Systematic Review and Meta-Analysis on Quality of Life in Diabetic Patients in Iran

Abstract

Background: Diabetes is the fifth leading cause of death in the world, which reduces the patients’ quality of life (QOL) and is considered as an important subject especially in medicine and medical community. The present study aimed at investigating the QOL of diabetic patients in Iran through meta-analysis. Methods: The search was conducted using relevant keywords in national and international databases including Iranmedex, SID, Magiran, IranDoc, Medlib, Science Direct, PubMed, Scopus, Cochrane, Embase, Web of Science. Questionnaires WHOQOL, SF-36, SF-20, DQOL, QOL, PedsQL, ADDQOL, D-39, DQOL-BCI, SWED-QUAL, IRDQOL, PHG-2, EQ-5D, and IDQOL-BCI were used to assess the QOL. Heterogeneity of studies was assessed using $I^2$ index. Data were analyzed using STATA version 11. Results: In 96 studies of 17,994 people, the mean score of QOL in diabetic patients was based on the questionnaires WHOQOL [66.55 (95% CI: 45.83, 87.26)], D-39 [129.43 (95% CI: 88.77, 170.10)], SF-36 [65.64 (95% CI: 59.82, 71.46)], SF-20 [46.50 (95% CI: 37.19, 55.81)], DQOL [61.19 (95% CI: 35.73, 86.60)], QOL [117.91 (95% CI: -62.97, 298.79)], PedsQL [34.36 (95% CI: -31.49, 100.22)], ADDQOL [41.76 (95% CI: 12.01-71.50)], SWED-QUAL [59.19 (95% CI: 21.15, 97.23)], IRDQOL [105.92 (95% CI: 102.73, 109.10)], PHG-2 [61.00 (95% CI: 59.63, 62.37)], EQ-5D [0.62 (95% CI: 0.61, 0.64)], DQOL-BCI [3.40 (95% CI: 3.31, 3.49)], and IDQOL-BCI [22.63 (95% CI: -2.38, 47.64)]. Conclusions: The QOL of diabetic patients was evaluated according to different types of questionnaires and the QOL of diabetic patients was found to be lower than normal population.

Keywords: Diabetes, meta-analysis, quality of life, systematic review

Introduction

World Health Organization defines quality of life (QOL) as an individuals’ understanding of living condition in terms of culture and the prevailing community values following their goals, expectations, standards, and interests. Hence, QOL is closely related to physical, psychological, and mental condition, personal beliefs, level of self-reliance, mass communication, and environment.[1-6] One reason for the multidimensional complexity of QOL is that it includes different aspects of an individual’s life. Another reason is that each individual has his/her own unique characteristics and his/her perception of a good or poor QOL is unique to that person.[17] The subject of QOL is important since it may lead to frustration, lack of motivation for any attempt and reduction of social, economic, cultural, and health activities. QOL influences the socioeconomic development of a country in deeper dimensions. Modifying the QOL is considered as a part of disease control program.[7-9]

Diabetes is known as a “silent epidemic” and is considered a major public health problem in the United States and other parts of the world, including Iran. It is the most prevalent metabolic disease with an increasing incidence, which shortens life expectancy by one third[10-12] and affects various aspects of a patient’s life, including psychological, physical, social, and economic condition, family life and sexual function.[13-16] Type 1 and type 2 diabetes are two major forms of this disease and include about 10–90% of the diabetes population, respectively.[17]

1. According to the latest available data, about 171 million people suffer from diabetes worldwide. Asia is one of the regions with a high prevalence of diabetes.[18] Two percent of the Iranian population are suffering from diabetes, meta-analysis, quality of life, systematic review

1 Quality of life

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the disease.\cite{19} Due to the large proportion of diabetic patients in Iran and the direct impact of diabetes on the QOL of patients with diabetes, the present study aims to evaluate the QOL in diabetic patients in Iran. Considering that a meta-analysis study of the same title was published in 2016\cite{20} and evaluated only two questionnaires (SF-20 and SF-36). Also, the previous meta-analysis included only the results of 10 studies. The present meta-analysis was performed with the aim of updating the previous study and without considering the time limit, limiting the type of questionnaire and covering all studies published in this field. In the present meta-analysis, the QOL of diabetic patients was evaluated in the form of levels: Good, Moderate, and Poor. This issue was not presented in previous meta-analysis.

Methods

Search strategy

This is a systematic review and meta-analysis aimed at investigating the QOL of diabetic patients in Iran. In order to achieve the related documentation in Persian and English, two researchers independently searched both national and international databases, including Iranmedex, SID, Magiran, Iran-Doc, Med-Lib, ScienceDirect, PubMed, Scopus, Cochrane, Embase, Web of Science, and Medline using related Persian keywords and their English equivalents: “Iran,” “meta-analysis,” “diabetes,” and “quality of life.” The keywords were searched using AND/OR operators. The search was performed without time limit until 22.04.2020. However, the articles in question were published between 2003 and 2020. The previous meta-analysis article published in this field belonged to 2016\cite{20} and only examined the SF-20 and SF-36 questionnaires, while the current meta-analysis did not impose any restrictions on the type of questionnaires used in the reviewed articles. For this reason, various questionnaires such as: WHOQOL, SF-36, SF-20, DQOL, PedsQL, ADDQOL, D-39, DQOL-BCI, SWED-QUAL, and IRDQOL were evaluated. In cases of lack of access to the article’s full text, the researchers asked the corresponding author for the full-text articles via email. To complete the search, Google Scholar was also searched.

Inclusion and exclusion criteria

Inclusion criteria included mentioning the QOL of diabetic patients in Iran in Persian and English. Exclusion criteria included non-random sampling, inadequate information in the article’s text, and population other than diabetic patients.

Study selection

In the first phase of the search, 501 articles related to QOL of diabetic patients were found. After reviewing the titles, 289 duplicate and overlapping articles were excluded. Abstracts of all remaining articles were reviewed and 59 irrelevant articles were excluded. The full text of the remaining articles was reviewed, then 57 studies were excluded due to having the exclusion criteria. Finally, 96 articles entered the qualitative evaluation stage [Chart 1].

Qualitative evaluation of studies

To check the quality of studies, the STROBE checklist (strengthening the reporting of observational studies in epidemiology)\cite{21} was applied. This checklist includes 22 items that cover different parts of a report (sampling, measuring variables, objectives of the study, and statistical analysis). Each item was given one point and higher points were given to other items that we considered more important. In this phase, four unqualified articles were excluded and finally 96 articles entered the meta-analysis stage.

Data extraction

To reduce bias in reporting and error in data collection, two researchers independently extracted data from articles and entered the data into a checklist, which included the following items: The first author’s name, title of study, sample size, year of publication, city of study, diabetes type, questionnaire title, the subjects’ average age, mean and standard deviation of the QOL of diabetic patients, mean and standard deviation of quality of life dimensions, etc.

Statistical analysis

Considering that the QOL in diabetic patients score and its subgroups score were quantitative, the mean and standard deviation of these indices were extracted in each study and the variance of the mean was calculated using normal distribution. Considering the heterogeneity of the studies, a random effects model was used to combine the results of the studies. The I² index was used to investigate the heterogeneity of the studies. A random effects meta-analysis was used to give a pooled estimate of prevalence of QOL for each measure. Metaregression was used to check heterogeneity.

![Figure 1: The relationship between quality of life score in diabetic patients and the year of publication](image-url)
among the studies and to find any association between the year of publication and the sample size with QOL in diabetic patients. Subgroup analysis was done according to sex, components, and questionnaire. All statistical analyses were performed using STATA ver 14. The significance level of the tests was considered to be $P < 0.05$.

**Results**

In 96 reviewed studies with a sample of 17,994, the mean QOL score in diabetic patients was based on WHO Quality of Life-BREF (WHOQOL-BREF) [66.55 (95% CI: 45.83, 87.26)], D-39 [129.43 (95% CI: 88.77, 170.10)], Short Form-36 (SF-36) [65.64 (95% CI: 59.82, 71.46)], Short Form-20 (SF-20) [46.50 (95% CI: 37.19, 55.81)], Diabetes Quality of Life (DQOL) [61.19 (95% CI: 35.73, 86.66)], Quality of Life [QOL] (117.91 (95% CI: -62.97, 298.79)], PedsQL [34.36 (95% CI: -31.49, 100.22)], Audit of Diabetes Dependent Quality of Life (ADDQOL) [41.76 (95% CI: 12.01-71.50)], SWED-QUAL [59.19 (95% CI: 21.15, 97.23)], IRDQOL [105.92 (95% CI: 102.73, 109.10]), PHG-2 [61.00 (95% CI: 59.63, 62.37)], EQ-5D [0.62 (95% CI: 0.61, 0.64)], DQOL-BCI [3.40 (95% CI: 3.31, 3.49)], and Iranian version of the Diabetes Quality of Life Brief Clinical Inventory (IDQOL-BCI) [22.63 (95% CI: -2.38, 47.64)]. Considering the heterogeneity between the studies, the confidence interval for each study based on random-effects model is shown in Table 1.

According to the results, the mean QOL score in diabetic patients is presented in Table 2. In the WHOQOL-BREF2 questionnaire, the highest and lowest scores of QOL score in diabetic patients were related to **Social Activity** (48.36) and the **Mental** (36.29), respectively. In the SF-36 questionnaire, the highest and lowest quality of life scores of diabetic patients were related to **Limitation of Activity** (52.72) and **Peripheral** (24.10), respectively. The mental dimension (20.75) and the **Peripheral** (9.60) had the highest and lowest QOL scores of diabetic patients in the SF-203 questionnaire. In the DQOL4 questionnaire, the highest and lowest QOL scores of diabetic patients were related to General Health dimension (41.25) and Social Activity (13.46), respectively. In the QOL5 questionnaire, the **Peripheral** dimension (20.23) and the **Social Activity** dimension (5.18) had the highest and lowest QOL scores of diabetic patients, respectively. In the PedsQL6 questionnaire, the highest and lowest QOL scores of diabetic patients were related to **Emotion** dimension (59.84) and **Peripheral** dimension (33.15), respectively. In the SWED-QUAL questionnaire, the highest and lowest QOL scores of diabetic patients were related to **Physical** dimension (21.84) and **Physical Pain** dimension (8.07), respectively. In the IRDQOL questionnaire, the highest and lowest QOL scores of diabetic patients were related to **Social Activity** dimension (69.53) and **Physical** dimension (57.03), respectively. In the PHG-2 questionnaire, the highest and lowest QOL scores of diabetic patients were related to **Physical** dimension (16.43) and **Emotion** dimension (9.84), respectively.

In the SF-36 questionnaire, 15% of diabetic patients had a good QOL and 46% had a poor QOL. In the SF-20 questionnaire, 29% of diabetic patients had a good QOL and 36% had a low QOL. In the QOL questionnaire, 36% of diabetic patients had a desirable QOL and 45% had a poor QOL. In the WHOQOL questionnaire, 55% of diabetic patients had an acceptable QOL and 37% had a poor QOL. In the SWED-QUAL questionnaire, 62% of diabetic patients had an acceptable QOL and 38% had a poor QOL. In the IRDQOL questionnaire, 11% of diabetic patients had an acceptable QOL and 66% had a poor QOL [Table 3].

In order to perform additional analyzes, we plotted the meta-regression diagram. There was no significant statistical relationship in the study of meta-regression score of quality of life in diabetic patients based on the year of study ($P = 0.565$) [Figure 1]. This means that over time, the QOL of diabetic patients has not decreased. The relationship between QOL score in diabetic patients and the number of research samples was not statistically significant ($P = 0.106$) [Figure 2].

**Discussion**

In 96 reviewed studies with a sample of 17,994, the QOL score in diabetic patients was 66.55 in WHOQOL, 65.64 in SF-36, 46.50 in SF-20, 61.19 in DQOL, 117.91

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3 Short Form 4 Diabetes Quality of Life 5 Quality of Life 6 Pediatric Quality of Life Inventory
Table 1: Specifications of reviewed articles on the status of the quality of life of diabetic patients in Iran

| ID  | Author                        | Year of publication | City of study       | Type of diabet | Sample size | Age mean | Questionnaire                  | Mean score of QOL | SD of QOL |
|-----|-------------------------------|---------------------|---------------------|----------------|-------------|----------|-------------------------------|--------------------|----------|
| [22] | Aghamolaei T                  | 2003                | Hormozgan           | type 2         | 80          | 32-72   | WHOQOL-BREF                   | 0.78               | 0.48     |
| [23] | Aghamolaei T                  | 2005                | Hormozgan           | type 2         | 71          | 51.3    | WHOQOL-BREF                   | 0.78               | 0.48     |
| [24] | Sadeghie Ahari S              | 2008                | Ardebil             | type 2         | 110         | 52.5    | SF-36                          | 0.78               | 0.48     |
| [25] | Ahmadi A                      | 2011                | Chaharmahal & Bakhtiari | type 2 | 254         | 30-65   | Developed by research team    | 0.78               | 0.48     |
| [26] | Alavi A                       | 2010                | Chaharmahal & Bakhtiari | type 1 | 22          | 15.33   | PedsQL                         | 0.78               | 0.48     |
| [27] | Baghianimoghadam MH           | 2008                | Yazd                | type 2         | 120         | 25-75   | SF-20                          | 0.78               | 0.48     |
| [28] | Bazzazian S                   | 2010                | Tehran              | type 1         | 300         | 18-30   | D-39                           | 0.78               | 0.48     |
| [29] | Borzou SR                     | 2010                | Hamedan             | type 2         | 165         | 14.94   | SQ-36                          | 0.78               | 0.48     |
| [30] | Safarabadi-Farahani T         | 2010                | Tehran              | type 1         | 70          | 19.44   | DQOL for youth                | 0.78               | 0.48     |
| [31] | Ghanbari A                    | 2004                | Guilan              | type 2         | 90          | >40     | SWED-QUAL                      | 0.78               | 0.48     |
| [32] | Ghanbari A                    | 2005                | East-Azerbaijan     | type 2         | 117         | >35     | SWED-QUAL                      | 0.78               | 0.48     |
| [33] | Haririan HR                   | 2009                | East-Azerbaijan     | type 2         | 150         | 20-60   | SWED-QUAL                      | 0.78               | 0.48     |
| [34] | Heydari M                     | 2007                | Zanjan              | type 1         | 47          | 11-20   | Developed by research team    | 0.78               | 0.48     |
| [35] | Jafari P                      | 2011                | Fars                | type 1         | 94          | 8-18    | PedsQL                         | 0.78               | 0.48     |
| [36] | Ghavami H                     | 2005                | west-Azerbaijan     | type 2         | 74          | 40-65   | Developed by research team    | 0.78               | 0.48     |
| [37] | Shahab-Jahanlou AR            | 2011                | Hormozgan           | type 2         | 256         | 27-72   | WHOQOL-BREF                    | 0.78               | 0.48     |
| [38] | Shahab-Jahanlou AR            | 2011                | Hormozgan           | type 1 & type 2 | 76         | 49.15   | IRDQOL                         | 0.78               | 0.48     |
| [39] | Darvishpour-Kakhaki A         | 2010                | Tehran              | type 1 & type 2 | 131        | 47.3    | SF-36                          | 0.78               | 0.48     |
| [40] | Sedaghati-Kasbaki M           | 2011                | Mazendaran          | type 2         | 100         | 14.6   | DQOL for youth                | 0.78               | 0.48     |
| [41] | Kermansaravi F                | 2012                | Sistan and Baluchestan | type 1 | 198         | >18     | SF-36                          | 0.78               | 0.48     |
| [42] | Khaleedi S                    | 2011                | Kurdestan           | type 2         | 150         | 22.14   | Developed by research team    | 0.78               | 0.48     |
| [43] | Khamseh MA                    | 2011                | Tehran              | type 1         | 302         | >18     | Developed by research team    | 0.78               | 0.48     |
| [44] | Peymani M                     | 2007                | Tehran              | type 1 and type 2 | 40         | 40-65   | DQOL                           | 0.78               | 0.48     |
| [45] | Rakhshanderu S                | 2006                | Tehran              | type 2         | 120         | 54.23   | IRDQOL                         | 0.78               | 0.48     |
| [46] | Rassouli D                    | 2011                | Tehran              | patients with diabetic foot ulcer | 123         | 30-70   | QOL                            | 0.78               | 0.48     |
| [47] | Safavi M                      | 2011                | Ardebil             | type 2         | 132         | 52.98   | SF-36                          | 0.78               | 0.48     |
| [48] | Shahjarij S                   | 2009                | Markazi             | type 2         | 27          | >35     | SF-36                          | 0.78               | 0.48     |
| [49] | Sayadi N                      | 2011                | Khuzestan           | type 2         | 31          | 58.35   | SF-36                          | 0.78               | 0.48     |
| [50] | Taghdisi MH                   | 2011                | Golestan            | type 2         | 78          | 49     | WHOQOL                         | 0.78               | 0.48     |
| [51] | Timareh M                     | 2012                | Kermanshah          | type 1 and type 2 | 350         | >18     | SF-36                          | 0.78               | 0.48     |
| [52] | Vares Z                       | 2010                | Isfahan             | type 1 and type 2 | 310         | >18     | IRDQOL                         | 0.78               | 0.48     |
| [53] | Vazirinezhad R                | 2010                | Kerman              | type 2         | 101         | 50.8    | SF-36                          | 0.78               | 0.48     |
| [54] | Yektaz M                      | 2011                | West-Azerbaijan     | type 2         | 250         | 60.73   | SF-36                          | 0.78               | 0.48     |
| [55] | Shahab-Jahanlou AR            | 2011                | Hormozgan           | type 1 and type 2 | 76          | 49.15   | WHOQOL                         | 0.78               | 0.48     |
| [56] | Mirfeizzi M                   | 2012                | Karaj               | type 2         | 180         | 53.47   | IDQOL-BCI                      | 0.78               | 0.48     |
| [57] | Shahi M                       | 2017                | Semnan              | type 2         | 60          | 57.82   | QOL                            | 0.78               | 0.48     |
| [58] | Najafi-Ghezeljeh T            | 2017                | Tehran              | type 2         | 65          | 54.3    | IDQOL-BCI                      | 0.78               | 0.48     |
| [59] | Shamshiragan SM               | 2016                | Ardebil             | type 2         | 300         | 54.13   | WHOQOL                         | 0.78               | 0.48     |
| [60] | Hajian-Tilaki K               | 2016                | Babol               | type 2         | 750         | 67.85   | SF-36                          | 0.78               | 0.48     |
| [61] | Dadgostar H                   | 2016                | Tehran              | type 2         | 74          | 49.65   | SF-36                          | 0.78               | 0.48     |
| [62] | Jafari N                      | 2014                | Isfahan             | type 2         | 203         | 55.42   | PHG-2                          | 0.78               | 0.48     |
| [63] | Abdoli S                      | 2015                | Malayer             | type 2         | 40          | 35-85   | WHOQOL-BREF                    | 0.78               | 0.48     |
|     | Hadi N                        | 2013                | Shiraz              | type 1 and type 2 | 300         | 50.98   | SF-36                          | 0.78               | 0.48     |

Contd...
### Table 1: Contd...

| ID | Author | Year of publication | City of study | Type of diabet | Sample size | Age mean | Questionnaire | Mean score of QOL | SD of QOL |
|----|--------|---------------------|---------------|----------------|-------------|----------|---------------|-----------------|----------|
| [64] | Shavandi N | 2010 | Markazi | type 2 | 17 | 48.52 | SF-36 | 74.58 | 11.34 |
| [65] | Shayeghian Z | 2013 | Tehran | type 2 | 100 | 55.4 | ADDQoL | 26.63 | 12.01 |
| [66] | Alipour A | 2012 | Yaza | type 2 | 80 | 46.2 | ADDQoL | 56.98 | 18.63 |
| [67] | Alshar M | 2014 | Kashan | type 2 | 56 | 14.75 | IRDQOL | 104 | 15.95 |
| [68] | Derakhshanpour F | 2015 | Gorgan | type 2 | 330 | 50.06 | WHOQOL-BREF | 54.79 | 13.7 |
| [69] | Zaker MR | 2016 | Urmia | type 2 | 80 | DQOL | 46.04 | 4.3 |
| [70] | Didarloo AR | 2016 | Khoy | type 2 | 352 | 43 | WHOQOL-BREF | 58.02 | 17.63 |
| [71] | Gholami A | 2013 | Neishabour | type 2 | 1847 | 59.65 | WHOQOL-BREF | 12.18 | 2.3 |
| [72] | Torabi M | 2014 | Hamedan | type 2 | 110 | 47.4 | SF-36 | 68 | 11.08 |
| [73] | Izadi A | 2014 | Khoram Abad | type 2 | 80 | 30-70 | SF-20 | 24 | 50.58 |
| [74] | Khodabakhshi-Kulaei A | 2015 | Tafresh | type 2 | 110 | 53.69 | SF-36 | 137.92 | 12.9 |
| [75] | Mohammad-Shahi A | 2014 | Ahvaz | type 2 | 60 | 40 | SF-36 | 98.11 | DQOL | 164.53 | 63.21 |
| [76] | Saedifard J | 2013 | Tehran | type 2 | 104 | 50.5 | QOL | 156 | 52.17 | SF-36 | 20.14 | SF-36 |
| [77] | Ghasemipour M | 2009 | Khoram Abad | type 2 | 150 | 18-65 | QOL | 2.77 | 0.79 |
| [78] | Eydi-Bayegi M | 2014 | Ahvaz | type 2 | 50 | 46.2 | WHOQOL-BREF | 73.91 | 14.85 |
| [79] | Sadeghi T | 2012 | Rafsanjan | type 2 | 70 | 18-65 | SF-36 | 37.52 | 14.85 |
| [80] | Zaree-Bahramabadi M | 2012 | Sanandaj | type 2 | 48 | 30-50 | SF-36 | 53.3 | 10.76 |
| [81] | Qashqaei S | 2014 | Shiraz | type 2 | 42 | 35-65 | SF-36 | 56.37 | 18.25 |
| [82] | Saadatsho SAR | 2012 | Birjand | type 2 | 100 | 42.82 | SF-36 | 57.29 | 26.09 |
| [83] | Behrooz B | 2016 | Kermanshah | type 2 | 16 | 49.47 | WHOQOL-BREF | 137.92 | 12.9 |
| [84] | Ebrahimi H | 2014 | Shahrood | type 2 | 156 | 48.11 | DQOL | 164.53 | 63.21 |
| [85] | Mohammadshahi GHR | 2016 | Tabriz | type 2 | 20 | 47.75 | SF-36 | 54.2 | 15.16 |
| [86] | Shams S | 2015 | Urmia | type 2 | 80 | SF-36 | 54.2 | 15.16 |
| [87] | Mohammadpour Y | 2008 | Tabriz | type 2 | 150 | Self-made | 54.2 | 15.16 |
| [88] | Ganjluo J | 2015 | Sabzevar | type 2 | 75 | 35-65 | ADDQoL-19 | 41.52 | 16.28 |
| [89] | Bidi F | 2012 | Bojnord | type 2 | 40 | 52.17 | SF-20 | 41.52 | 16.28 |
| [90] | Derakhshanpour F | 2015 | Gorgan | type 2 | 330 | 51 | WHOQOL | 105.23 | 16.06 |
| [91] | Bahadori-Khosroshahi J | 2011 | Tabriz | type 2 | 100 | 20-60 | WHOQOL-BREF | 47.48 | 16.33 |
| [92] | Fooladandani M | 2014 | Kerman | type 2 | 96 | 53.08 | SF-36 | 54.2 | 15.16 |
| [93] | Shahraki-Vahed A | 2010 | Zabol | type 1 and type 2 | 100 | >7 | SF-36 | 54.2 | 15.16 |
| [94] | Taghdisi MH | 2011 | Minudasht | type 2 | 78 | 49 | WHOQOL-BREF | 80.39 | 11.35 |
| [95] | Sephrania I | 2011 | Karaj | type 2 | 30 | 40-65 | SF-36 | 53.97 | 13.09 |
| [96] | Fathi-Ahmadsaraee N | 2016 | Karaj | type 2 | 40 | 42.83 | DQOL | 26.37 | 4.51 |
| [97] | Moein M | 2014 | Kashan | type 2 | 96 | 51.45 | DQOL | 105.23 | 16.06 |
| [98] | Khalili M | 2016 | Isfahan | type 2 | 123 | 52 | DQOL | 1.88 | 0.36 |
| [99] | Hadipour M | 2013 | type 2 | 3472 | 59.4 | EQ-5D | 0.623 | 0.387 |
| [100] | Daneshvar S | 2018 | Ilam | type 1 and type 2 | 122 | 57.74 | SF-36 | 80.39 | 11.35 |
| [101] | Soleimani Z | 2016 | Sabzevar | type 1 and type 2 | 189 | 51.7 | DQOL-BREF | 3.4 | 0.62 |
| [102] | Kaveh MH | 2018 | Shiraz | type 2 | 207 | 55.35 | DQOL | 45.95 | 9.67 |
| [103] | Shafeiee-Kandjani AR | 2018 | Shiraz | type 2 | 263 | SF-36 | 57.52 | 20.18 |
| [104] | Sotodeh-Ash N | 2020 | Semnan | type 2 | 50 | 18 | SF-36 | 75.66 | 12.97 |
| [105] | Tafazoli M | 2017 | Mashhad | type 2 | 90 | 43.58 | SF-36 | 58.75 | 16.24 |
| [106] | Tavakkoli L | 2017 | Kerman | type 2 | 198 | 54.91 | WHOQOL-BREF | 46.48 | 20.45 |
| [107] | Borhaninejad, VR | 2016 | Kerman | type 2 | 120 | 71.32 | SF-36 | 46.48 | 20.45 |
| [108] | Zareipour MA | 2017 | Tehran | type 2 | 250 | 35-65 | SF-36 | 38.32 | 19.62 |
| [109] | Soleymani T | 2017 | Tehran | type 2 | 219 | 62.2 | SF-36 | 45.7 | 20.9 |
| [110] | Barzegar Damadi MA | 2018 | Sari | type 2 | 15 | 43.5 | D-39 | 151 | 33.17 |
| [111] | Shakeri M | 2018 | Bojnord | type 2 | 18 | 53.5 | SF-36 | 151 | 33.17 |
| [112] | Marzban A | 2018 | Yazd | type 2 | 600 | 56.11 | DQOL | 79.34 | 11.02 |
| [113] | Ghaedrahmati A | 2019 | Isfahan | type 2 | 12 | 44 | SF-36 | 54.25 | 4.78 |
| Questionnaire | Subgroups: Diabetic Patients’ Quality of Life | Number of studies | The quality of life of diabetic patients (CI 95%) | P       | I2 (%) |
|---------------|---------------------------------------------|-------------------|-----------------------------------------------|---------|--------|
| WHOQOL        | Total                                       | 10                | 66.55 (45.83, 87.26)                           | <0.0001 | 100    |
|               | Men                                         | 4                 | 46.41 (14.76, 78.06)                           | <0.0001 | 99.8   |
|               | Women                                        | 4                 | 42.33 (13.92, 70.73)                           | <0.0001 | 99.9   |
|               | Physical Aspect                              | 15                | 41.06 (26.35, 55.78)                           | <0.0001 | 100    |
|               | Mental Aspect                                | 14                | 36.29 (22.26, 50.33)                           | <0.0001 | 100    |
|               | Social Activity Aspect                       | 14                | 48.36 (34.63, 62.09)                           | <0.0001 | 100    |
|               | Peripheral Aspect                            | 11                | 36.73 (29.46, 44)                              | <0.0001 | 99.9   |
|               | General Health Aspect                        | 2                 | 31.70 (-24.34, 87.73)                          | <0.0001 | 100    |
| DQOL          | Total                                       | 19                | 65.64 (59.82, 71.46)                           | <0.0001 | 98.3   |
|               | Men                                         | 1                 | 49.86 (42.34, 57.38)                           | -       | -      |
|               | Women                                        | 1                 | 63.62 (56.64, 70.60)                           | -       | -      |
|               | Physical Aspect                              | 32                | 51.97 (42.75, 61.19)                           | <0.0001 | 100    |
|               | Mental Aspect                                | 31                | 46.68 (38.99, 54.36)                           | <0.0001 | 99.9   |
|               | Social Activity Aspect                       | 28                | 48.42 (41.37, 55.46)                           | <0.0001 | 99.9   |
|               | Peripheral Aspect                            | 2                 | 24.10 (22.94, 25.26)                           | 0.143   | 53.4   |
|               | Vitality Aspect                              | 24                | 49.69 (43.26, 56.11)                           | <0.0001 | 99.5   |
|               | General Health Aspect                        | 24                | 43.62 (37.0, 50.24)                            | <0.0001 | 99.6   |
|               | Physical Pain Aspect                         | 26                | 51.16 (40.61, 61.70)                           | <0.0001 | 99.9   |
|               | Physical Role Aspect                         | 12                | 48.31 (42.53, 54.10)                           | <0.0001 | 96.5   |
|               | Emotion Aspect                               | 15                | 51.32 (45.18, 57.47)                           | <0.0001 | 98.7   |
|               | Limitation of Activity Aspect                | 12                | 52.72 (33.13, 72.31)                           | <0.0001 | 99.7   |
| SF-20         | Total                                       | 2                 | 46.50 (37.19, 55.81)                           | 0.002   | 90     |
|               | Men                                         | 1                 | 54.80 (49.87, 59.73)                           | -       | -      |
|               | Women                                        | 1                 | 48.47 (44.71, 52.23)                           | -       | -      |
|               | Physical Aspect                              | 1                 | 16.05 (15.42, 16.68)                           | -       | -      |
|               | Mental Aspect                                | 1                 | 20.75 (19.99, 21.51)                           | -       | -      |
|               | Social Activity Aspect                       | 1                 | 18.05 (17.43, 18.67)                           | -       | -      |
|               | Peripheral Aspect                            | 1                 | 9.60 (9.06, 10.14)                             | -       | -      |
|               | General Health Aspect                        | 1                 | 41.25 (37.54, 44.96)                           | -       | -      |
| DQOL          | Total                                       | 10                | 61.19 (35.73-86.66)                            | <0.0001 | 100    |
|               | Physical Aspect                              | 3                 | 19.81 (8.70, 30.92)                            | <0.0001 | 99.9   |
|               | Mental Aspect                                | 3                 | 23.67 (10.00, 37.34)                           | <0.0001 | 99.9   |
|               | Social Activity Aspect                       | 3                 | 13.46 (7.03, 19.89)                            | <0.0001 | 99.6   |
|               | Peripheral Aspect                            | 2                 | 15.26 (-0.92, 31.44)                           | <0.0001 | 99.9   |
|               | General Health Aspect                        | 1                 | 41.25 (37.54, 44.96)                           | -       | -      |
| QOL           | Total                                       | 3                 | 117.91 (-62.97-298.79)                         | <0.0001 | 100    |
|               | Physical Aspect                              | 2                 | 9.95 (-5.40, 25.29)                            | <0.0001 | 99.8   |
|               | Mental Aspect                                | 2                 | 8.84 (-3.54, 21.23)                            | <0.0001 | 99.7   |
|               | Social Activity Aspect                       | 2                 | 5.18 (2.09, 8.26)                              | <0.0001 | 98.8   |
|               | Peripheral Aspect                            | 1                 | 20.23 (19.13, 21.33)                           | -       | -      |
| PedsQL        | Total                                       | 2                 | 34.36 (-31.49, 100.22)                         | <0.0001 | 100    |
|               | Physical Aspect                              | 2                 | 35.06 (-31.78, 101.89)                         | <0.0001 | 99.9   |
|               | Mental Aspect                                | 2                 | 34.29 (-30.44, 99.03)                          | <0.0001 | 99.9   |
|               | Social Activity Aspect                       | 2                 | 38.62 (-36.12, 113.37)                         | <0.0001 | 99.9   |
|               | Peripheral Aspect                            | 2                 | 33.15 (-30.76, 97.07)                          | <0.0001 | 99.9   |
|               | Emotion Aspect                               | 1                 | 59.84 (55.71, 63.97)                           | -       | -      |
| ADDQOL        | Total                                       | 2                 | 41.76 (12.01, 71.50)                           | <0.0001 | 99.4   |
|               | Physical Aspect                              | 1                 | -1.81 (-1.96, -1.66)                           | -       | -      |
|               | Mental Aspect                                | 1                 | -0.94 (-1.11, -0.76)                           | -       | -      |
|               | Social Activity Aspect                       | 1                 | -0.96 (-1.07, -0.85)                           | -       | -      |
| D-39          | Total                                       | 2                 | 129.43 (88.77, 170.10)                         | <0.0001 | 95.4   |

Contd...
in QOL, 129.43 in D-39, 34.36 in PedsQL, 41.76 in ADDQOL7, 22.63 in IDQOL-BCI8, 3.40 in DQOL-BCI, 0.62 in EQ-5D, 61.00 in PHG-2, 105.92 in IRDQOL, 59.19 in SWED-QUAL.

So far, several meta-analyses have been conducted on the status of QOL in diabetic patients in Iran, which we will examine below: In a meta-analysis of T. Schram et al. (2009)7 in The Netherlands, the aim was to investigate the relationship between depression and quality of life in diabetic patients. All studies suggest a negative association between depressive symptoms and at least one aspect of QOL in people with diabetes. People with diabetes with depressive symptoms also had a much lower QOL than diabetes.

1. In meta-analysis of Kiadaliri et al. (2013),8 46 studies found that people with diabetes were less likely to have health-related quality of life (HRQoL) without diabetes. The study covered 20 of Iran’s 30 provinces. Of these 46 studies, 5 were type 1 diabetes and 23 were type 2 diabetes, and other studies were a combination of different types of diabetes. However, our study covered the studies published until 2017, and therefore the number of studies studied in our study is about twice that of the 2013 meta-analysis. In 2016, Soleimannejad et al.20 Studied the QOL of diabetic patients in 10 studies. And we decided

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7 Audit of Diabetes Dependent Quality of Life
8 Iranian version of the Diabetes Quality of Life Brief Clinical Inventory

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### Table 2: Contd...

| Questionnaire | Subgroups: Diabetic Patients’ Quality of Life | Number of studies | The quality of life of diabetic patients (CI 95%) | P     | I² (%) |
|---------------|---------------------------------------------|-------------------|-----------------------------------------------|-------|--------|
| SWED-QUAL     | Total                                       | 3                 | 59.19 (21.15, 97.23)                           | <0.0001 | 99.8   |
|               | Physical Aspect                             | 2                 | 21.84 (14.66, 29.02)                           | <0.0001 | 98.9   |
|               | Physical Pain Aspect                        | 2                 | 8.07 (3.89, 12.26)                             | <0.0001 | 98.8   |
|               | Physical Role Aspect                        | 1                 | 9.70 (8.89, 10.51)                             | -     | -      |
|               | Emotion Aspect                              | 2                 | 20.48 (9.50, 31.47)                            | <0.0001 | 99.5   |
| IRDQOL        | Total                                       | 2                 | 105.92 (102.73, 109.10)                        | 0.952  | 0      |
|               | Physical Aspect                             | 1                 | 57.03 (56.65, 57.41)                           | -     | -      |
|               | Mental Aspect                               | 1                 | 59.54 (59.29, 59.79)                           | -     | -      |
|               | Social Activity Aspect                      | 1                 | 69.53 (69.16, 69.90)                           | -     | -      |
| PHG-2         | Total                                       | 2                 | 22.63 (-2.38, 47.64)                           | <0.0001 | 99.9   |
|               | Physical Aspect                             | 1                 | 16.43 (15.60, 17.26)                           | -     | -      |
|               | Social Activity Aspect                      | 1                 | 16.04 (15.30, 16.78)                           | -     | -      |
|               | Emotion Aspect                              | 1                 | 9.84 (9.13, 10.55)                             | -     | -      |
| IDQOL-BCI     | Total                                       | 1                 | 3.40 (3.31, 3.49)                              |       |        |
|               | Mental Aspect                               | 2                 | 11.82 (11.36, 12.29)                           | 0.690  | 0      |
|               | Social Activity Aspect                      | 2                 | 11.82 (11.36, 12.29)                           | 0.690  | 0      |

### Table 3: The QOL of diabetic patients in Iran in three levels (good, fair, and poor)

| Questionnaire | Subgroups | Number of study | The QOL in diabetic patients (95%CI) | P     | I² (%) |
|---------------|-----------|----------------|--------------------------------------|-------|--------|
| SF-36         | Good      | 3              | 15 (-2 , 32)                         | <0.0001 | 100    |
|               | Fair      | 3              | 68 (53, 83)                          | <0.0001 | 100    |
|               | Poor      | 3              | 46 (0, 92)                           | <0.0001 | 100    |
| SF-20         | Good      | 3              | 29 (14, 44)                          | <0.0001 | 100    |
|               | Fair      | 3              | 35 (30, 39)                          | <0.0001 | 99.5   |
|               | Poor      | 3              | 36 (32, 41)                          | <0.0001 | 99.5   |
| QOL           | Good      | 2              | 36 (24, 47)                          | <0.0001 | 100    |
|               | Fair      | 1              | 29 (29, 30)                          | -     | -      |
|               | Poor      | 2              | 45 (20, 71)                          | <0.0001 | 100    |
| WHOQOL        | Good      | 1              | 55 (55, 55)                          | -     | -      |
|               | Fair      | 1              | 56 (55, 56)                          | -     | -      |
|               | Poor      | 1              | 37 (37, 37)                          | -     | -      |
| SWED-QUAL     | Good      | 2              | 62 (19, 105)                         | <0.0001 | 100    |
|               | Poor      | 2              | 38 (-5, 81)                          | <0.0001 | 100    |
| IRDQOL        | Good      | 1              | 11 (11, 11)                          | -     | -      |
|               | Fair      | 1              | 23 (22, 23)                          | -     | -      |
|               | Poor      | 1              | 66 (66, 66)                          | -     | -      |
update this study: In the previous meta-analysis the number of studies studied was 10, whereas in the present study 82 studies were reviewed.

2. In previous meta-analysis, only studies using questionnaires SF-36 and SF-20 were evaluated. However, in the present meta-analysis, all available questionnaires (WHOQOL-BREF, SF-36, SF-20, DQOL, QOL, PedsQL, ADDQoL, Youth Diabetes QOL and IDQOL-BCI) have been reviewed and no restrictions have been imposed on the questionnaire.

3. The number of samples studied in the previous meta-analysis was 1,082, while in the present study 15,571 diabetic patients were evaluated.

4. In the present meta-analysis, the QOL score of diabetic patients was examined by type of questionnaire and by dimensions of questionnaires and compared with each other, whereas this was not the case in previous meta-analysis.

5. Current meta-analysis covers studies published as of December 31, 2016, while previous meta-analysis has carried out resource search for year 2015.

6. Current meta-analysis, in addition to the databases used by the previous meta-analysis, it has also examined the Cochrane, Embase, and Medline databases. Given the above, the present study is more complete than the previous meta-analysis.

7. In the present meta-analysis, the QOL of diabetic patients was evaluated in the form of levels: Good, Moderate, and Poor. This issue was not presented in previous meta-analysis.

Recently, two meta-analysis has been published in this regard, which we refer to: In meta-analysis Mokhtari et al. (2018)\[116] of 5,472 samples, the mean physical dimension score in patients with type 2 diabetes (53.5, 95% CI: 43.1–63.9) and the mean mental dimension score (54.5, 95% CI: 47–61.9) was less. As the age of the samples increased, the mean HRQoL score in diabetic patients in Iran decreased significantly.

In a meta-analysis of Dehvan et al. 2019, the QOL of type 2 diabetes patients in Iran was examined. The mean QOL of patients with type 2 diabetes was 61.90 (95% CI: 54.40–6940.). The highest and lowest QOL was achieved in terms of social support (49.19) and mental health (42.96). In this study, the WHOQOL-BREF questionnaire was used to assess the QOL of diabetic patients and therefore the number of studies studied was limited (16 studies). However, in our study, we did not have any restrictions on the type of diabetes or the type of questionnaire.

A meta-analysis of Khunkaew et al. (2018)\[118] 12 studies in Australia found this conclusion. Overall, the HRQOL of participants in the studies was poor on four of eight subscales in the SF-36; Physical functioning (42.75); role physical (20.61); general health (39.52); and vitality (45.73). The results of this study are almost consistent with the results of the present meta-analysis.\[113-116]

Thommasen et al. conducted a study on the people of China, Malaysia, and India. In China, the mean scores of physical functioning was 83.3, public health was 69.3, social functioning was 83.9, and mental health was 72.9. In Malaysia, the mean scores of physical functioning was 86.6, public health was 68.6, social functioning was 78.8, and mental health was 75. In India, the mean scores of physical functioning was 73.9, public health was 70.1, social functioning was 86.1, and mental health was 71.5.\[119]

QOL\[1,118,119\] Given that varied data have been archived for QOL of diabetic patients, the present meta-analysis was used to obtain an accurate estimate of the QOL of diabetic patients.

**Conclusions**

In this study, the QOL of diabetic patients was evaluated according to different types of studied questionnaires. We found that QOL of diabetic patients was lower than normal society. According to the results, the highest and lowest mean QOL score in diabetic patients in Iran were related to the D-39 questionnaire (129.43) and the EQ-5D questionnaires (0.62), respectively.

**Limitations of the study**

The limitations of the present study include lack of access to the full text of articles, lack of sufficient data in some articles, lack of reference to mean and standard deviation of QOL score in diabetic patients in some studies, and lack of uniform distribution of studies in different regions of Iran.

**Authors’ contribution**

MF, MR, MA and DS searched the literature and analyzed the papers. The extraction stage was performed by MR, MA and DS. DS, MF, AHD prepared the manuscript. All authors read and signed the final paper.
Supplement

S1: Abbreviated table

| Full name                                      | Abbreviated name |
|------------------------------------------------|------------------|
| Quality of life                                | QOL              |
| WHO Quality of Life-BREF                       | WHOQOL-BREF      |
| Short Form-36                                  | SF-36            |
| Short Form-20                                  | SF-20            |
| Diabetes Quality of Life                       | DQOL             |
| Quality of Life                                | QOL              |
| The World Health Organization Quality of Life  | WHOQOL           |
| Pediatric Quality of Life Inventory            | PedsQL           |
| Audit of Diabetes Dependent Quality of Life    | ADDQoL           |
| Iranian version of the Diabetes Quality of Life | IDQOL-BCI        |

Brief Clinical Inventory

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Darvish Poor Kakhki A, Saeedi J, Yaghaime F, Majd H, Montazeri A. Quality of life of diabetic patients referred to Tehran hospitals in 2004. Int J Endocrinol Metab 2006;8:49-56.
2. Sayari A, Gari D, Asadai Lari M. Assessing quality of life, global experiences and the need for action in Iran. Teb va Tazkiye 2001:30-5.
3. Cote I, Gregoire J, Moisan J, Chabot I. Quality of life in hypertension: The SF-12 compared to the SF-36. Can J Clin Pharmacol 2004;11:232-8.
4. Masoudi-Alavi N, Ghofranipor F, Ahmadi F, Rajab A, Babai G. Quality of life in diabetic patient refers to diabetic association of Iran Behboud Journal 2004;8:47-56.
5. Leininger M. Quality of life from a transcultural nursing perspective. Nurs Sci Q 1994;7:22-8.
6. Karlson I, Berglin E, Larson P. Sense of coherence: Qol before and after coronary artery bypass surgery longitudinally. J Aadv Nurs 2000;31:1383-92.
7. Monica S, Clare M, Lesley B. Diabetic foot care: Assessing the impact of care on the whole patient. Practical Diabetes Int 2000;17:147-51.
8. Glasgow R, Ruggiero L, Eakin E, Dryfoos J, Chobanian I. Quality of life associated characteristics in a large national sample of adults with diabetes. Diabetes Care 1997;20:562-7.
9. Kotsanos J, Marrfero D, Viginati J, Mathias A, Huster W, Boggs M, et al. Health related quality of life results from multinational clinical trial of insulin lispro. Diabetes Care 1997;20:948-58.
10. Andrew J. Guideline and performance measures for diabetes. Am J Manag Care 2007;13(Suppl 2):S41-6.
11. Gambert S. Are we up to the challenge? Clin Geriatri 2002;10:14-7.
12. Wild S, Ruglie G, Grcon A, Sicree R, king H. Global prevalence of diabetes: Estimates for the Year 2000 and projections for 2030. Diabetes Care 2004;27:1047-53.
13. Lustman PJ, Anderson RJ, Freedland KE, de Groot M, Carney RM, Clouse RE. Depression and poor glycemic control: A meta-analytic review of the literature. Diabetes Care 2000;23:934-42.
14. Michael J. Diabetes foundation, clinical diabetes. Am Diabetes Assoc 2008;26:77-82.
15. Graham JE, Stockmen-May DG, Ostir GV, Snih SA, Peek MK, Markides K, et al. Health related quality of life in older Mexican Americans with diabetes. Health Qual Life Outcomes 2007;5:39.
16. Abdel Gwad E. Quality of life In Saudis with diabetes. Saudi J Disabil 2002;8:163-8.
17. Heine J. Diabetes in the next century: Challenges and opportunities. Neth J Med 1999;55:265-70.
18. Sabiha I. WHO study group. Prevention of diabetes mellitus: Report of a WHO study group. Pak Dev Rev 1995;34:91.
19. Azizi F, Gouya MM, Vazirian P, Dolatshahi P, Habibian S. Screening for type 2 diabetes in the Iranian national programme: A preliminary report la revue de sant’dre la me’diterrane’e orientale. East Mediterr Health J 2003;9:1122-7.
20. Soleimannejad K, Sarokhani D, Sarokhiani M, Sayehmiri K, Ahmadi N. Quality of life in diabetes patients in Iran: A systematic review and meta-analysis method. Int J Pharm Tech 2016;8:21608-18.
21. Von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP, et al. The Strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. Prev Med 2007;45:247-51.
22. Aghamolaei T, Eftekhar H, Shojaeizadeh D, Mohammad K, Nakhjavani M, Pour F. Behavior, metabolic control and health-related quality of life in diabetic patients at Bandar Abbas diabetic clinic. Iranian J Publ Health 2003;32:54-9.
23. Aghamolaei T, Eftekhar H, Mohammad K, Sobhani A, Shojaeizadeh D, Nakhjavani M, et al. Influence of educational intervention using interaction approach on behavior change, hemoglobin A1C and health-related quality of life in diabetic patients. J School Publ Health Int Pub Health Res 2005;3:1-2.
24. Sadeghe-Ahari S, Arshi S, Iranpour M, Amani F, Shiahpush H. The effect of complications of type 2 diabetes in quality of life in diabetic patients. J Ardabil Univ Med Sci 2008;3:194-402.
25. Ahmadi A, Hasanzadeh J, Rahimi M, Laskari L. Factors affecting quality of life in type 2 diabetes in Chaharmahal va Bakhtiari province. J North Khorasan Univ Med Sci 2011;3:7-11.
26. Alavi A, Parvin N, Salehian T, Samipour V. Comparing quality of life of children and adolescents with diabetes mellitus and healthy group from patient and parents perspective in ShahreKord. J Kordian Univ Med Sci 2010;15:46-52.
27. Baghianimoghadam M, Akhami-Ardakani M. The effect of educational intervention on quality of life of diabetic patients type 2, referee to diabetic research centre of Yazd. Horizon Med Sci 2008;13:21-8.
28. Bazzazian S, Besharat M, Ehsan H, Rajab A. The moderating role of coping strategies in relationship between illness perception, quality of life and HbA1c in patients with type I diabetes. Iranian J Endocrinol Metab 2010;12:213-21.
29. Borzou S, Salavati M, Safari M, Hadadinejad S, Zandieh M, Torkaman B. Quality of life in type II diabetic patients referred to...
30. Safarabadi-Farahani T, Ali-Akbar M, Safarabadi-Farahani A, Haghani H. Quality of life in young people with type 1 diabetes in relation to age and gender. Iran J Nurs 2011;23:73-9.
31. Ghanbari A, Kazeremmezehad E. A comparative study on the quality of life not insulin dependent diabetic mellitus (niddm) patients of the razi hospital of rasht. Modares J Med Sci 2004;7:69-80.
32. Ghanbari A, Yeka Z, Roushan Z, Lakeh N. Assessment of factors affecting quality of life in diabetic patients in Iran. Public Health Nurs 2005;22:311-22.
33. Harriam H, Moghadasian S, Aghajanlou A. Quality of life and its dimensions in diabetic patients referring to diabetes center, Tabriz university of medical sciences, 2007. J Diabetes Metab Disord 2009;9:152-60.
34. Heydari M, Alhani F, Kazemnejad A, Mozefi F. The effect of empowerment model on quality of life of diabetic adolescents. Iran J Pediatr 2007;17:87-94.
35. Jafari P, Forouzanpede E, Bagheri Z, Karamizadeh Z, Shalileh K. Health related quality of life of Iranian children with type 1 diabetes: Reliability and validity of the Persian version of the PedsQL™ generic core scales and diabetes module. Health Qual Life Out 2011;9:104.
36. Ghaemani H, Ahmad F, Entezami H, Memarian R. The effect of continuous care model on quality of life in diabetic patients. J Urmia Univ Med Sci 2005;16:22-7.
37. Jahanlou AS, Karami NA. The effect of literacy level on health related-quality of life, self-efficacy and self-management behaviors in diabetic patients. Acta Med Iran 2011;49:153-8.
38. Jahanlou AS, Ghoferanipour F, Kimmigmar M, Vafaei M, Heydarnia A, Sobhani A. Can quality of life questionnaires be used in diabetics to assess the relation between HbA1c and patients’ domain aspects? Acta Med Iran 2011;49:246-51.
39. Sedaghati-Kasbaki M, Ehsani M, Ghanbari A. Comparison of quality of life in patients with type 2 diabetes with non-diabetic patients. J Babol Univ Med Sci 2007;9:55-60.
40. Kermansaravi F, Navidian A, Ansarymoghadam A. Quality of life in type 1 diabetic adolescents in Zahedan (2011). Iranian J Endocrinol Metab 2012;13:651-7.
41. Khaledi S, Moridi G, Gharibi F. Survey of eight dimensions of quality of life for patients with diabetes type II, referred to Sanandaj diabetes center in 2009. J Fasa Univ Med Sci 2011;1:29-37.
42. Khamseh M, Monavari A, Malek M, Shafiee G, Baradaran H. Health-related quality of life in patients with type 1 diabetes. Iranian J Endocrinol Metab 2011;13:249-56.
43. Peymani M, Monjamed Z, Aliasghapour M, Mehran A. Surveying the quality of life of diabetic patients with cardiovascular complications referring to the endocrinology clinic of selected hospitals of Tehran university of medical sciences in 2004-2005. J Med Council IRI 2007;25:142-8.
44. Rahkshanderu S, Heydarnia A, Rajab A. The effect of health education on quality of life in diabetic patients. Daneshvar Med 2006;13:15-20.
45. Rasouli D, Nasiriziba F, Nabiamrad R, Haghani H. Comparison of quality of life in men and women with diabetic foot ulcer in selected hospitals of Tehran universities, 1387. Pars J Med Sci 2011;9:38-45.
46. Safavi M, Samani N, Mahmodi M. Effect of quality of life improvement on type 2 diabetes patients’ self-esteem. Saudi Med J 2011;32:954-7.
47. Sanjari M, Safari S, Shokoochi M, Safizade H, Rashidinezhad H, Mashrouteh M, et al. A cross-sectional study in Kerman, Iran, on the effect of diabetic foot Ulcer on health-related quality of life. Int J Low Extrem Wounds 2011;10:200-2006.
48. Shahrjerdi S, Shavandi N, Golpaygani M, Sheykhhooseini R. Effect of endurance and strength training on blood glucose control, quality of life and mental health in women with type 2 diabetes. Iranian J Diabetes Metab 2009;9:35-44.
49. Sayadi N, Fazyzi S, Ramazani A. Comparison of quality of life among diabetic and non diabetic patients after open heart surgery (Short report). J Rafsanjan Univ Med Sci Health Serv 2011;10:144-50.
50. Taghdisi M, Borhani M, Solhi M, Afkari M, Hosseini F. The effect of an education program utilising PRECEDE model on the quality of life in patients with type 2 diabetes. Health Educ J 2012;71:229-38.
51. Timareh M, Rahimi M, Abbasi P, Rezaei M, Hyaidarpoor S. Quality of life in diabetic patients referred to the diabetes research center in Kermanshah. J Kermanshah Univ Med Sci (BEHBOOD) 2012;16:63-9.
52. Vares Z, Zandi M, Baghaei P, Alavi N, Aajorpaz N. Quality of life and related factors in diabetic patients attending a diabetes center in Kashan. Nurs Res 2010;5:14-22.
53. Vazirinejad R, Sadjad MA, Maghool N. A historical cohort study assessing the effect of diabetes on the quality of life of patients. Res Med 2010;34:35-40.
54. Yekta Z, Pourali R, Ghassemi-Rad M. Comparison of demographic and clinical characteristics influencing health-related quality of life in patients with diabetic foot ulcers and those without foot ulcers. Diabetes Metab Syndr Obes 2011;4:393-9.
55. Mirfeizi M, Jafarabadi M, Toorzani Z, Mohammadi S, Azad M, Mohammadi A, et al. Feasibility, reliability and validity of the Iranian version of the diabetes quality of life brief clinical inventory (IDQOL-BCI). Diabetes Res Clin Pract 2012;96:237-47.
56. Shahi M, Mohamadifar M. Comparison of depression, anxiety, stress, quality of life, and alexithymia between people with type II diabetes and non-diabetic counterparts. Pers Individ Diff 2017;104:64-8.
57. Najafi-Ghezeljeh T, Kohandany M, Oskouei F, Malek M. The effect of progressive muscle relaxation on glycated hemoglobin and health-related quality of life in patients with type 2 diabetes mellitus. Appl Nurs Res 2017;33:142-8.
58. Shamshirgaran S, Ataei J, 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 10:244-50.
59. Hajian-Tilaki K, Heidari B, Hajian-Tilaki A. Solitary and combined negative influences of diabetes, obesity and hypertension on health-related quality of life of elderly individuals: A population-based cross-sectional study. Diabetes Metab Syndr 2016;10:37-42.
60. Dadgostar H, Firouzinezhad S, Ansari M, Younespour S, Mahmoudpour A, Khamseh M. Supervised group-exercise therapy versus home-based exercise therapy: Their effects on quality of life and cardiovascular risk factors in women with type 2 diabetes. Diabetes Metab Syndr 2016;10:30-6.
61. Jafari N, Farajzadegan Z, Loghmani A, Majlesi M, Jafari N. Spiritual well-being and quality of life of Iranian adults with type 2 diabetes. Evid Based Complement Alternat Med 2014:2014:8.
62. Abdoli S, Abdoli S. Quality of life in people with type 2 diabetes living in rural and remote areas, Iran. Int J Diabetes Dev Ctries 2015;35:290-7.
63. Hadi N, Ghahramani S, Montazeri A. Health related quality of life in both types of diabetes in Shiraz, Iran. Shiraz E Medical J
78. EydiBaygi M, Mehrabizade M, Davoudi I, Ahmadi V, Mohammadshahi M, Shirani F, Elahi S, Ghasemi S, Shahni M, Izadi A, Sepahvand F, Naderifar M, Mohammadipour F. The intermediary role of self-efficacy in relation with stress, glycosylated haemoglobin and health-related quality of life in patients with type 2 diabetes. Iran J Public Health 2012;41:76-80.

Afshar M, Memarian R, Mohammad E. The effect of group discussion on the quality of life and HbA1c levels of adolescents with diabetes. Iran Red Crescent Med J 2014;16:e21110.

69. Zaker M, Moghadam A, Shams S, Moradi Y. Effect of self-management education package on specific quality of life among diabetic patients in Iran. J Chem Pharm Sci 2016;9:1396-9.

70. 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.

71. Gholami A, Azimi M, Borji A, Shirazi F, Shariati Z, Zarei E. Quality of life in patients with type 2 diabetes: Application of WHOQOL-BREF scale. Shiraz E Medical J 2013;14:162-71.

72. Torabi M, Izadi A, Naderi F, Shamsaei F. Sleep quality and quality of life in adults with type 2 diabetes. J Diabetes Nurs 2014;2:51-61.

73. Izadi A, Sepahvand F, Naderifar M, Mohammadipour F. The effect of an educational intervention on quality of life in patients with type 2 diabetes referring to Tamin Ejenmaei hospital in 2013. J Diabetes Nurs 2014;2:18-28.

74. Khodabakhshi-Koolaei A, Navidian A, Baati Z, Rahmatiazadeh M. Effectiveness of supportive psychotherapy on quality of life in patients with type 2 diabetes. J Diabetes Nurs 2015;3:31-41.

75. Mohammadshahi M, Shirani F, Elahi S, Ghasemi S, Shahni M, Haidari F. Evaluation of relationship between dietary patterns and quality of life in patients with type 2 diabetes. Daneshvar Med 2015;22:3-12.

76. Saedpour J, Jafari M, Asgar M, Dardashi H, Teymoorzadeh E. The impact of self-care education on quality of life of diabetic patients. J Health Admin 2013;16:26-36.

77. Ghasempour M, Ghasemi V, Zamani A. Evaluation of quality of life and its dimensions in diabetic patients referring to Khorraramabad Shohada hospital (in 2008). Yafeh 2009;11:125-33.

78. EydiBaygi M, Mehrabizade M, Davoudi I, Ahmadi V, Dehghanizade Z. Comparison the quality of life in patients with diabetes type 2 and non-diabetic individuals. Sci J Ham Uni Med Sci 2014;22:55-62.

79. Sadegh T, Derakhshan R. The effect of nurse telephone follow up on quality of life in diabetic patients. Payesh 2012;11:711-7.

80. Zaree-Bahramabadi M, Vafeai-Banef F, Ghaderi E, Taghvaei D. The Effectiveness of cognitive-behavioral therapy on quality of life in patients with type 2 diabetes. J Diabetes Metab Disord 2013;12:225-32.

81. Ghashghaie S, Farnam R. The effectiveness of mindfulness-based cognitive therapy on quality-of-life in outpatients with diabetes. Iranian J Diabetes Metab 2014;13:319-30.

82. Saadatjoo S, Revanmee S, Tabyee S, Oudi D. Life quality comparison in type 2 diabetic patients and none diabetic persons. Mod Care Sci Qly Birjand Nurs Midwifery Fac 2012;9:24-31.

83. Behrouz B, Bavali F, Heidarizadeh N, Farhadi M. The effectiveness of acceptance and commitment therapy on psychological symptoms, coping styles, and quality of life in patients with type-2 diabetes. J Health 2016;7:236-53.

84. Ebrahimi H, Sadeghi M, Bzaghal M, Shaker S, Ghasemi M. Relationship between metabolic control indexes and quality of life in patients with type II diabetes mellitus. Iran J Nurs 2014;27:73-82.

85. Mohammad Rahimi G, Attarzadeh Hosseini S. Effect of aerobic training and diet on insulin resistance and quality of life in type II diabetic patients. Horizon Med Sci 2016;21:277-84.

86. Shams S, Zaker M, Ghavami H. Effect of self management educative package on quality of life among diabetic patients in Urmia diabetes centers between in the years of 2013. J Urmia Nurs Midwifery Fac 2016;13:863-8.

87. Mohammadpour Y, Harihian H, Moghadasian S, Ebrahimi H. Study of quality of life and its dimensions in diabetic patients referring to diabetes center of Tabriz university of medical sciences in 2007. J Urmia Nurs Midwifery Fac 2008;6:26-37.

88. Ganjoo J, Talebi Z, Assarroudi A, Rakhshani M. Comparative assessment of effect of education in the OREM’s self care model way with current method on the quality of life of diabetic type 2 patients. Bimonthly J Sabzevar Univ Med Sci 2015;22:748-57.

89. Bidi F, Hassanpour K, Ranjarzadeh A, Kheradmand A. Effectiveness of educational program on knowledge, attitude, self care and life style in patients with type II diabetes. J Sabzevar Univ Med Sci 2013;19:336-44.

90. Derakhshanpour F, Farsinia M, Shahimi N. Relationship between anxiety disorders and life quality in type two diabetic patients. J Res Dev Nusr Midw 2015;12:94-102.

91. Bahadori-Khosroshahi J, Khanjani Z. Depression and quality of life between diabetic and non-diabetic patients. J Health Psychol 2011;1:61-77.

92. Fuladvandi M, Aziz Zadeh Foroozi M, Asad Abadi A, Fuladvandi G, Lashkari T, Malekian L. Effectiveness of stress management training on improved quality of life in patients with type 2 diabetes. J Health Promot Manag 2014;3:16-24.

93. Shahraki-Vahed A, Hamedi-Shahraki S, Masinaeinazhad N, Shahdadi H. Survey of life’s quality in diabetic patients referred to diabetic’s clinic of Zabol 2010. J Rostamian J 2011;3:21-9.

94. Taghdisi M, Borhani M, Solhi M, Afkari M, Hosseini M. Effect of educational program based on PRECED model on quality of life in patients with typeI diabetes. J Gorgan Univ Med Sci 2011;13:29-36.

95. Sepehrnia E, Ranjar F, Hosseinzadeh-Taghvaei M, Peymani J. The effectiveness of life skills training on the subscale of quality of life in people with diabetes. J Health Psychol 2011;1:81-102.

96. Fathi Ahmadzaree N, Neshat Doost H, Mansheea G, Nadi M. The effectiveness of acceptance and commitment therapy on quality of life among patients with type 2 diabetes. Iran J Health Educ Health Promot 2016;6:31-9.

97. Moein M, Aghajani M, Mirbagher-Ajorpaz N. Effects of the empowerment program on the quality of life in patients with type II diabetes. J Diabetes Nurs 2013;5:29-41.

98. Khalili M, Sabouhi F, Abazari P, Aminoroaya A. Comparing the quality of life in insulin recipient and refusal patients with type 2 diabetes. Iran J Nurs Midwifery Res 2016;21:351-6.

99. Hadipour M, Aboalhasani F, Molavi-Vardanjani H. Health related quality of life in patients with of type II diabetes in Iran. Payesh
100. Daneshvar S, Khodamoradi A, Ghazanfari Z, Montazeri A. Quality of life in diabetic patients: A comparative study. Payesh 2018;17:541-50.

101. Solimani Z, Barati H, Mozafari J, Ershadi M, Mohammadi M. The quality of life of patients with diabetes from the city of Sabzevar during year 2016. Military Caring Med 2017;3:264-71.

102. Kaveh M, Ghahremani L, Nazari M, Zare S. Quality of life in diabetic patients: The predicting role of personal resources. J Health Sci Surveillance Sys 2018;6:142-8.

103. Shafiee-Kandjani AR, Hosseinpour M, Shoj H, Daneshamouz H, Mohammad-Alizadeh S. Assessing quality of life and general health status in married women with type II diabetes in Tabriz. Depiction Health 2018;9:195-205.

104. Sotodeh Asl N, Avazabadian M, Ghorbani R, Malek F. Quality of life in patients with hypertension and type 2 diabetes mellitus. Koumesh 2020;22:263-8.

105. Tafazoli M, Parman A, Azmoude E. Sexual function and quality of life in diabetic women referring to health care centers in Mashhad. J Educ Health Promot 2017;6:25.

106. Tavakkoli I, Dehghan A. Compare the quality of life in type 2 diabetic patients with healthy individuals (Application of WHOQOL-BREF). Zahedan J Res Med Sci 2017;19:e5882.

107. Borhaninejad V, Kazazi L, Haghi M, Chehrrehnegar N. Quality of life and its related factors among elderly with diabetes. Iran J Ageing 2016;11:162-73.

108. Zareipour M, Ghechil Ghojogh M, Mahdi-Akhgar M, Alinejad M, Akbari S. The quality of life in relationship with glycemic control in people with type 2 diabetes. J Community Health Res 2017;6:141-9.

109. Soleymanian T, Kokabeh Z, Mahjoob A, Ramaghi R, Argani H. Clinical outcomes and quality of life in hemodialysis diabetic patients versus non-diabetics. J Nephropathol 2017;6:81-9.

110. Barzegar Damadi M, Mirzaaian B, Akha O, Hosseini S, Jadidi M. Effect of cognitive-behavioral group therapy on HbA1C, selfefficacy, depression, illness perception, and quality of life in patients with type II diabetes. J Mazandaran Univ Med Sci 2018;27:87-100.

111. Shakeri M, Hatami M, Hasani J, Shakeri HS. The Effectiveness of Mindfulness-Based Stress Reduction (MBSR) on mental health and quality of life of the patients with type 2 diabetes. INKUMS 2018;10:31-40.

112. Marzhan A. Relationship between spiritual health and quality of life in type II diabetic patients: A cross-sectional study in Yazd. J Diabetes Nurs 2018;6:641-52.

113. Ghaedrahmati A, Jabalameli S. Effect of acceptance and commitment therapy on the quality of life and physical indices of patients with diabetes. J Diabetes Nurs 2019;7:915-28.

114. Schram M, Baan C, Pouwer F. Depression and quality of life in patients with diabetes: A systematic review from the European depression in diabetes (EDID) research consortium. Curr Diabetes Rev 2009;5:112-9.

115. 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;12:54.

116. Mokhtari Z, Gheslagh RG, Khordad A. Health-related quality of life in Iranian patients with type 2 diabetes: An updated meta-analysis. Diabetes Metab Syndr 2019;13:402-7.

117. Dehvan F, Sacid DM, Dekordi AH, Gheslagh RG. Quality of life of Iranian patients with type 2 diabetes: A systematic review and meta-analysis. Nurs Pract Today 2019;6:167-75.

118. Khunkaew S, Fernandez R, Sim J. Health-related quality of life among adults living with diabetic foot ulcers: A meta-analysis. Qual Life Res 2019;28:1413-27.

119. Thommasen HV, Zhang W. Impact of chronic disease on quality of life in the Bella Coola valley. Rural Remote Health 2006;6:528.