



REVIEW ARTICLE

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# Quality of life in people with diabetes: a systematic review of studies in Iran

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## Abstract

Evaluation of health-related quality of life (HRQoL) among people with diabetes has been growing in Iran over the last decade. The main aim of the current study was to systematically review the characteristics of these studies and examine quality of their findings. Persian (SID, Magiran) and English (Pubmed, Medline, Web of Science, CINAHL, Scopus, PsycINFO and ERIC) databases were systematically searched using the search terms: "diabetes" AND "quality of life" AND "Iran". The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. A total of 46 studies passed the inclusion criteria and were included in the review. The included studies were conducted in 20 out of 30 provinces of the country. Most studies investigated HRQoL among people with type 2 diabetes. The Short Form Health Survey (SF-36) and WHO quality of life instruments (WHOQOL) were the main instruments used in these studies. Studies showed that people with diabetes had lower HRQoL than people without diabetes. Better socioeconomic status and better control of cardiovascular risk factors were associated with better HRQoL among the patients with diabetes. In general, the predictors of HRQoL among Iranian patients were similar to their international counterparts implying that diabetes patients share many common features. The reviewed studies suffer from major methodological and reporting flaws which limit validity and generalizability of their findings.

**Keywords:** HRQoL, Diabetes, Systematic review, Iran

## Introduction

Due to insufficiency of traditional end points (which are mainly focused on the biologic and physiologic outcomes) in capturing the effects of interventions on patients' health-related quality of life (HRQoL), a growing interest has emerged during the past decades for assessing determinant factors of patients' HRQoL, especially in chronic diseases [1]. Diabetes mellitus is one of these chronic diseases that involve people of all ages and races. It is considered as one of the most common chronic diseases in approximately all countries, and its prevalence continues to increase mainly due to the changes in lifestyles resulting in physical inactivity, and increased obesity [2]. It was estimated that diabetes affected 285 million adults (20–79 years) worldwide in 2010, and this figure will increase to 439 million adults by 2030 [2].

Diabetes is associated with higher risk of some macro and microvascular complications. As result, these complications cause mortality rate among diabetic patients to be about twice as much as that of non-diabetic individuals of a similar age [3,4]. Moreover, patients with these complications have lower HRQoL than diabetes patients without the complications [5,6].

In Iran, prevalence of diabetes increased from 7.7% in 2005 to 8.7% in 2007 [7,8]. In addition, it was estimated that annual direct medical cost of diabetes is roughly US \$ 113 million and direct medical cost in patients with diabetes is about 3 times higher than general population in the country [9]. High prevalence of diabetes and its related complications have attracted the research and policy concern in the country over last few years. In response to this policy concern, a considerable body of literature has been emerged to evaluate HRQoL and its determinants in diabetic patients. These studies aimed to improve HRQoL in people with diabetes by providing evidence for informed decision-making. However, differences in the research questions, tools and population

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among these individual studies make it difficult to reach an obvious answer applicable for policy making purposes. In response to this, conducting a systematic review of individual studies to make the available evidences more accessible for policy-making is common in medical researches.

In this course, the current systematic review was conducted to describe the latest available information about HRQoL in people with diabetes in Iran. Specifically, this review aimed to investigate how HRQoL was measured in Iranian diabetic population, what were the main methodological flaws of these studies, and which factors were mainly associated with HRQoL in people with diabetes.

## Method and materials

### Literature search

A systematic literature search was independently conducted in March 2012 to review the studies which evaluated HRQoL among people with diabetes in Iran. The results of this literature search were independently verified and updated in June 2012. Studies published up to May 2012 were included in the review. National (SID, Magiran) and international databases (Pubmed, Medline, Web of Science, CINAHL, Scopus, PsycINFO and ERIC) were searched through following search terms: ["diabetes" AND "quality of life" AND "Iran"]. Moreover, we searched Google for extra Persian publications. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [10].

### Selection of studies

Five exclusion criteria were applied: (1) the study did not investigate HRQoL in people with diabetes, (2) the study did not provide any data about HRQoL among study population (e.g., the study was related to instrument development in patients with diabetes); (3) the study was a review article; (4) the study was not a journal article (e.g., conference abstracts and dissertations); (5) the study was not applied to the Iranian population.

The initial search resulted in 214 documents. After excluding duplicates and non-relevant studies, 59 articles were selected for full text examination. The reference lists of these 59 documents were manually searched. In total, 46 studies were included for the review (Figure 1). In cases where multiple publications were produced from a single study, the paper with most comprehensive data was included.

Data extracted from the selected studies are included, among others: year of publication, the location (or province) and the year the studies were conducted, study design, sample size, type of diabetes, age range of the sample, duration of diabetes, HRQoL measurement tool

used, main predictors of HRQoL, and statistical methods used for analysis.

## Results

### General characteristics

The characteristics of 46 eligible studies [11-56] for this review are shown in Table 1. First study was published in year 2003 and since then there were few publications per year on the topic, with a peak in the publications in 2011 (Figure 2). HRQoL in people with diabetes was investigated in 20 out of 30 provinces of the country. 17 out of 46 studies were conducted in two provinces (Tehran & Hormozgan). Sample sizes across the studies ranged from 27 to 387 participants. Majority of the studies (76%) were published in a national Persian language journal. Cross-sectional design was the dominant design in the studies (N=32). In terms of type of diabetes, five studies included only people with type 1 diabetes and 23 studies covered only type 2 diabetic patients. In the remaining studies, there was a combination of type1, type2, and non-diabetes people in the sample. The age of participants ranged from 10 to 75 years old. In most studies, women constituted the majority of the study participants.

### HRQoL instruments

Regarding the instrument used to measure HRQoL, 17 different instruments were used in the studies. 25 studies used a generic measure, 13 studies used a disease-specific instrument and 7 studies applied both generic and disease-specific instruments among the study population. 14 studies used the Short Form Health Survey (SF-36) and 10 studies employed WHO quality of life instruments (WHOQOL) to evaluate HRQoL in patients with diabetes. In 10 studies an Iranian questionnaire, developed by authors or research teams of those studies or adapted from other Iranian researchers, were applied.

### HRQoL in diabetes patients vs. non-diabetes

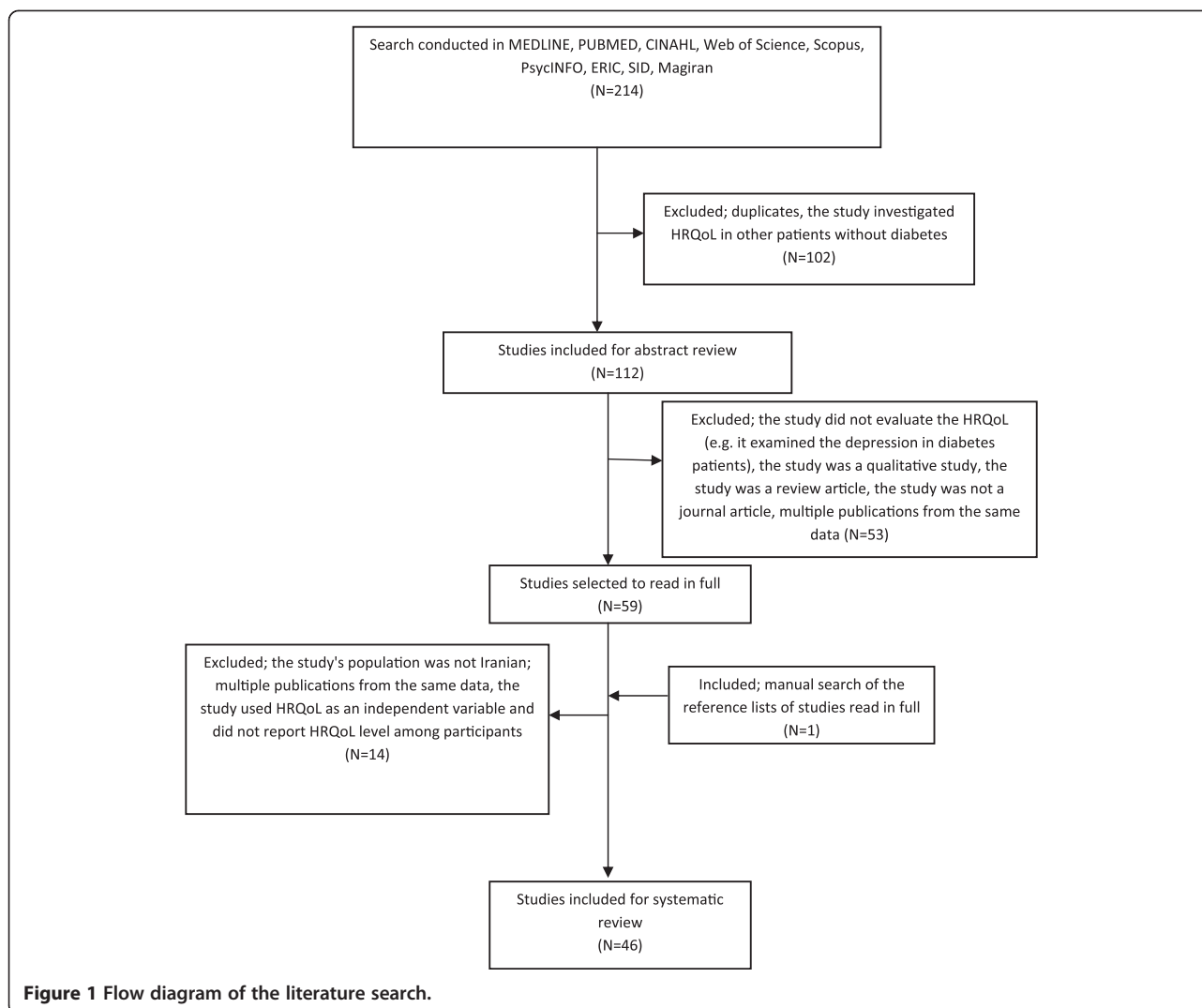
Six studies, which examined the effect of diabetes on HRQoL, compared HRQoL in people with and without diabetes and reported negative effects of both type 1 and type 2 diabetes on HRQoL.

### The effects of interventions

A total of 12 studies examined the effects of an intervention on HRQoL in people with diabetes. All studies, but one, evaluated the effects of educational interventions on HRQoL in people with diabetes and demonstrated improvements in HRQoL caused by these interventions.

### Diabetes-related complications

Six studies mainly examined the effects of diabetes-related complications on HRQoL in patients with diabetes and



**Figure 1** Flow diagram of the literature search.

reported negative effects of these complications on HRQoL. In addition, among remaining studies, 9 studies included these complications as a predictor of HRQoL and found that these complications were associated with lower HRQoL.

#### Other predictors of HRQoL

Association between HRQoL and some demographic, socioeconomic and clinical predictors were examined in the most studies. Except one study, all the other studies found a negative association between age and HRQoL. Moreover, in all studies except one, females had lower HRQoL than males. Better socioeconomic status (including income, education, employment) of individuals and/or their family was associated with better HRQoL. Better HRQoL was reported for married compared to non-married (single, widow) people. People with higher HbA1c generally had lower HRQoL. There were negative associations between blood pressure, blood lipid and

HRQoL. Lower level of HRQoL was found among people with higher BMI. While most studies found a negative association between HRQoL and duration of diabetes, two studies reported a positive association. Smokers had worse HRQoL than their non-smoker counterparts. Two studies examined rural/urban disparities in HRQoL, but their results were not consistent, showing opposite results. In general, patients who were under diet treatment had better HRQoL than patients on drug or/and insulin therapies.

#### Discussion

To our knowledge, for the first time, the current study has reviewed the results of 46 identified studies examining HRQoL among the Iranian patients with diabetes. The findings of this review showed that generally people with diabetes have worse HRQoL than their healthy counterparts. In addition, the findings indicated that diabetes-related complications have a significant negative impact on

**Table 1 Characteristics of the studies included in the review**

| First author                   | Data year | Language | Province              | Main interest variable              | Study design       | Sample characteristics             |             |           |  |                                 | HRQoL assessment                             |                      | Statistical analysis            |
|--------------------------------|-----------|----------|-----------------------|-------------------------------------|--------------------|------------------------------------|-------------|-----------|--|---------------------------------|--|----------------------|---------------------------------|
|                                |           |          |                       |                                     |                    | Type of diabetes (%)               | Sample size | Age range | Females (%)  | Diabetes duration (mean/median) | Instrument                                   | Specific or generic? | Adjusted (A) or unadjusted (U)? |
| Aghamolaei T, 2003 [11]        | -         | English  | Hormozgan             | Predictors of HRQoL                 | Cross-sectional    | Type 2 (100)                       | 80          | 32-72     | 58.8   | 5.8                             | WHOQOL-BREF                                  | Generic              | U                               |
| Aghamolaei T, 2005 [12]        | -         | Persian  | Hormozgan             | Health education                    | Quasi-experimental | Type 2 (100)                       | 71          | -         | 59.2   | 6.0                             | WHOQOL-BREF                                  | Generic              | U                               |
| Ahari SS, 2008 [13]            | 2004      | Persian  | Ardebil               | Type 2 diabetes                     | Cross-sectional    | Type 2 (100)                       | 110         | -         | 66.4   | 8                               | SF-36  | Generic              | U                               |
| Ahmadi A, 2011 [14]            | 2008      | Persian  | Chaharmahal Bakhtiari | Predictors of HRQoL                 | Cross-sectional    | Type 2 (100)                       | 254         | 30-65     | 59   | 7.4                             | Developed by research team                   | Specific             | A                               |
| Alavi A, 2010 [15]             | 2008      | Persian  | Chaharmahal Bakhtiari | Type 1 diabetes                     | Historical cohort  | Type 1 (14.5), non-diabetes (85.5) | 152         | 8-18      | 52.4 in diabetic group                             | NA                              | PedSQL                                       | Generic              | U                               |
| Alavi NM, 2004 [16]            | 2003      | Persian  | Tehran                | Predictors of HRQoL                 | Cross-sectional    | Type 1 (13), Type 2 (87)           | 104         | >18       | 65   | 9.7                             | Developed by research team, Well Being Index | Specific, generic    | U                               |
| Bagheri H, 2005 [17]           | NA        | Persian  | Semnan                | Micro-& macrovascular complications | Cross-sectional    | Type 2 (100)                       | 150         | 35-65     | NA   | NA                              | Audit of Diabetes Dependent Quality of Life  | Specific             | U                               |
| Baghianimoghadam MH, 2007 [18] | NA        | Persian  | Yazd                  | Health education                    | Quasi-experimental | Type 2 (100)                       | 120         | 25-75     | 59   | 9.87                            | SF-20  | Generic              | U                               |
| Bazzazian S, 2010 [19]         | NA        | Persian  | Tehran                | Coping strategies                   | Cross-sectional    | Type 1 (100)                       | 300         | 18-30     | 57.3   | NA                              | D-39   | Specific             | A                               |
| Borzou SR, 2010 [20]           | NA        | Persian  | Hamedan               | HRQoL level                         | Cross-sectional    | Type 2 (100)                       | 165         | NA        | 67.3   | NA                              | SF-36  | Generic              | U                               |
| Delvarianzadeh M, 2006 [21]    | NA        | Persian  | Semnan                | Diet consultation                   | RCT                | Type 2 (100)                       | 144         | 35-65     | 67.8   | NA                              | SF-36  | Generic              | U                               |
| Farahani TS, 2010 [22]         | 2007      | Persian  | Tehran                | Age and sex                         | Cross-sectional    | Type 1 (100)                       | 70          | 11-18     | 52.1   | 2.23                            | Diabetes Quality of Life for Youth           | Specific             | U                               |
| Ghanbari A, 2004 [23]          | 2000      | Persian  | East Azerbaijan       | Predictors of HRQoL                 | Quasi-experimental | Type 2 (100)                       | 137         | NA        | 86.1   | NA                              | NA   | Generic, specific    | A                               |
| Ghanbari A, 2004 [24]          | NA        | Persian  | Gilan                 | Type 2 diabetes                     | Cross-sectional    | Type 2 (51.1), non-diabetes (48.9) | 176         | >40       | 78.8% (diabetic group), 55.8% (non-diabetic group) | NA                              | SF-36, SWED-QUAL                             | Generic              | A                               |

**Table 1 Characteristics of the studies included in the review (Continued)**

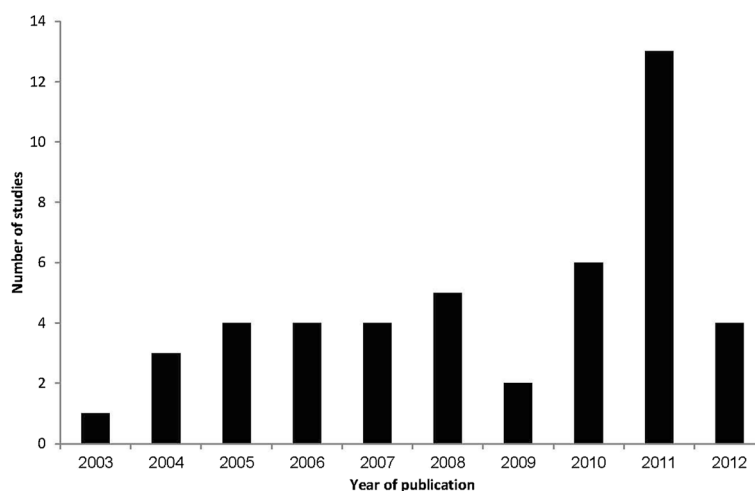
|                               |           |         |                 |                                    |                    |                                    |     |        |  |      |  |                   |   |
|-------------------------------|-----------|---------|-----------------|------------------------------------|--------------------|------------------------------------|-----|--------|--|------|--|-------------------|---|
| Ghanbari A, 2005 [25]         | 2000      | English | East Azerbaijan | Predictors of HRQoL                | Cross-sectional    | Type 2 (100)                       | 117 | >35    | 85.5   | NA   | SWED-QUAL, diabetes-specific quality-of-life scale           | Generic, specific | A |
| Ghavami H, 2005 [26]          | 2003-2004 | Persian | West Azerbaijan | Continious care                    | Quasi-experimental | Type 2 (100)                       | 74  | 40-65  | NA   | NA   | Developed by research team in Iran (Alavi NM)                | Specific          | U |
| Haririan H, 2009 [27]         | 2007      | Persian | East Azerbaijan | Aspects of HRQoL                   | Cross-sectional    | Type 2 (100)                       | 150 | 20->60 | 61.33  | NA   | SF36+Swed-QUAL, a diabetes-specific questionnaire            | Generic, specific | A |
| Hashemi Hefzabad F, 2011 [28] | NA        | English | Isfahan         | Diabetes impact on HRQoL           | Cross-sectional    | Diabetes (50), non-diabetes (50)   | 204 | 20-60  | 52% in both groups.                                    | NA   | Hanestad & Albrektsen's Attitude to Quality of Life          | Generic           | U |
| Heidari M, 2007 [29]          | 2004-2005 | Persian | Zanjan          | Empowerment model                  | Quasi-experimental | Type 1 (100)                       | 47  | 11-20  | -  | -    | -  | -                 | U |
| Jafari P, 2011 [30]           | NA        | English | Fars            | Impact of type 1 diabetes on HRQoL | Cross-sectional    | Type 1 (32), healthy (68)          | 294 | 8-18   | 56.4% in diabetes and 53% in healthy group.            | NA   | PedsQL™ 4.0 Generic Core Scales, PedsQL™ 3.0 Diabetes Module | Generic, specific | A |
| Jahanlou AS, 2007 [31]        | 2006      | Persian | Hormozgan       | Smoking                            | Cross-sectional    | Type 2 (100)                       | 125 | NA     | NA   | NA   | WHOQOL-BREF 26   | Generic           | U |
| Jahanlou AS, 2008 [32]        | 2007      | Persian | Hormozgan       | Glycemic control                   | Cross-sectional    | Type 2 (100)                       | 110 | 27-72  | 66.9   | 6.33 | WHOQOL-BREF 26   | Generic           | U |
| Jahanlou AS, 2011 [33]        | 2007      | English | Hormozgan       | Education                          | Cross-sectional    | Type 2 (100)                       | 256 | 27-72  | 67.5   | 6.33 | WHOQOL-BREF 26   | Generic           | U |
| Jahanlou AS, 2011 [34]        | 2006      | English | Hormozgan       | HbA1c                              | Cross-sectional    | Type 1 (11.8), Type 2 (88.2)       | 76  | NA     | 60.5   | NA   | WHOQOL-BREF 26, Iranian Diabetics' Quality of Life           | Generic, specific | U |
| Jahanlou AS, 2011 [35]        | 2007      | English | Hormozgan       | -                                  | Cross-sectional    | Type 2 (100)                       | 387 | 27-72  | 51.9   | 5.83 | WHOQOL-BREF 26, Iranian Diabetics' Quality of Life           | Generic, specific | U |
| Kakhaki AD, 2006 [36]         | 2004      | Persian | Tehran          | Predictors of HRQoL                | Cross-sectional    | Type 1 (15.3), Type 2 (84.7)       | 131 | 18-65  | 60.3   | 6.10 | SF-36  | Generic           | U |
| Kasbakhi MS, 2008 [37]        | 2008      | Persian | Mazandaran      | Type 2 diabetes                    | Case-control       | Type 2 (48.3), non-diabetes (51.7) | 145 | NA     | 90% in diabetic group and 81.3% in non-diabetic group. | NA   | SF-36, SWED-QUAL   | Generic           | U |

**Table 1 Characteristics of the studies included in the review (Continued)**

|                           |           |         |                      |                          |                             |   |     |         |                                     |      |   |          |   |
|---------------------------|-----------|---------|----------------------|--------------------------|-----------------------------|---|-----|---------|-------------------------------------|------|---|----------|---|
| Kermansaravi F, 2012 [38] | 2011      | Persian | Sistan & Baluchestan | Predictors of HRQoL      | Cross sectional             | Type 1 (100)                            | 100 | 10-18   | 47                                  | 3.5  | Diabetes quality of life youth                                  | Specific | U |
| Khaledi S, 2011 [39]      | 2009      | Persian | Kordestan            | Predictors of HRQoL      | Cross-sectional             | Type 2 (100)                            | 198 | >18     | 83.8                                | NA   | SF-36   | Generic  | U |
| Khamseh MA, 2011 [40]     | 2009-2010 | Persian | NA                   | Aspects of HRQoL         | Cross-sectional             | Type1 (100)                             | 150 | 12-30   | 49.3                                | 8.97 | Developed by research team                                      | Specific | A |
| Nejatisafa, 2008 [41]     | 2005      | Persian | Tehran               | HbA1c                    | Cross sectional             | Type 1 (4), Type 2 (96)                 | 100 | 18-65   | 68.0                                | 9    | WHOQOL-BREF   | Generic  | A |
| Peymani M, 2006 [42]      | 2005      | Persian | Tehran               | Neuropathy               | Cross sectional             | Type 1, Type 2                          | 304 | >18     | 76.1                                | NA   | Developed by research team                                      | Specific | A |
| Peymani M, 2007 [43]      | 2004-2005 | Persian | Tehran               | Cardiovascular disease   | Cross sectional             | Type 1, Type 2                          | 302 | >18     | 76.1                                | NA   | Developed by research team                                      | Specific | A |
| Peymani M, 2008 [44]      | 2005      | Persian | Tehran               | Retinopathy              | Cross sectional             | Type 1, Type 2                          | 178 | >18     | 75.8                                | NA   | Developed by research team                                      | Specific | A |
| Rakhshandehru, 2006 [45]  | 2001-2002 | Persian | Tehran               | Health education         | Quasi-experimental          | Type 2 (100)                            | 44  | 40-65   | 45.5                                | NA   |   | Specific | U |
| Rasouli D, 2011 [46]      | 2008      | Persian | Tehran               | The predictors of HRQoL  | Cross sectional             | Patients with diabetic foot ulcer (100) | 120 | >45-65< | 40.0                                | NA   | Diabetic foot scale questionnaire                               | Specific | U |
| Safavi M, 2011 [47]       | 2009-2010 | English | Ardebil              | Health education         | Randomised controlled trial | Type 2 (100)                            | 123 | 30-70   | 50.8% (experiment), 51.6% (control) | NA   | Farrell and Grant quality of life questionnaire                 | Generic  | U |
| Sanjari M, 2011 [48]      | -         | English | Kerman               | Foot ulcer               | Case-control                | Type 1 (11.4), Type 2 (88.6)            | 132 | -       | 37.9                                | 10.9 | SF-36   | Generic  | A |
| Sayadi N, 2011 [49]       | 2007      | Persian | Khuzestan            | Open heart surgery       | Case-control                | Type 2 (38.8), non-diabetes (61.2)      | 80  | 35-75   | 65% (diabetic), 33% (non-diabetic)  | 4.3  | SF-36   | Generic  | U |
| Shahrjerdi S, 2009 [50]   | 2008      | Persian | Markazi              | Physical exercise        | Quasi-experimental          | Type 2 (100)                            | 27  | >35     | 100                                 | 5.3  | SF36, General Health Questionnaire                              | Generic  | U |
| Shareh H, 2012 [51]       | -         | Persian | Fars                 | Perceived social support | Cross sectional             | Type 2 (100)                            | 50  | NA      | NA                                  | NA   | Multidimensional Scale of Perceived Social Support, WHOQOL-BREF | Generic  | A |
| Taghdisi MH, 2012 [52]    | 2009      | English | Golestan             | Health education         | Quasi-experimental          | Type 2 (100)                            | 78  | NA      | 79.5                                | NA   | WHOQOL  | Generic  | U |
| Timareh M, 2012 [53]      | -         | Persian | Kermanshah           | Predictors of HRQoL      | Cross sectional             | Type 1 (4), Type 2 (96)                 | 350 | >18     | 58.3                                | NA   | SF-36   | Generic  | U |

**Table 1 Characteristics of the studies included in the review (Continued)**

|                          |           |         |                 |                     |                   |                                      |     |             |      |      |  |          |   |
|--------------------------|-----------|---------|-----------------|---------------------|-------------------|--------------------------------------|-----|-------------|------|------|--|----------|---|
| Vares Z, 2010 [54]       | 2006      | Persian | Isfahan         | Predictors of HRQoL | Cross-sectional   | Type 1 (18.4), Type 2 (81.6)         | 310 | >18         | 74   | 10.9 | Iranian Diabetes Quality of Life questionnaire | Specific | A |
| Vazirinejad R, 2010 [55] | 2007      | Persian | Kerman          | Diabetes            | Historical cohort | Diabetes (45.1), non-diabetes (54.9) | 224 | <30-<br>>60 | 76.3 | 8.0  | SF-36  | Generic  | U |
| Yekta Z, 2011 [56]       | 2009-2010 | English | West Azerbaijan | Foot ulcer          | Cross-sectional   | Type 2 (100)                         | 250 | -           | 61.6 | 7.7  | SF-36  | Generic  | A |



**Figure 2** Number of studies by year of publication.

HRQoL among the diabetic patients in Iran. In general, associations between covariates and HRQoL in the reviewed Iranian studies were in line with their international counterparts.

The reviewed studies suffer from major methodological and reporting flaws which affected quality of their findings and limit their validity and generalizability. The reviewed studies mainly applied a nonrandom sampling method leading to possible selection bias. Moreover, calculation of sample size was unclear in the majority of the studies. Furthermore, while most studies were observational, univariate analysis was the main statistical approach used for data analysis and minimum effort was done to control for any imbalance in the covariates leading to potential confounder and selection biases. Among studies which employed multivariate analysis, some of the main confounding factors (such as diabetes-related complications and duration of diabetes) were not controlled for, raising possibility of confounder bias. In addition, these studies didn't explain their limitations adequately and did not comment on the potential biases in their reported results. Although, generic instruments were used by the most studies, limitations of these instruments in capturing HRQoL in patients with diabetes were not fairly explained. Moreover, several studies failed to validate the instruments before putting to use in a new population and only referred to application of the instruments in a diabetic population in other countries or a general population in Iran. It seems that similar to few other settings [57], Iranian researchers have used the instruments applied in other studies without worrying about their content.

The results of the current review should be interpreted in light of few limitations. Firstly, although Persian databases used in this review consisted majority of the articles published nationally, there is a possibility that some

studies may not be included in these databases. Secondly, as a wide range of instruments were used in the reviewed studies and the transparency of reported results was limited, it was not possible to apply statistical methods such as meta-analysis to test association between the covariates and HRQoL. Increasing the number of studies applying the same instrument and improving transparency of reporting results may make it possible to conduct a meta-analysis in future.

The previous systematic reviews mainly have focused on evaluating and comparing measurement properties of instruments used in examining HRQoL among diabetes patients [57-61]. In a review of HRQoL studies among people with diabetes in Nordic countries, Wandell [62] found that diabetes had a negative effect on HRQoL and being at older age, having diabetes-related complications, having lower socioeconomic status, being female and having weaker control of clinical risk factors were associated with lower HRQoL. These findings are comparable to the findings of the current review.

In conclusion, growing interests in evaluating HRQoL among people with diabetes were observed in Iran over the last decade. The findings of this review showed that people with diabetes had a lower HRQoL than healthy people. The findings also indicated that better socioeconomic status and better control of cardiovascular risk factors were associated with better HRQoL among the patients with diabetes. The reviewed studies suffer from major methodological and reporting flaws which limit the validity and generalizability of their findings.

#### Competing interests

All authors declare that they have no competing interests.

#### Authors' contributions

AAK participated in the design, search of databases, data extract and preparing the manuscript. BN and MMS participated in the search of



databases, data extract and preparing the manuscript. All authors have read and approved the final manuscript.

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#### References

1. Tofighi S, Ahmad Kiadaliri A, Sadeghifar J, Raadabadi M, Mamikhani J: **Health-Related Quality of Life among Patients with Coronary Artery Disease: a Post-Treatment Follow-Up Study in Iran.** *Cardiol Res Pract* 2012, **2012**:973974. doi:10.1155/2012/973974.
2. Shaw JE, Sicree RA, Zimmet PZ: **Global estimates of the prevalence of diabetes for 2010 and 2030.** *Diabetes Res Clin Pract* 2010, **87**(1):4–14.
3. Emerging Risk Factors Collaboration, Seshasai SR, Kaptoge S, Thompson A, Di Angelantonio E, Gao P, Sarwar N, et al: **Diabetes mellitus, fasting glucose, and risk of cause-specific death.** *N Engl J Med* 2011, **364**(9):829–841.
4. Guzder RN, Gatling W, Mullee MA, Byrne CD: **Early mortality from the time of diagnosis of Type 2 diabetes: a 5-year prospective cohort study with a local age- and sex-matched comparison cohort.** *Diabet Med* 2007, **24**(10):1164–1167.
5. Oliva J, Fernández-Bolaños A, Hidalgo A: **Health-related quality of life in diabetic people with different vascular risk.** *BMC Public Health* 2012, **12**:812. doi:10.1186/1471-2458-12-812.
6. Zhang P, Brown MB, Bilik D, Ackermann RT, Li R, Herman WH: **Health utility scores for people with type 2 diabetes in U.S. managed care health plans: results from Translating Research Into Action for Diabetes (TRIAD).** *Diabetes Care* 2012, **35**(11):2250–2256.
7. Esteghamati A, Gouya MM, Abbasi M, Delavari A, Alikhani S, Alaedini F, et al: **Prevalence of diabetes and impaired fasting glucose in the adult population of Iran, national survey of risk factors for non-communicable diseases of Iran.** *Diabetes Care* 2008, **31**(1):96–98.
8. Esteghamati A, Meysamie A, Khalilzadeh O, Rashidi A, Haghazali M, Asgari F, et al: **Third national surveillance of risk factors of non-communicable diseases (SuRFNCD-2007) in Iran: methods and results on prevalence of diabetes, hypertension, obesity, central obesity, and dyslipidemia.** *BMC Public Health* 2009, **9**:167.
9. Esteghamati A, Khalilzadeh O, Anvari M, Meysamie A, Abbasi M, Forouzanfar M, et al: **The economic costs of diabetes: a population-based study in Tehran Iran.** *Diabetologia* 2009, **52**(8):1520–1527.
10. Moher D, Liberati A, Tetzlaff J, Altman DG: **PRISMA Group: preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement.** *PLoS Med* 2009, **6**(7):e1000097.
11. Aghamolaei T, Eftekhari H, Shojaeizadeh D, Mohammad K, Nakhjavani M, Ghofrani 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**(3):54–59.
12. Aghamolaei T, Eftekhari 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.** *Journal of School of Public Health and Institute of Public Health Research* 2005, **3**(4):1–9 (in Persian).
13. Ahari SS, Arshi S, Iranparvar M, Amani F, Siahpush H: **The effects of type II diabetes on quality of life.** *Journal of Ardebil University of Medical Sciences* 2008, **8**(4):394–402 (in Persian).
14. Ahmadi A, Hasanazadeh J, Mediseh MR, Lashkari L: **Factors affecting quality of life in patients with type 2 diabetes in Chaharmahal & Bakhtiari province.** *Journal of North Khorasan University of Medical Sciences* 2011, **3**(1):7–13 (in Persian).
15. 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.** *Journal of Kordestan University of Medical Sciences* 2010, **15**(1):46–52 (in Persian).
16. Alavi NM, Ghofranipour F, Ahmadi F, Rajab A, Babae G: **Quality of life in patients with diabetes mellitus, referring to Iranian Diabetes Society.** *Journal of Kermanshah University of Medical Sciences* 2004, **8**(2):47–56 (in Persian).
17. Bagheri H, Ebrahimi H, Taghavi N, Hassani MR: **Quality of life of diabetes-related complications in diabetic patients referred to Imam Hossein hospital in Shahrood.** *Journal of Shahrood University of Medical Sciences* 2005, **7**(2):50–56 (in Persian).
18. Baghianimoghadam MH, Ardakani MA: **The effect of educational intervention on quality of life in type 2 diabetic patients referred to Yazd diabetes research center.** *Journal of Gonabad University of Medical Sciences* 2007, **13**(4):21–28 (in Persian).
19. Bazzazian S, Besharat MA, Ehsan HB, 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 Journal of Endocrinology and Metabolism* 2010, **12**(3):213–221 (in Persian).
20. Borzou R, Salavati M, Safari M, Hadadinejad SH, Zandieh M, Torkman B: **Quality of life in type II diabetic patients referred to Sina Hospital, Hamadan.** *Zahedan Journal of Research in Medical Sciences* 2010, **13**(4):43–46 (in Persian).
21. Delvarianzade M, Bagheri H, Sadeghian F: **Effect of dietary counseling on quality of life in patients with type II diabetes who were referred to Imam Hossein hospital nutrition clinic in Shahrood.** *Iranian Journal of Diabetes and Lipid Disorders* 2006, **5**(4):371–378 (in Persian).
22. Farahani TS, Aliakbar M, Farahani AS, Haghani H: **Quality of life in young people with type 1 diabetes in relation to age and gender.** *Iran Journal of Nursing* 2010, **23**(68):73–79 (in Persian).
23. Ghanbari A, Yekta ZP, Faghizade S, Hashemi MS: **Application of path analysis in identifying factors affecting quality of life and metabolic status of diabetic patients.** *Medical Daneshvar* 2004, **11**(51):65–74 (in Persian).
24. Ghanbari A, Kazemnejad E: **Comparing quality of life in type 2 diabetic patients referred to Razi hospital diabetes center with healthy individuals.** *Modares Journal of Medical Sciences* 2004, **7**(1):69–80 (in Persian).
25. Ghanbari A, Yekta ZP, Roushan ZA, Lakeh NM: **Assessment of factors affecting quality of life in diabetic patients in Iran.** *Public Health Nurs* 2005, **22**(4):311–322.
26. Ghavami H, Ahmadi F, Entezami H: **Evaluating the effects of continuous care model on quality of life in people with diabetes.** *Urmia Medical Journal* 2005, **16**(1):22–27 (in Persian).
27. Haririan H, Moghadasian S, Aghajanolou A: **Quality of life and its dimensions in diabetic patients referred to diabetes center of Tabriz medical university.** *Iranian Journal of Diabetes and Lipid Disorders* 2009, **9**(2):152–160 (in Persian).
28. Hashemi Hefz Abad F, Shabany Hamedan M: **Comparison of attitudes regarding quality of life between insulin-treated subjects with diabetes mellitus and healthy populations.** *Diabetes Metab J* 2011, **35**(4):397–403.
29. Heidari M, Alhani F, Kazemnejad A, Moezi F: **The effect of empowerment model on quality of life of diabetic adolescents.** *Iran J Pediatr* 2007, **17**(1):87–94. in Persian.
30. Jafari P, Forouzandeh 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 Outcomes* 2011, **9**:104.
31. Jahanlou AS, Ghofranipour F, Jahani J, Sobhani A, Kimmiagar M, Vafaei M, et al: **The relation between awareness, self – efficiency and quality of life with controlling glycemic and lipids in smoking diabetics patients.** *Hormozgan Medical Journal* 2007, **11**(4):261–266 (in Persian).
32. Jahanlou AS, Ghofranipour F, Sobhani A, Kimmiagar M, Vafaei M: **Evaluating curvilinear hypothesis in quality of life and glycemic control in diabetic patients.** *Journal of Arak University of Medical Sciences* 2008, **11**(2):27–33 (in Persian).
33. 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**(3):153–158.

34. Jahanlou AS, Ghofranipour F, Kimmiagar 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**(4):246–251.
35. Jahanlou AS, Karami NA: **WHO quality of life-BREF 26 questionnaire: reliability and validity of the Persian version and compare it with Iranian diabetics quality of life questionnaire in diabetic patients.** *Prim Care Diabetes* 2011, **5**(2):103–107.
36. Kakhaki AD, Saeedi JA, Yaghmaie F, Majd HA, Montazeri A: **Quality of life of diabetic patients referred to Tehran hospitals in 2004.** *Iranian Journal of Endocrinology and Metabolism* 2006, **8**(1):49–56 (in Persian).
37. Kasbakhi MS, Ehsani M, Ghanbari A: **Comparing quality of life of type 2 diabetics patients with health people.** *Journal of Babol University of Medical Sciences* 2008, **9**(5):55–60 (in Persian).
38. Kermansaravi F, Navidian A, Ansarymoghdam A: **Quality of life in type 1 diabetic adolescents in Zahedan.** *Iranian Journal of Endocrinology and Metabolism* 2012, **13**(6):651–657 (in Persian).
39. Khaledi S, Moridi G, Gharibi F: **Survey of eight dimensions quality of life for patients with diabetes type II referred to Sanandaj diabetes center in 2009.** *Journal of Fasa University of Medical Sciences* 2011, **1**(1):29–37 (in Persian).
40. Khamseh MA, Monavari A, Malek M, Shafeei G, Baradaran HR: **Health-related quality of life in patients with type 1 diabetes.** *Iranian Journal of Endocrinology and Metabolism* 2011, **13**(3):249–255 (in Persian).
41. Nejatiasafa A, Larijani B, Shariati B, Amini H, Rezagholizadeh A: **Depression, quality of life and glyemic control in patients with diabetes.** *Iranian Journal of Diabetes and Lipid Disorders* 2008, **7**(2):195–204 (in Persian).
42. Peymani M, Monjamed Z, Aliasgharpoor M: **The relationship between diabetic neuropathy and quality of life.** *Iranian Journal of Diabetes and Lipid Disorders* 2006, **5**(4):387–394 (in Persian).
43. Peymani M, Monjamed Z, Aliasgharpoor M, Mehran A: **Evaluating the effect of cardiovascular diseases on quality of life among diabetic patients referred to Tehran hospitals during 20004–2005.** *Journal of Medical Council of Islamic Republic of Iran* 2007, **25**(2):142–148 (in Persian).
44. Peymani M, Monjamed Z, Aliasgharpoor M: **The relationship between diabetic retinopathy and quality of life.** *Iranian Journal of Diabetes and Lipid Disorders* 2008, **8**(1):11–18 (in Persian).
45. Rakhshanderu S, Heidarnia A, Rajab A: **Effect of health education on patients' quality of life.** *Medical Daneshvar* 2006, **13**(63):15–20 (in Persian).
46. Rasouli D, Nasiriziba F, Nabiamjad R, Haghani H: **The quality of life in men and women with diabetic foot ulcer in selected hospitals of Tehran universities.** *Journal of Jahrom University of Medical Sciences* 2011, **9**(1):38–45 (in Persian).
47. Safavi M, Samadi N, Mahmoodi M: **Effect of quality of life improvement on type 2 diabetes patients' self-esteem.** *Saudi Med J* 2011, **32**(9):954–957.
48. Sanjari M, Safari S, Shokoohi 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**(4):200–206.
49. Sayadi N, Fayazi S, Ramezani A: **Assessing quality of life after open heart surgery in diabetic and non-diabetic patients.** *Journal of Rafsanjan University of Medical Sciences* 2011, **10**(2):144–150 (in Persian).
50. Shahrjerdi S, Shavnadi N, Golpayegani M, Hosseini RS: **Impact of strength and resistance training on glycemic control, quality of life and mental health in women with type 2 diabetes.** *Iranian Journal of Diabetes and Lipid Disorders* 2009, **9**(1):35–44 (in Persian).
51. Shareh H, Soltani E, Ghasemi A: **Predicting of quality of life of non-insulin-dependent diabetic patients based on perceived social support.** *Zahedan Journal of Research in Medical Sciences* 2012, **14**(2):82–85 (in Persian).
52. Taghidisi MH, Borhani M, Solhi M, Afkari ME, 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**(2):229–238.
53. Timareh M, Rahimi MA, Abbasi P, Rezaei M, Heidarpoor S: **Quality of life among diabetic patients referred to the diabetes research center of Kermanshah.** *Journal of Kermanshah University of Medical Sciences* 2012, **16**(1):63–69 (in Persian).
54. Vares Z, Zandi M, Baghaei P, Alavi NM, Ajorpoz NM: **Quality of life and related factors in diabetic patients attending a diabetes center in Kashan.** *Nurs Res* 2010, **5**(17):14–22 (in Persian).
55. Vazirinejad R, Sajadi M, Maghool N: **Effect of diabetes on quality of life: results of a historical cohort study.** *Journal of Research in Medical Sciences* 2010, **34**(1):35–40 (in Persian).
56. Yekta Z, Pourali R, Ghasemi-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**:393–399.
57. Polonsky WH: **Understanding and assessing diabetes-specific quality of life.** *Diabetes Spectr* 2000, **13**:36.
58. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, et al: **Quality criteria were proposed for measurement properties of health status questionnaires.** *J Clin Epidemiol* 2007, **60**(1):34–42.
59. Speight J, Reaney MD, Barnard KD: **Not all roads lead to Rome-a review of quality of life measurement in adults with diabetes.** *Diabet Med* 2009, **26**(4):315–327.
60. Achhab YE, Nejari C, Chikri M: **Disease-specific health-related quality of life instruments among adults diabetic: a systematic review.** *Diabetes Res Clin Pract* 2008, **80**(2):171–184.
61. Smith SC, Lamping DL, Maclaine GD: **Measuring health-related quality of life in diabetic peripheral neuropathy: a systematic review.** *Diabetes Res Clin Pract* 2012, **96**(3):261–270.
62. Wandell 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**(2):68–74.

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