidemiological correlates among people with type 2 diabetes.

METHODS
This cross-sectional study was conducted in Tabriz, Northwest of Iran, including a total of 394 people with type 2 diabetes using convenient sampling method from November 2014 to March 2015. General information including demographic, socioeconomic status and lifestyle factors were collected by trained interviewers. Clinical information was retrieved from clinic’s record and QOL was assessed using the 26-item WHOQOL-BREF questionnaire. Univariate and multivariate linear regression were performed to assess the related factors and QOL dimensions.

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RESULTS
The mean of overall health related QOL was 52.11 ± 11.53 and the maximum and minimum dimensions were
respectively seen in psychological (60.38 ± 14.54) and social (38.32 ± 16.94) dimensions. The results of multiple linear regression showed a significant overall relationship between HRQOL and age (β = -1.48%, 95%CI: -0.03 and -2.93) level of education (β = 4.12%, 95%CI: 2.73 and 5.5), number of comorbidities (β = -2.41%, 95%CI: -3.89 and -9.41), and level of income (β = 1.98, 95%CI: 0.05 and 3.9), functional limitation (β = -3.59, 95%CI: -2.26 and -4.92) and psychological distress (β = -2.02%, 95%CI: -2.83 and -1.21). Level of education, functional limitation, psychological distress were associated with the score of physical, mental and environmental dimensions, and number of comorbidities was associated with the score of physical and mental dimensions.

CONCLUSION
Based on our findings, lifestyle modification and increasing facilities of clinics providing service can be effective steps to improve the QOL among people with type 2 diabetes.

Key words: Diabetes mellitus; Type 2; Lifestyle; Quality of life; Psychological distress

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Core tip: Health related quality of life (HRQOL) is an important outcome measure in chronic diseases. The aim of this study was to assess quality of life and a range of epidemiological and clinical factors among people with type 2 diabetes. The findings of the present study showed that age, level of education, income, body mass index, functional limitation, psychological distress and number of comorbidities have a decisive role on HRQOL of patients with type 2 diabetes. So, it is important to improve the HRQOL by considering above predictors as an appropriate mechanism for public health interventions for type 2 diabetes.

Mamaghanian A, Shamshirgaran SM, Aiminisani N, Aliasgarzadeh A. Clinico-epidemiological factors of HRQOL among people with type 2 diabetes. World J Diabetes 2017; 8(8): 407-413 Available from: URL: http://www.wjgnet.com/1948-9358/full/v8/i8/407.htm DOI: http://dx.doi.org/10.4239/wjd.v8.i8.407

INTRODUCTION
Diabetes is one of the most common metabolic diseases with increasing prevalence that reduces life expectancy by one third. Diabetes is known as a “silent epidemic” which due to the aging population, changing patterns of life, prevalence of risk behaviors and rapid growth of urbanization has increased around the world[1-3]. It is estimated that 415 million people worldwide and 4.5 million people in Iran had diabetes in 2015. It is predicted that the number rises to more than 642 million worldwide and 4.8 million in Iran by 2040. In addition diabetes caused 4.9 million deaths in 2014 and 48% of deaths occurred in people less than 60 years[4-6].

One of the important issues in the care of chronic diseases such as diabetes is to investigate the quality of their life, which significantly affects one’s physical-psychological performance and social communication[7]. As defined by the World Health Organization, quality of life (QOL) refers to “individuals’ perception of their position in life in terms of culture, value system where they live, goals, expectations, standards and priorities”[8,9]. In other words, the health related QOL (HRQOL) is a subjective issue that is measured using different dimensions include physical, mental and social functions[10]. HRQOL as a multi-dimensional concept focuses on the impact of health on QOL[11].

There is a mutual relationship between the quality of diabetes care and QOL so that reducing the HRQOL of people with type 2 diabetes leads to poor glycemic control and an increased risk of disease complications. On the other hand, poor quality of care leads to reduced HRQOL[12,13].

Some studies showed that demographic factors, socio-economic status, presence of comorbid conditions, and diabetes control affect HRQOL among people with type 2 diabetes. Results of most studies on this group of patients showed that their HRQOL was not desirable[14-18]. Considering that East Azerbaijan province, is among provinces, in which diabetes is highly prevalent and this disease is among research priorities outlined in the province as well as the different climatic, socio-cultural conditions, lifestyle of the area and the low quality of diabetes care that has been shown in multiple studies[19,20], the present study was designed and implemented in order to investigate the factors affecting the HRQOL of diabetic patients referred to diabetes clinics in Tabriz.

MATERIALS AND METHODS
The present study was a cross-sectional study, which was conducted by trained interviewers on 394 patients with type 2 diabetes referred to diabetes clinics in Tabriz (Imam Reza and Sina Hospitals) in the form of face to face interviews using convenient sampling method from November 2014 to March 2015. Inclusion criteria included the willingness to cooperate and participate in the study, having diabetes type II, age group above 25 years, having records of diabetes care in clinics of Tabriz (at least for a year), living in Tabriz and lack of specific (hemophilia, thalassemia, etc.) or debilitating diseases leading to hospitalization. Exclusion criteria included death, emigration, or any disability that prevents the provision of information by patients. Information required for the project was collected using a two-part questionnaire.

In the first part of the questionnaire, sociodemographic and clinical characteristics including age, sex, marital status, income, insurance status, education level, type of treatment (diet, oral medications, insulin), having comorbidities (hypertension, depression, kidney
disease, cardiovascular disease, cancer and other diseases) complications (retinopathy, neuropathy, nephropathy, cardiovascular complications), duration of diabetes, functional limitation, Kessler psychological distress (K10) and family history as well as anthropometric measures were collected. In the second part, the 26-item WHOQOL-BRIFE questionnaire was used. This questionnaire evaluates four broad areas, including physical health, psychological health, social relationships and environment. This questionnaire contained two questions on the assessment of the overall HRQOL and the level of self-perception of QOL. The 24 the next questions evaluate physical health (7 questions), mental health (6 questions), social relationships (3 questions) and environment (8 questions). The questionnaire was scored using Likert-5 point scale; i.e., every question is assigned five answers (never, low, medium, high, very high), to each of which 1 to 5 points is assigned, respectively. The higher score in each of the dimensions reflects the better QOL. During analysis stage, those questionnaires, more than 20% of questions of which are remained unanswered (6 questions and more), were excluded. After calculating the raw score in each dimension, the scores can be converted and analyzed to 0-100 or 4-20 scale\(^{(23)}\). In this study, the 0-100 scale was used to analyze the results. The validity and reliability of the Persian version of the questionnaire, was determined by Nejat et al\(^{(23)}\) in 2005.

Descriptive statistics [mean, standard deviation and frequency (percent)] was performed and test-t, Mann-Whitney, ANOVA, Kruskal Wallis were used and Welch test was employed to analyze the HRQOL according to demographic data and treatment options. Also, the multiple regression models were used to show the association between independent factors with dimensions of QOL. The level of significance of \(P = 0.05\) was considered in the present study. Data analysis was performed using SPSS 23.

This project was approved by Ethics Committee of Tabriz University of Medical Sciences (Ethic approval number TBZMED.REC.2015.55). In addition, at the beginning of the study, informed consent was obtained in written forms from all of the participants.

**RESULTS**

The mean patient age was 56.67 ± 9.01 years. of the majority of participants (66%) were female, and married (88.6%), 36% were illiterate, most of them (96%) had health insurance and 56.8% of them had a monthly income of less than 10 million Rials, respectively. Smokers accounted for 10.2% of the participants and 48.7% of patients suffered complications, in 39.6% of whom the neuropathy was observed. A total of 74.1% of people had comorbidities, the most prevalent of which was high blood pressure (40.4%). A total of 56.9% of them used oral medicine and 55.3% of patients had a family history of diabetes (Table 1).

The mean of overall HRQOL was 52.11 ± 11.53 and the maximum and minimum dimensions of HRQOL were respectively seen in psychological 60.38 ± 14.54 and social dimension 38.32 ± 16.74 (Table 2).

A total of 79.8% of individuals had undesirable BMI (< 25) and HRQOL score was significantly lower in all HRQOL dimensions. The majority (63.5%) of individuals mentioned the disease duration of over 7 years. Also, the association between disease duration and QOL was statistically significant in all dimensions, except in social relations dimensions. HRQOL scores were low in all dimensions in people with functional limitation and those suffering from two or more comorbidities and patients with kidney disease had the lowest HRQOL score in all dimensions but in physical and mental dimensions. Blood biochemical indicators such as levels of HbA1c, cholesterol levels were not significant in each of HRQOL dimensions (\(P = 0.05\)) (Table 3).

The results of multiple linear regression showed a significant overall relationship between HRQOL and age \((b = -1.48\%, \ 95\% CI: -0.03 \text { and } -2.93)\) level of education \((b = 4.12\%, \ 95\% CI: 2.73 \text { and } 5.5)\), number of comorbidities \((b = -2.41\%, \ 95\% CI: -3.89 \text { and } -9.41)\), and level of income \((b = 1.98, \ 95\% CI: 0.05 \text { and } 3.9)\), functional limitation \((b = -3.59, \ 95\% CI: -2.26 \text { and } -4.92)\) and psychological distress \((b = -2.02\%, \ 95\% CI: -2.83 \text { and } -1.21)\). Also, there was association between the physical (level of education, BMI, functional limitation, psychological distress and number of comorbidities), social (age, level of education and functional limitation), mental (level of education and functional limitation, psychological distress and the number of comorbidities) and environmental dimensions (level of education, functional limitation, psychological distress and number of comorbidities).

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\(1\) Mean and standard deviation: 56.67 ± 9.01; \(2\) Amounts are in 10000 Rials (1 USD equals to 33000 Islamic Republic of Iran’s Rials).

### Table 1  Demographic characteristics of diabetic people referring to diabetes clinic of Tabriz, 2015

| Variable                  | Subgroups                  | n (%)          |
|---------------------------|----------------------------|----------------|
| Age\(^1\)                 | ≤ 49                       | 85 (21.6)      |
|                           | 59-50                      | 142 (37.3)     |
|                           | ≥ 60                       | 162 (41.1)     |
| Gender                    | Male                       | 134 (34)       |
|                           | Female                     | 260 (66)       |
| Level education           | Illiterate                 | 143 (36.3)     |
|                           | Primary school             | 149 (37.8)     |
|                           | Secondary school and higher| 102 (25.9)     |
| Marital status            | Single                     | 45 (11.4)      |
|                           | Married                    | 349 (88.6)     |
| Occupation                | Employed                   | 70 (17.8)      |
|                           | Housekeeper                | 252 (63.9)     |
|                           | Retired/other              | 72 (18.3)      |
| Health insurance          | Yes                        | 378 (95.9)     |
|                           | No                         | 16 (4.1)       |
| Household monthly income\(^2\) | < 500                   | 25 (6.3)       |
|                           | 1000-500                   | 199 (50.5)     |
|                           | > 1000                     | 170 (43.1)     |
| Smoking status            | Yes                        | 40 (10.2)      |
|                           | No                         | 354 (89.8)     |

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\(1\) Mean and standard deviation: 56.67 ± 9.01; \(2\) Amounts are in 10000 Rials (1 USD equals to 33000 Islamic Republic of Iran’s Rials).
Table 2  The status of different domains of health related quality of life according to the gender of diabetic people referring to diabetes clinics of Tabriz, 2015

| Variable                  | Male            | Female          | P-value | P-value |
|---------------------------|-----------------|-----------------|---------|---------|
| Gender                    |                 |                 |         |         |
| Male                      | 134 (34)        | 260 (66)        |         |         |
| Female                    |                 |                 |         |         |
| Age                       |                 |                 |         |         |
| ≤ 49                      | 85 (21.6)       | 147 (37.3)      |         |         |
| 50-59                     | 162 (41.1)      | 143 (36.3)      | < 0.001 | < 0.001 |
| Educational level         |                 |                 |         |         |
| Primary school            | 241 (64.3)      | 194 (48.6)      | < 0.001 | < 0.001 |
| Secondary school and higher | 102 (25.9)   | 105 (26.1)      | < 0.001 | < 0.001 |
| Income                    |                 |                 |         |         |
| Low (< 1000)              | 224 (56.8)      | 170 (43.2)      | < 0.001 | < 0.001 |
| Acceptable                |                 |                 |         |         |
| Disease duration (yr)     |                 |                 |         |         |
| ≤ 3 yr                    | 51 (12.9)       | 236 (59.2)      | < 0.001 | < 0.001 |
| ≥ 7 yr                    | 250 (63.5)      | 104 (25.9)      | < 0.001 | < 0.001 |
| HbA1c                     |                 |                 |         |         |
| ≤ 7%                      | 180 (47.2)      | 201 (52.8)      | < 0.001 | < 0.001 |
| > 7%                      | 195 (49.6)      | 72 (18.3)       | < 0.001 | < 0.001 |
| Psychological distress    |                 |                 |         |         |
| MODERATE                  | 52 (2.13)       | 50.96 (14.41)   | 39.19 (19.07) | 58.57 (12.12) | 59.76 (16.61) | 52.12 (13.91) |
| SEVER                      | 74 (18.8)       | 43.9 (15.76)    | 34.14 (17.23) | 54.33 (66.10) | 48.87 (15.22) | 45.31 (11.66) |
| Functional limitation      |                 |                 |         |         |
| No                        | 106 (26.9)      | 61.25 (10.89)   | 47.47 (15.85) | 63.05 (11.16) | 67.91 (14.37) | 59.92 (10.79) |
| Moderate                  | 78 (19.8)       | 54.92 (11.51)   | 44.34 (18.16) | 61.12 (6.62) | 64.79 (12.13) | 56.29 (10.18) |
| Sever                     | 210 (53.3)      | 44.85 (11.35)   | 31.44 (13.25) | 55.17 (9.26) | 54.91 (13.17) | 46.58 (9.23)  |
| Treatment                 |                 |                 |         |         |
| Oral medication           | 223 (57.4)      | 53.57 (12.59)   | 38.69 (15.71) | 58.97 (10.37) | 61.69 (14.64) | 53.11 (11.09) |
| Oral medication + insulin injection | 164 (42.2) | 48.92 (13.64) | 37.82 (17.96) | 58.07 (10.55) | 58.78 (14.38) | 50.9 (11.97) |
| Comorbidities             |                 |                 |         |         |
| No                        | 102 (25.9)      | 58.93 (11.79)   | 42.23 (18.29) | 63.37 (10.57) | 66.51 (14.82) | 57.76 (11.75) |
| 1                         | 207 (52.5)      | 50.82 (12.07)   | 38.28 (16.42) | 57.56 (10.03) | 60.49 (13.19) | 51.79 (10.66) |
| ≥ 2                       | 85 (21.6)       | 43.05 (12.99)   | 33.74 (14.41) | 54.83 (9.39)  | 52.75 (13.88) | 46.09 (10.09) |

HRQOL: Health related quality of life.

Table 3  Different dimensions of health related quality of life according to the clinical aspects of diabetes among diabetic people referring to diabetes clinics of Tabriz, 2015

| Variable                  | Total          | Male            | Female          | P-value | P-value |
|---------------------------|----------------|-----------------|-----------------|---------|---------|
| HRQOL dimensions          | Mean           | SD              | Mean            | SD      | Mean    | SD    |
| Mean                      |                |                 |                 |         |         |      |
| Physical health           | 51.24 (13.34)  | 54.97 (12.92)   | 59.65 (11.14)   |         | 56.26 (13.30) | 55.46 (11.34) |
| Psychological health      | 60.38 (14.54)  | 65.26 (13.30)   | 57.88 (14.54)   | < 0.001 | 50.39 (11.27) |
| Social relationship       | 38.32 (16.74)  | 41.96 (16.71)   | 0.02 (0.115)    | < 0.001 | < 0.001 |
| Environmental             | 58.48 (10.48)  | 59.64 (11.13)   | 57.88 (10.10)   | < 0.001 | 0.115   |
| Total HRQOL score         | 52.11 (11.53)  | 55.46 (11.14)   | 50.39 (11.27)   | < 0.001 |         |

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**DISCUSSION**

HRQOL is one of the most important assessment indices of health cares in chronic disease.[24] In this study, HRQOL based on the WHOQOL-BRIFE and its correlates among people with type 2 diabetes was examined. Based on these findings, the mean of overall HRQOL was 52.11 ± 11.53 which was similar to other studies that have also shown that HRQOL dimensions of diabetes patients was moderate.[25-27] while some studies reported the lower score of the mean of overall HRQOL.[28-30]. Based on these findings, in all dimensions, men had higher average HRQOL than women (55.46 ± 11.34 and 50.39 ± 11.27 in males and females, respectively), which was consistent with the result obtained in studies conducted by Rasouli et al.[31], Khalde et al.[32] and Redekop et al.[33]. These studies attributed women’s low HRQOL score to biological and psychological differences (women’s menopause and sensitivity in dealing with the disease).

But Saadatjoo et al.[34] reported that women’s HRQOL score obtained in different dimensions was higher than men, which is different from the results obtained in the present research. Some studies also have shown no significant association between gender and HRQOL.[35] In the present study, the lowest and highest HRQOL scores were obtained in mental and social dimensions, respectively. The score was different in other studies due to socioeconomic status and cultural conditions as well as collection tools. The findings of the present study showed a significant association between the HRQOL of patients, and factors including age, income, BMI, level of education, functional limitation, psychological distress, and number of comorbidities which was consistent with the study conducted by Didarloo et al.[36]. There was a significant relationship between BMI and HRQOL so that by increasing BMI levels, HRQOL level was decreased. The results of regression analysis showed that there was a relationship between BMI and HRQOL in terms of physical dimension (β = -1.5), which were consistent with many studies conducted in this area.[36-38]. The association between age and HRQOL was consistent with many studies so that the lowest and highest mean HRQOL scores were obtained in young and elderly patients, respectively.[19,39,40]. The results of the present study showed that there was a significant relationship between level of education and all HRQOL dimensions so that people with higher education levels also had better QOL, which is consistent with findings obtained in different studies.[12,41,42]. Moreover, the findings of the present study indicated that the frequency of comorbidities in patients was associated with a reduced HRQOL and this relationship was significant in the physical, psychological and environmental dimensions based on the results obtained in multiple regression analysis.[43]. There was a negative correlation between functional limitation and HRQOL among people with type 2 diabetic in the current study. This means that increasing functional limitation score was indicative of the fact that patients faced limitation in doing their daily life activities.

**Table 4 Multivariate linear regression models of significant factors predicting health related quality of life domains among diabetic people referring to diabetes clinics of Tabriz, 2015**

| HRQOL domains | Variables | B ($SE$) | Beta | P-value | 95%CI of B | Adjusted $R^2$ |
|---------------|-----------|----------|------|---------|------------|---------------|
| Physical health | Education | 3.35 (0.63) | 0.198 | < 0.001 | 1.77 | 4.93 | 0.436 |
| | BMI | -1.55 (0.75) | -0.087 | 0.039 | -3.12 | 0.07 | |
| | Functional limitation | -4.79 (0.77) | -0.229 | < 0.001 | -6.11 | -3.07 | |
| | Kessler psychological distress | -1.98 (0.46) | -0.174 | < 0.001 | -2.90 | -1.06 | |
| | Comorbidities | -4.05 (0.85) | -0.210 | < 0.001 | -5.73 | -2.37 | |
| Social relationship | Age | -4.65 (1.2) | -0.212 | < 0.001 | -7.01 | -2.28 | 0.279 |
| | Education | 5.3 (1.15) | 0.246 | < 0.001 | 3.03 | 7.56 | |
| | Functional limitation | -4.05 (1.11) | -0.208 | < 0.001 | -6.24 | -1.87 | |
| Psychological health | Education | 3.52 (0.94) | 0.190 | < 0.001 | 1.67 | 5.38 | 0.353 |
| | Functional limitation | -3.94 (0.9) | -0.234 | < 0.001 | -5.72 | -2.15 | |
| | Comorbidities | -3.72 (1.0) | -0.176 | < 0.001 | -5.69 | -1.75 | |
| | Kessler psychological distress | -3.96 (0.55) | -0.317 | < 0.001 | -5.04 | -2.88 | |
| Environment | Education | 4.3 (0.73) | 0.318 | < 0.001 | 2.86 | 5.75 | 0.257 |
| | Comorbidities | -2.37 (0.78) | -0.154 | 0.003 | -3.91 | -0.83 | |
| | Kessler psychological distress | -1.33 (0.43) | -0.135 | 0.004 | -2.07 | -0.38 | |
| | Functional limitation | -1.77 (0.7) | -0.145 | 0.012 | -2.47 | -0.38 | |
| | Comorbidities | 2.13 (1.02) | 0.101 | 0.057 | 0.12 | 4.14 | |
| | Kessler psychological distress | -3.96 (0.55) | -0.317 | < 0.001 | -5.04 | -2.88 | |
| Total HRQOL score | Education | 4.12 (0.7) | 0.278 | < 0.001 | 2.73 | 5.5 | 0.433 |
| | Functional limitation | -3.59 (0.67) | -0.267 | < 0.001 | -4.92 | -2.26 | |
| | Age | 1.48 (0.73) | 0.098 | 0.044 | -2.93 | -0.03 | |
| | Kessler psychological distress | -2.02 (0.41) | -0.203 | < 0.001 | 2.83 | -1.21 | |
| | Income | 1.98 (0.97) | 0.085 | 0.044 | 0.05 | 3.9 | |
| | Comorbidities | -2.41 (0.75) | -0.143 | 0.001 | -3.89 | -9.41 | |
diabetes, which in turn reduced their HRQOL. There were no similar studies for comparison purposes in this context.

The results of the current study showed that the psychological distress had negative effects on the average HRQOL of patients and led to reduced HRQOL in these people. The results of multiple regression analysis were indicative of a significant relationship between psychological distress and all HRQOL dimensions (except social dimension). These findings are consistent with other studies done in this area. In the present study, there was a reverse relationship between duration of diabetes, and HRQOL scores; but after adjustment for other variables it was no longer significant in any of HRQOL dimensions. Studies also indicated that there was no significant relationship between duration of diabetes and HRQOL, which confirmed the results of the present study.

In conclusion, the findings of the present study showed that age, level of education, income, BMI, functional limitation, psychological distress and number of comorbidities have a decisive role on HRQOL of patients with type2 diabetes. So, it is important to improve the HRQOL by considering above predictors as an appropriate mechanism for public health interventions for type 2 diabetes. Therefore, correcting lifestyle and increasing facilities of clinics providing service can be an effective step to improve the QOL of patients.

ACKNOWLEDGMENTS

This article is the result of a research project approved by Health Faculty of Tabriz University of Medical Sciences and was sponsored by the above faculty. The authors appreciate the respected authorities and all colleagues and respected staffs of diabetes clinic of Sina and Imam Reza Hospitals as well as all patients participating in this study.

REFERENCES

1. Ahmann AJ. Guidelines and performance measures for diabetes. Am J Manag Care 2007; 13 Suppl 2: S41-S46 [PMID: 17417032]
2. Azizi F, Hatami H, Jianghoriangi M. Epidemiology and control of common diseases in Iran. Tehran: Etshagi Publications, 2000: 602-616
3. Edelman D, Olsen MK, Dudley TK, Harris AC, Oddone EZ. Impact of diabetes screening on quality of life. Diabetes Care 2002; 25: 1022-1026 [PMID: 12032109 DOI: 10.2337/diacare.25.6.1022]
4. Butt J. Media backgrounder diabetes in the developing world. World Diabetes Foundation, 2010
5. Guariguata L, Whiting DR, Hambleton I, Beagley J, Linnenkamp U, Shaw JE. Global estimates of diabetes prevalence for 2013 and projections for 2035. Diabetes Res Clin Pract 2014; 103: 137-149 [PMID: 24630390 DOI: 10.1016/j.diabres.2013.11.002]
6. Shamshirgaran SM, Ataei J, Iranparvar Alamdari M, Safaeian A, Aminiassad N. Predictors of health-related quality of life among people with type II diabetes Mellitus in Ardabil, Northwest of Iran, 2014. Prim Care Diabetes 2016; 10: 244-250 [PMID: 26654733 DOI: 10.1016/j.pcd.2015.11.004]
7. Burckhardt CS, Anderson KL. The Quality of Life Scale (QOLS): reliability, validity, and utilization. Health Qual Life Outcomes 2003; 1: 60 [PMID: 14613562 DOI: 10.1186/1477-7525-1-60]
8. The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. Soc Sci Med 1995; 41: 1403-1409 [PMID: 8560308 DOI: 10.1016/0277-9536(95)00112-K]
9. Darvishpour A, Saiidi ZH, Yaghmaei F, Alavi M, Montazeri A. Survey correlation between quality of life and disease and demographic variables of diabetic patients referred to Tehran hospitals in 2004. Iranian J Endocrinol Metab 2006; 8: 49-56
10. Hennessy CH, Moriarty DG, Zack MM, Scherr PA, Brackbill R. Measuring health-related quality of life for public health surveillance. Public Health Rep 1997; 109: 665-672 [PMID: 9793838]
11. Kobau R, Sniezek J, Zack MM, Lucas RE, Burns A. Well-being assessment: An evaluation of well-being scales for public health and population estimates of well-being among US adults. Appl Psychol Health Well Being 2010; 2: 272-197 [DOI: 10.1111/j.1758-0854.2010.01035.x]
12. Vares Z, Zandi M, Baghaei P, Mosoudi Alavi N, Mirbagher Ajorpaz N. Study of quality of life and associated factors in diabetes mellitus patients of Kashan Diabetic center. Ira J Nurs Res 2010; 5: 14-22
13. Zimmet P. The burden of type 2 diabetes: are we doing enough? Diabetes Metab 2003; 29: 659-618 [PMID: 14502096]
Fenwick EK, Xie J, Ratcliffe J, Pesudovs K, Finger RP, Wong TY, Lamoureux EL. The impact of diabetic retinopathy and diabetic macular edema on health-related quality of life in type 1 and type 2 diabetes. Invest Ophthalmol Vis Sci 2012; 53: 677-684 [PMID: 22205611 DOI: 10.1167/iovs.11-8992]

Issa B, Baiyewu O. Quality of life of patients with diabetes mellitus in a Nigerian teaching hospital. Hong Kong J Psychiar 2006; 16: 27

Papadopoulos AA, Kontodimopoulos N, Frydias A, Ikonomakis E, Niakas D. Predictors of health-related quality of life in type II diabetic patients in Greece. BMC Public Health 2007; 7: 186 [DOI: 10.1186/1471-2458-7-186]

Santhanam P, Gabbar RA, Saleem TF. Poor quality of life scores in persons with higher A1Cs in type 2 diabetes. Diabetes Res Clin Pract 2011; 92: e53-e54 [PMID: 21397970 DOI: 10.1016/j.diabres.2011.02.016]

Wändell PE. Quality of life of patients with diabetes mellitus. An overview of research in primary health care in the Nordic countries. Scand J Prim Health Care 2005; 23: 68-74 [PMID: 16065644 DOI: 10.1080/02815390510005296]

Ataei J, Shamshirgani S, Iranparvar Alamdari M, Safaeian A. Evaluation of Diabetes Quality of Care Based on a Care Scoring System among People Referring to Diabetes Clinic in Ardabil. 2014. JARUMS 2015; 15: 207-219

Delipishah A, Azizi H, Dantabal Esmaeili E, Haghiri L, Karimi G, Abbasi F. The quality of care and blood sugar control in type 2 diabetic patients of rural areas under the care by family physicians. Iran J Diab Metab 2016; 14: 189-198

Skevington SM, Lotfy M, O’Connell KA; WHOQOL Group. The World Health Organization’s WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group. Qual Life Res 2004; 13: 299-310 [PMID: 15085902 DOI: 10.1023/B:QURE.0000018486.91360.00]

World Health Organization. WHOQOL-BREF: introduction, administration, scoring and generic version of the assessment: field trial version, December 1996. Available from: URL: http://apps.who.int/iris/bitstream/10665/63259/1/WHOQOL-BREF.pdf

Nedjat S, Montazeri A, Holakouie K, Mohammad K, Majdzadeh R. Psychometric properties of the Iranian interview-administered version of the World Health Organization’s Quality of Life Questionnaire (WHOQOL-BREF): a population-based study. BMC Health Serv Res 2008; 8: 61 [PMID: 18366715 DOI: 10.1186/1472-6963-8-61]

Tol A, Sharifirad G, Eslami A, Shojaeizadeh D, Alhani F, Tehranii MM. Analysis of some predictive factors of quality of life among type 2 diabetic patients. J Educ Health Promot 2015; 4: 9 [DOI: 25767820 DOI: 10.4103/2277-9531.151903]

Bani-Issa W. Evaluation of the health-related quality of life of Emirati people with diabetes: integration of sociodemographic and disease-related variables. East Mediterr Health J 2011; 17: 825-830 [PMID: 22276489]

Kolawole BA, Mosaik SI, Ikem RT. A comparison of two measures of quality of life of Nigerian clinic patients with type 2 diabetes mellitus. Afr Health Sci 2009; 9: 161-166 [PMID: 20589144]

Wändell PE, Tovi J. The quality of life of elderly diabetic patients. J Diabetes Complications 2000; 14: 25-30 [PMID: 10925863 DOI: 10.1016/S1056-8727(00)00086-5]

Jain V, Krishnamurthy S, Gupta O. Health-related quality of life (hr-qol) in patients with type 2 diabetes mellitus. N Am J Med Sci 2014; 6: 96-101 [PMID: 24696831 DOI: 10.4103/1947-2714.127752]

Mustapha W, Hossain Z, O’Loughlin K. Management and impact of diabetes on quality of life among the Lebanese community of Sydney: A quantitative study. J Diab Metab 2014; 5: 2 [DOI: 10.41722155-6156.1000329]

Sadeghi Ahari S, Arshi S, Iranparvar M, Amami F, Siahpoooh H. The effect of complications of type II diabetes on patients’ quality of life. JARUMS 2008; 8: 394-402

Rasouli D, Nasiriziba F, Nabianjamd R, Haghighi H. Comparison of life quality in men and women with diabetic foot ulcer in selected hospitals of Tehran universities, 1387. J Jahrom Uni Med Sci 2011; 1: 38-45

Khalide S, Mezidi G, Geribi F. Evaluation of quality of life in eight type 2 diabetic patients attending diabetes center in Sanandaj in 1388. Sci Arqyonom Plant Breed 2011; 1: 29-36

Redekop WK, Koopmanschap MA, Stolk RP, Rutten GE, Wolfenbuttel BH, Niessen LW. Health-related quality of life and treatment satisfaction in Dutch patients with type 2 diabetes. Diabetes Care 2002; 25: 458-463 [PMID: 11874930 DOI: 10.2337/ diacare.25.3.458]

Saadatso JA, Rezvanez M, Tahyee S, Oudi D. Life quality comparison in type 2 diabetic patients and none diabetic persons. Med Care J 2012; 9: 24-31

Ahmadi A, Hasanzadeh A, Rahimi M, Lashkari L. Effective factors in the quality of life of patients with type 2 diabetes in Chaharmahal & Bakhtiaryan province. J North Khorasan Uni Med Sci 2011; 3: 7-13

Didarloo A, Alizadeh M. Health-Related Quality of Life and its Determinants Among Women With Diabetes Mellitus: A Cross-Sectional Analysis. Nurs Midwifery Stud 2016; 5: e28937 [PMID: 27331054 DOI: 10.17795/nmsjournal28937]

Håmmén J, Takala J, Keinänen-Kiukaanniemi S. Quality of life in NIDDM patients assessed with the SF-20 questionnaire. Diabetes Res Clin Pract 1998; 42: 17-27 [PMID: 9888429 DOI: 10.1016/S0168-8227(98)00085-0]

Liao D, Ashbery P, Shofer JB, Callahan H, Matthys C, Boyko EJ, Leonetti D, Kahn SE, Austin M, Newell E, Schwartz RS, Fujimoto WY. Improvement of BMI, body composition, and body fat distribution with lifestyle modification in Japanese Americans with impaired glucose tolerance. Diabetes Care 2002; 25: 1504-1510 [PMID: 12196418 DOI: 10.2337/diacare.25.9.1504]

Hellström Y, Persson G, Hallberg IR. Quality of life and symptoms in people with type 2 diabetes not using insulin. Diabetes Care 2001; 24: 162-171 [PMID: 1105130 DOI: 10.1046/j.1523-4730.2001.45029.x]

Aliasquarpoor M, Eyboosh S. The quality of life of elderly nursing home residents and its relationship with different factors. Iran J Nurs Midwifery Stud 2013; 5(2): 458-459 [PMID: 25536544 DOI: 10.14196/ijnms.2013.05.04.01]

Song JI, Shin DW, Choi JY, Kang J, Baik YJ, Mo H, Park MH, Choi SE, Kwak JH, Kim EM. Quality of life and mental health in family caregivers of patients with terminal cancer. Support Care Cancer 2011; 19: 1519-1526 [PMID: 21479527 DOI: 10.1007/s00520-010-0977-x]

Patel B, Oza B, Patel K, Malliotra S, Patel V. Health related quality of life in type-2 diabetic patients in Western India using World Health Organization Quality of Life–BREF and appraisal of diabetes scale. JDDC 2014; 34: 100-107 [DOI: 10.1007/s13410-013-0162-y]

Goldney RD, Phillips PJ, Fisher LJ, Wilson DH. Diabetes, depression, and quality of life: a population study. Diabetes Care 2004; 27: 1066-1070 [PMID: 15111522 DOI: 10.2337/diabetes.27.5.1066]

Kooshyar H, Hossaini M, Dari M, Aceini AR. Surveying Health-Related Quality of Life of Diabetic Elderly in Khorasan-e-Razavi. J Haraz 2016; 14: 175-188

Gholami A, Azimi M, Borji A, Shariati F, Sharafi Z, Zarei E. Quality of life in patients with type 2 diabetes: application of WHOQOL-BREF scale. Shiraz E-Med J 2013; 14: 162-171

P-Reviewer: Gómez-Sáez JM  S-Editor: Ji FF  L-Editor: A  E-Editor: Lu YJ
