**Name of Journal: *World Journal of Diabetes***

**Manuscript NO: 32910**

**Manuscript Type: Original Article**

***Observational Study***

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

Mamaghanian A *et al.* Clinico-epidemiological factors of HRQOL

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

**Azra Mamaghanian, Seyed Morteza Shamshirgaran, Nayyereh Aiminisani,** Department of Statistics and Epidemiology, School of Health Sciences Tabriz University of Medical Sciences, Tabriz 5165665931, Iran

**Seyed Morteza Shamshirgaran,** Road Traffic Injury Research Center, Tabriz University of Medical Sciences, Tabriz 5165665931, Iran

**Akbar Aliasgarzadeh,** Endocrine Research Center, Tabriz University of Medical Sciences, Tabriz 5165665931, Iran

**Author contributions:** All authors were involved in design of the study; Mamaghanian A was responsible for collection and assembly of data and contributed to data analysis; Shamshirgaran SM was responsible for provision of study material and drafted the manuscript; Shamshirgaran SM, Aiminisani N and Aliasgarzadeh A supervised and supported data collection and analysis; all authors read and approved the manuscript including the final version.

**Supported by** Research Council, Faculty of Health Sciences, Tabriz University of Medical Sciences grant, No. 5.53.1590.

**Institutional review board statement:** The study was reviewed and approved  
by the ethics committee of Tabriz University of Medical Sciences (TBZMED.REC.2015.55).

**Informed consent statement:** All patients completed an informed consent form prior to the interview session.

**Conflict-of-interest statement:** There are no conflicts of interest to report.

**Data sharing statement:** No additional data are available.

**Open-Access:** This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

**Manuscript source:** Invited manuscript

**Correspondence to:** **Seyed Morteza Shamshirgaran, MD, PhD, Assistant Professor,** Department of Statistics and Epidemiology, School of Health Sciences Tabriz University of Medical Sciences, Rm 405, Golgasht Ave., Atar Neyshabouri St, Tabriz 5165665931, Iran. [shamshirgaranm@tbzmed.ac.ir](mailto:shamshirgaranm@tbzmed.ac.ir)

**Telephone:** +98-33-57582

**Fax:** +98-33-57582

**Received:** January 25, 2017

**Peer-review started:** February 6, 2017

**First decision:** March 28, 2017

**Revised:** May 9, 2017

**Accepted:** May 18, 2017

**Article in press:**

**Published online:**

**Abstract**

***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-BRIFE questionnaire. Univariate and multivariate linear regression were performed to assess the related factors and QOL dimensions.

***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 (b = -1.48%, 95%CI: -0.03 and -2.93) level of education (b = 4.12%, 95%CI: 2.73 and 5.5), number of comorbidities (b = -2.41%, 95%CI: -3.89 and -9.41), and level of income (b = 1.98, 95%CI: 0.05 and 3.9), functional limitation (b = -3.59, 95%CI: -2.26 and -4.92) and psychological distress (b = -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

**© The Author(s) 2017.** Published by Baishideng Publishing Group Inc. All rights reserved.

**Core tip:** Health related quality of life (HRQOL) is an important outcome measure in chronic diseases. The aim of this study was to assess QOL 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, 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.

Mamaghanian A, Shamshirgaran SM, Aiminisani N, Aliasgarzadeh A. Clinico-epidemiological factors of health related quality of life among people with type 2 diabetes. *World J Diabetes* 2017; In press

**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[21,22]. 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 Saharnaz 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 numberTBZMED.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 and -2.93) level of education (b = 4.12%, 95%CI: 2.73 and 5.5), number of comorbidities (b = -2.41%, 95%CI: -3.89 and -9.41), and level of income (b = 1.98, 95%CI: 0.05 and 3.9), functional limitation (b = -3.59, 95%CI: -2.26 and -4.92) and psychological distress (b = -2.02%, 95%CI: -2.83 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 level of income) (Table 4).

**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 (b = -1.5), which were consistent with many studies conducted in this area[30,37,38]. 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[3,43]. 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 activities, 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[24,44]. 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[45,46] also indicated that there was no significant relationship between duration of diabetes and HRQOL, which confirmed the results of the present study.

***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.

**ACKNOWLEDGEMENTS**

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.

**COMMENTS**

***Background***

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. Although, some studies showed that demographic factors, socio-economic status, presence of comorbid conditions, and diabetes control affect health related quality of life (HRQOL) among people with type 2 diabetes, a comprehensive assessment of a range of epidemiologic and clinical factors related to the QOL among people with type 2 diabetes in this area is needed.

***Research frontiers***

Diabetes an emerging health problem in Iran and will continue to rise in the next decades. Considering that East Azerbaijan province, is among provinces, in which diabetes is highly prevalent and the different climatic, socio-cultural conditions, lifestyle of the area as well as the low quality of diabetes care can affect the QOL, a comprehensive assessment of clinical and epidemiological correlates of QOL can provide a more clear picture of the problem in order to implement an appropriate public health interventions.

***Innovations and breakthroughs***

To our knowledge, limited studies in this area have been conducted to assess QOL and a range of different epidemiological and clinical factors specially there is no information about the association between functional limitation, and psychological distress and QOL in Iran. This study designed to capture a more details about the QOL and its correlates using a valid questionnaires and trained interviewers.

***Applications***

QOL is considered as an outcome measure therefore identification of any modifiable factor associated with that could be of interest for further intervention. Diabetes will continue to rise; health policy makers need to be updated about the required information in order to implement the new interventional programs and also to enhance the current practice related to diabetes care.

***Terminology***

QOL: Individuals’ perception of their position in life in terms of culture, value system where they live, goals, expectations, standards and priorities; HRQOL: A subjective issue that is measured using different dimensions include physical, mental and social functions; Kessler psychological distress (K10): A 10-item questionnaire intended to measure the level of distress based on questions about anxiety and depressive symptoms over the recent 4 wk.

***Peer-review***

The paper is interesting and has been developed with appropriate methodology.

**REFERENCES**

1 **Ahmann AJ**. Guidelines and performance measures for diabetes. *Am J Manag Care* 2007; **13** Suppl 2: S41-S46 [PMID: 17417932]

2 **Azizi F**, Hatami H, Janghorbani M. Epidemiology and control of common diseases in Iran. Tehran: Eshtiagh 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, Aminisani 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 **Darrvishpour A**, Saiedi 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* 1994; **109**: 665-672 [PMID: 7938388]

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, Masoudi 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**: 6S9-618 [PMID: 14502096]

14 **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]

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

16 **Papadopoulos AA**, Kontodimopoulos N, Frydas 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 [PMID: 17663782 DOI: 10.1186/1471-2458-7-186]

17 **Santhanam P**, Gabbay 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]

18 **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: 16036544 DOI: 10.1080/02813430510015296]

19 **Ataei J**, Shamshirgaran 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

20 **Delpisheh A**, Azizi H, Dantalab Esmaeili E, Haghiri L, Karimi G, Abbasi F. The quality of care and blood sugar control in type 2 diabetes patients of rural areas under the care by family physucians. *Ira J Diab Metab* 2016; **14**: 189-198

21 **Skevington SM**, Lotfy M, O'Connell KA. 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]

22 **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/10665/63529/1/WHOQOL-BREF.pdf

23 **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]

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

25 **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]

26 **Kolawole BA**, Mosaku SK, 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]

27 **Wändell PE**, Tovi J. The quality of life of elderly diabetic patients. *J Diabetes Complications* 2000; **14**: 25-30 [PMID: 10925063 DOI: 10.1016/S1056-8727(99)00066-5]

28 **Jain V**, Shivkumar 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]

29 **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: 10.4172/2155-6156.1000329]

30 **Sadeghie Ahari S**, Arshi S, Iranparvar M, Amani F, Siahpoosh H. The effect of complications of type II diabetes on patients' quality of life. *JARUMS* 2008; **8**: 394-402

31 **Rasouli D**, Nasiriziba F, Nabiamjad R, Haghani 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

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

33 **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**: 458-463 [PMID: 11874930 DOI: 10.2337/diacare.25.3.458]

34 **Saadatjoo SA**, Rezvanee M, Tabyee S, Oudi D. Life quality comparison in type 2 diabetic patients and none diabetic persons. *Mod Care J* 2012; **9**: 24-31

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

36 **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]

37 **Hänninen 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: 9884029 DOI: 10.1016/S0168-8227(98)00085-0]

38 **Liao D**, Asberry PJ, Shofer JB, Callahan H, Matthys C, Boyko EJ, Leonetti D, Kahn SE, Austin M, Newell L, 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]

39 **Hellström Y**, Persson G, Hallberg IR. Quality of life and symptoms among older people living at home. *J Adv Nurs* 2004; **48**: 584-593 [PMID: 15548249 DOI: 10.1111/j.1365-2648.2004.03247.x]

40 **Lloyd A**, Sawyer W, Hopkinson P. Impact of long-term complications on quality of life in patients with type 2 diabetes not using insulin. *Value Health* 2001; **4**: 392-400 [PMID: 11705130 DOI: 10.1046/j.1524-4733.2001.45029.x]

41 **Aliasquarpoor M**, Eybpoosh S. The quality of life of elderly nursing home residents and its relationship with different factors. *Ira J Nurs* 2012; **25**: 60-70

42 **Song JI**, Shin DW, Choi JY, Kang J, Baik YJ, Mo H, Park MH, Choi SE, Kwak JH, Kim EJ. 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/s00520-010-0977-8]

43 **Patel B**, Oza B, Patel K, Malhotra 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. *IJDDC* 2014; **34**: 100-107 [DOI: 10.1007/s13410-013-0162-y]

44 **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/diacare.27.5.1066]

45 **Kooshyar H**, Shoorvazi M, Dalir Z, Hoseini S. Surveying Health-Related Quality of Life and Related Factors in the Diabetic Elderly in Mashhad in 2013. *J Rafsanjan Uni Med Sci* 2015; **14**: 175-188

46 **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. *Shiraz E-Med J* 2013; **14**: 162-171

**P-Reviewer:** Gómez-Sáez JM **S-Editor:** Ji FF **L-Editor: E-Editor:**

**Specialty type:** Endocrinology and metabolism

**Country of origin:** Iran

**Peer-review report classification**

Grade A (Excellent): A

Grade B (Very good): 0

Grade C (Good): 0

Grade D (Fair): 0

Grade E (Poor): 0

|  |  |  |
| --- | --- | --- |
| *n* (%) | Subgroups | Variable |
| 85 (21.6) | ≤ 49 | Age1 |
| 147 (37.3) | 59-50 |
| 162 (41.1) | ≥ 60 |
| 134 (34) | Male | Gender |
| 260 (66) | Female |
| 143 (36.3) | Illiterate | Level education |
| 149 (37.8) | Primary school |
| 102 (25.9) | Secondary school and higher |
| 45 (11.4) | Single | Marital status |
| 349 (88.6) | Married |
| 70 (17.8) | Employed | Occupation |
| 252 (63.9) | Housekeeper |
| 72 (18.3) | Retired/other |
| 378 (95.9) | Yes | Health insurance |
| 16 (4.1) | No |
| 25 (6.3) | < 500 | Household monthly income2 |
| 199 (50.5) | 1000-500 |
| 170 (43.1) | > 1000 |
| 40 (10.2) | Yes | Smoking status |
| 354 (89.8) | No |

**Table 1 Demographic characteristics of diabetic people referring to diabetes clinics of Tabriz, 2015**

1Mean and standard deviation: was 56.67 ± 9.01; 2Amounts 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**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *P*-value | Female | | Male | | Total | | HRQOL dimensions |
| SD | Mean | SD | Mean | SD | Mean |
| < 0.001 | 13.18 | 49.34 | 12.92 | 54.97 | 13.34 | 51.24 | Physical health |
| < 0.001 | 14.54 | 57.88 | 13.3 | 65.26 | 14.54 | 60.38 | Psychological health |
| 0.002 | 16.48 | 36.46 | 16.71 | 41.96 | 16.74 | 38.32 | Social relationship |
| 0.115 | 10.10 | 57.88 | 11.13 | 59.64 | 10.48 | 58.48 | Environmental |
| < 0.001 | 11.27 | 50.39 | 11.34 | 55.46 | 11.53 | 52.11 | Total HRQOL score |

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**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Total HRQOL** | **Psychological health** | **Environmental** | **Social relationship** | **Physical health** | ***n* (%)** | **Subgroups** | **Variable** |
| 55.46 (11.34) | 65.26 (13.3) | 59.65 (11.14) | 41.96 (16.71) | (12.92) 54.97 | 134 (34) | Male | **Gender** |
| 50.39 (11.27) | 57.88 (14.54) | 57.88 (10.11) | 36.46 (16.48) | 49.34 (13.18) | 260 (66) | Female |
| <0.001 | < 0.001 | 0.115 | 0.002 | < 0.001 | - | *P*-value |
| 58.8(11.66) | (16.15)64.11 | (11.14)61.64 | (17.59)47.8 | (11.64)58.65 | (21.6)85 | ≤ 49 | **Age** |
| 53.28(11.19) | (14.71)61.37 | (10.9)59.71 | (15.17)39.68 | (12.97)52.36 | (37.3)147 | 59-50 |
| 47.89(10.11) | (12.91)57.5 | (9.01)55.68 | (15.02)32.08 | (12.53)46.32 | (41.1)162 | ≥ 60 |
| <0.001 | 0.002 | < 0.001 | < 0.001 | < 0.001 | - | *P*-value |
| 45.94(8.73) | 55.06(12.25) | 54.34 (8.57) | 29.8 (13.21) | 44.56 (11.04) | 143 (36.3) | Illiterate | **Education** |
| 52.37(10.87) | 59.79(14.31) | 57.46 (10.13) | 40.25 (16.08) | 51.99 (12.93) | 149 (37.8) | Primary school |
| 60.44 (10.68) | 68.77 (14.15) | 65.83 (9.7) | 47.55 (16.52) | 59.61 (11.92) | 102 (25.9) | Secondary school and higher |
| < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | - | *P*-value |
| 49.50 (11.39) | 57.9 (14.73) | 56.22 (9.98) | 35.44 (17.47) | 48.43 (12.82) | 224 (56.8) | Low (< 1000) | **Income** |
| 54.86 (11.06) | 63 (13.9) | 60.86 (10.49) | 41.38 (15.41) | 54.23 (13.27) | 170 (43.2) | acceptable |
| < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | - | P-value |
| 56.29 (12.18) | 65.48 (14.81) | 61.7 (12.31) | 41.88 (16.86) | 56.12 (13.81) | 51 (12.9) | 3 yr ≥ | **Disease duration (yr)** |
| 51.34 (10.06) | 59.47 (12.48) | 57.52 (9.29) | 37.3 (16.15) | 51.09 (10.95) | 93 (23.6) | 4-7 |
| 51.55 (11.78) | 59.7 (15.03) | 58.19 (10.43) | 38 (16.91) | 50.33 (13.89) | 250 (63.5) | 7 yr ≤ |
| < 0.001 | 0.029 | 0.058 | 0.260 | 0.019 | - | *P*-value |
| 55.6 (12.53) | 64.36 (15.85) | 60.77 (12.09) | 42.08 (17.32) | 55.21 (12.9) | 72 (20.2) | < 25 |
| 53.7 (11.66) | 62.15 (14.22) | 59.2 (10.26) | 39.25 (15.68) | 54.2 (13.01) | 148 (41.6) | 25-29.9 |
| 49.66 (11.08) | 58.23 (13.79) | 57.16 (9.98) | 35.27 (17.46) | 47.97 (12.85) | 136 (38.2) | ≥ 30 |
| 0.001 | 0.008 | 0.052 | 0.014 | < 0.001 | - | *P*-value |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 51.76 (11.07) | 60.1 (14.12) | 57.8 (1084) | 38.02 (16.02) | 51.11 (12.7) | 180 (47.2) | < 7 | **HbA1c** |
| 52.22 (12.05) | 60.83 (14.75) | 58.89 (10.25) | 37.96 (17.35) | 51.21 (14.01) | 201 (52.8) | 7 ≤ |
| 0.696 | 0.620 | 0.136 | 0.969 | 0.938 | - | *P*-value |
| (9.74) 54.32 | (11.81) 64.73 | (9.57) 60.4 | (15.11) 38.33 | (.7810) 53.83 | (49.6) 195 | NORMAL | **Kessler psychological distress** |
| (11.57) 53.07 | (12.61) 60.84 | (10.25) 57.47 | (18.03) 41.97 | (13.65) 52.01 | (18.3) 72 | MILD |
| (13.91) 52.12 | (16.61) 59.76 | (12.12) 58.57 | (19.07) 39.19 | (14.41) 50.96 | (2.13) 52 | MODERATE |
| (11.66) 45.31 | (15.22) 48.87 | (66.10) 54.33 | (17.23) 34.14 | (15.76) 43.9 | (818.) 74 | SEVER |
| < 0.001 | < 0.001 | < 0.001 | 0.042 | < 0.001 | - | *P*-value |
| (10.79) 59.92 | 67.91 (14.37) | (11.16) 63.05 | 47.47 (15.85) | (10.89) 61.25 | (26.9)106 | No | **Functional limitation** |
| (10.18) 56.29 | (12.13) 64.79 | (9.62) 61.12 | (18.16) 44.34 | (11.51) 54.92 | (19.8)78 | Moderate |
| (9.23) 46.58 | (13.17) 54.91 | (9.26) 55.17 | (13.25) 31.44 | (11.35) 44.8 | 210 (53.3) | Sever |
| < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | - | *P*-value |
| (11.09) 53.11 | (14.64) 61.69 | 58.97 (10.37) | 38.69 (15.71) | 53.57 (12.59) | 223 (57.4) | Oral medication | **Treatment** |
| (11.97) 50.9 | 58.78 (14.38) | 58.07 (10.55) | 37.82 (17.96) | 48.92 (13.64) | 164 (42.2) | Oral medication + insulin injection |
| 0.120 | 0.101 | 0.161 | 0.883 | 0.007 | - | *P*-value |
| 57.76 (11.75) | 66.51 (14.82) | 63.37 (10.57) | 42.23 (18.29) | 58.93 (11.79) | 102 (25.9) | No | **Comorbidities** |
| 51.79 (10.66) | 60.49 (13.19) | 57.56 (10.03) | 38.28 (16.42) | 50.82 (12.07) | 207 (52.5) | 1 |
| 46.09 (10.09) | 52.75 (13.88) | 54.83 (9.39) | 33.74 (14.41) | 43.05 (12.99) | 85 (21.6) | ≥ 2 |
| < 0.001 | < 0.001 | < 0.001 | 0.002 | < 0.001 | - | *P*-value |

HRQOL: Health related quality of life.

**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**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Adjusted R2 | 95%CI of B | | | *P*-value | Beta | | B(SE) | | Variables | HRQOL domains |
| Upper | Lower | |
| 0.436 | 4.93 | | 1.77 | < 0.001 | 0.198 | 3.35 (0.83) | | Education | | Physical health |
| 0.07 | | -3.12 | 0.039 | -0.087 | -1.55 (0.75) | | BMI | |
| -3.07 | | -6.11 | < 0.001 | -0.229 | -4.79 (0.77) | | Functional Limitation | |
| -1.06 | | -2.9 | < 0.001 | -0.174 | -1.98 (0.46) | | Kessler Psychological distress | |
| -2.37 | | -5.73 | < 0.001 | -0.210 | -4.05 (0.85) | | Comorbidies | |
| 0.279 | -2.28 | | -7.01 | < 0.001 | -0.212 | -4.65 (1.2) | | Age | | Social relationship |
| 7.56 | | 3.03 | < 0.001 | 0.246 | 5.3 (1.15) | | Education | |
| -1.87 | | -6.24 | < 0.001 | -0.208 | -4.05 (1.11) | | Functional limitation | |
| 0.353 | 5.38 | | 1.67 | < 0.001 | 0.190 | 3.52 (0.94) | | Education | | Psychological health |
| -2.15 | | -5.72 | < 0.001 | -0.234 | -3.94 (0.9) | | Functional limitation | |
| -1.75 | | -5.69 | < 0.001 | -0.176 | -3.72 (1.0) | | Comorbidies | |
| -2.88 | | -5.04 | < 0.001 | -0.317 | -3.96 (0.55) | | Kessler psychological distress | |
| 0.257 | 5.75 | | 2.86 | < 0.001 | 0.318 | 4.3 (0.73) | | Education | | Environment |
| -0.83 | | -3.91 | 0.003 | -0.154 | -2.37 (0.78) | | Comorbidies | |
| -0.38 | | -2.07 | 0.004 | -0.135 | -1.33 (0.43) | | Kessler psychological distress | |
| -0.38 | | -3.17 | 0.012 | -0.145 | -1.77 (0.7) | | Functional limitation | |
| 4.14 | | 0.12 | 0.037 | 0.101 | 2.13 (1.02) | | Income | |
| 0.433 | 5.5 | | 2.73 | < 0.001 | 0.278 | 4.12 (0.7) | | Education | | Total HRQOL score |
| -2.26 | | -4.92 | < 0.001 | -0.267 | -3.59 (0.67) | | Functional limitation | |
| -0.03 | | -2.93 | 0.044 | -0.098 | 1.48 (0.73) | | Age | |
| -1.21 | | 2.83 | < 0.001 | -0.203 | -2.02 (0.41) | | Kessler psychological distress | |
| 3.9 | | 0.05 | 0.044 | 0.085 | 1.98 (0.97) | | Income | |
| -9.41 | | -3.89 | 0.001 | -0.143 | -2.41 (0.75) | | Comorbidities | |

HRQOL: Health related quality of life.