Quality of Life and Associated Factors among Elderly Diabetic Patients in Shiraz, 2014

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Abstract

Background: Today, the quality of life (QoL) studies have an important role in public health care, especially among the old adults suffering from chronic diseases such as diabetes. Diabetes and its complications can widely affect various aspects of QoL. Therefore, the present study aimed to assess diabetic patients' QoL and identify the factors that affect it.

Methods: A cross-sectional study was conducted on 593 randomly selected diabetic patients aged 60 years and above who were admitted in 13 diabetes clinics in Shiraz, Iran, in 2014. Diabetes Quality of Life-Brief Clinical Inventory (DQOL-BCI) questionnaire was used to assess the quality of life in these patients. Univariate and multivariate linear regression analyses were performed, using Stata software, version 12, to identify the predictors of DQoL.

Results: The participants' mean DQoL score was 41.8±6.2 with a mean age of 66.2±6.0 years. Multivariate linear regression analyses revealed that FBS level (115-180 mg/dL: P=0.05; above 180 mg/dL: P=0.02) and duration of diabetes (4-9 years: P=0.06; above 9 years: P=0.002) were two important clinical predictors of DQoL.

Conclusion: This study demonstrated a relationship between clinical and socio-demographic factors and diabetic patients' QoL. Considering these related variables could lead to effective control of diabetes complications and improvement of the patients' QoL.

Introduction

In the recent century, due to the success of public healthcare in changing disease patterns and increasing life expectancy, the elderly population has significantly increased, especially in developing countries, such as Iran. Therefore, the elderly population has had the highest growth rate among all the age groups.[1] According to surveys, the proportion of the world's older adults is estimated to double from about 11% to 22% between 2000 and 2050.[2] This is an expected increase from 605 million to 2 billion people over the age of 60 years.[3,4] According to the conducted census in Iran, about 8.2% of the total population (over 6 million) are aged 60 years and above and this value is expected to reach 10 million by 1400.[3,5]

Aging is always combined with special physical and mental health challenges and disabilities, which can lead to loss of opportunities to improve the elderly Quality of Life (QoL). QoL is a subjective concept with various definitions. World Health Organization (WHO) defined QoL as "an individual's perception regarding his life in a cultural context within the system they are inserted, and in relation to their goals, expectation, standards and concerns".[4] QoL is a multidimensional concept incorporating perceptions of positive dimensions, such as physical, emotional, social, and cognitive functions, as well as

negative dimensions, such as somatic discomfort and other symptoms arising from a disease.[6,7] QoL and Health-Related Quality of Life (HRQoL) are used interchangeably in the literature, but each one has its own meaning. QoL is a broader concept which covers all aspects of life. Illness and treatment of that illness can affect a patient's psychological, social and economic wellbeing as well as biological status; in health care, HRQoL is an assessment of how the individual's well-being may be affected over time by a disease. QoL is therefore, broader than HRQoL because it includes evaluation of non-health related features of life whereas HRQoL is connected to an individual's health or disease status.[8]

Presence of any chronic disease can have a negative impact on QoL, particularly in old adults.[9] Diabetes is one of the most common chronic diseases, a metabolic disorder characterized by hyperglycemia.[10] In the recent years, the prevalence of diabetes has dramatically increased. According to WHO, the number of diabetic patients in the world has reached 347 million, while this number was about 135 million in 1995. Regarding the epidemiology of diabetes in Iran, the report by the Ministry of Health, Treatment, and Medical Education indicated that 1240000 patients suffered from diabetes in 1994, while this number reached above four million in 2006.[11] The prevalence of diabetes increases significantly with age. In most populations, the highest rate of diabetes is related to the oldest age group.[10] The prevalence of diabetes has been reported to be 10-25% among the elderly (2-3 times higher than the youth).[12] Hence, diabetes is one of the major problems of aging and its serious, debilitating, and sometimes fatal complications, such as amputation, kidney failure, and cardiovascular, nerve, and eye diseases can widely affect various aspects of QoL.[9,13,14]

Studies have shown that the most severe complications which reduce QoL scores occurred within long-term diabetes.[6] In other words, duration of diabetes and other clinical factors, such as medications and blood sugar, can be associated with DQoL.[15-18] Researchers have also found associations between socio-economic and demographic factors and QoL in diabetic patients.[19] For example, a study in Shiraz, Iran revealed a significant linear correlation between some aspects of QoL and age, education level, and duration of diabetes.[15] Besides, a Chinese study indicated that QoL was negatively correlated with gender, age, Fasting Blood Sugar (FBS), and diabetes complications and positively correlated with occupation, income, and exercise.[17]

Assessment of Diabetic Quality of Life (DQoL), especially among the elderly, is an important indicator for the evaluation of diabetes care as a part of the monitoring procedure. Moreover, low DQoL can lead to low self-care and inappropriate control of blood glucose, eventually increasing the risk of complications.[14] Therefore, the present study aimed to assess diabetic patients' QoL and identify the factors that affect QoL. To the best of our knowledge, our study was the first research in Shiraz, Iran, which investigated QoL among the elderly diabetic patients through a valid questionnaire [Diabetes Quality of Life-Brief Clinical Inventory (DQoL-BCI).[20]

Methods

This cross-sectional study was conducted on 593 randomly selected diabetic patients aged 60 years and above who were admitted in 13 diabetes clinics in Shiraz, south of Iran, from January to November 2014. Systematic random selection was used to select the patients. In this way, the first patient in each day was selected and the rest of the patients were selected every other day. The inclusion criteria of the study were being 60 years old and above, being willing to participate in the study, being among conscious outpatients, and self-report of any type of diabetes. Elderly patients who were unable to answer the questions were excluded from the study.

Trained interviewers tried to enroll all diabetes spectrums, from low to high, into the study by paying daily visits to the clinics. In order to estimate the study sample size and increase the validity of the study, a pilot study was conducted on 100 elderly diabetic patients in Motahari clinic, Shiraz, Iran. Accordingly, a 383-subject sample size was determined for the study. Yet, considering the population-based nature of the study and the effect size of 1.5, the sample size was increased to 574 subjects.

Due to the participants' low literacy level, the study data were collected through interviews by trained experts (after a verbal consent) and the interviewers just read the questions in the preset questionnaires and recorded the patients' answers. The questionnaires had two parts. The first part included demographic, socio-economic, and clinical characteristics, such as age, sex, marital status, Body Mass Index (BMI), education level, occupation, income level, housing status, living companions, smoking, social activity, co-morbidities, medication, FBS level, and duration of diabetes. Its content validity was approved by three professors in the field of Biostatistics, with 0.8 Cronbach's alpha. The second part included DQoL-BCI questionnaire which contained 15 items, such as the level of patients' satisfaction with their treatment, time devoted to their care, and pain and diseases caused by diabetes. A score between 1 and 5 was assigned to each question in this part. Thus, the minimum and maximum DQoL scores were 15 and 75, respectively. DQoL-BCI is a valid and reliable questionnaire for evaluation of QoL in Iran. Nasihatkon and colleagues have determined

DQoL-BCI reliability with 0.77 Cronbach's alpha.[14]

Univariate and multivariate linear regression analyses were performed to identify the predictors of DQoL. In doing so, the DQoL score was treated as the continuous dependent variable. Besides, two clinical factors, i.e. FBS and duration of diabetes, were entered into the model as the main exposures.

All the statistical evaluations were made assuming a two-sided test based on 5% level of significance. The statistical analyses were performed using Stata software, version 12.

Results

The characteristics of the study participants are presented in Table 1. The participants included 593 diabetic patients with a mean age [(Standard Deviation (SD)] of 66.2 (SD=6.0) years. Over half of the participants (52.6%) were female and had low literacy levels (77.0%). Besides, the patients' mean BMI was 26.2(SD=3.8) kg/m2, and the prevalence of being over-weight was 47.0%. Most of the participants (76.0%) were living with their spouses and in their own houses (88.2%).

Table 1: Description of the study participants

Variable	Frequency (%)
Age(years)	
60-70	478 (80.61)
>70	115 (19.39)
Total (n)	593 (100)
Sex	
Female	312 (52.6)
Total (n)	593 (100)
Marital status	
Married	488 (82.3)
Single, divorced, widowed	105 (17.7)
Total (n)	593 (100)
BMI	
<18.5	9 (1.5)
18.5-25	221 (37.8)
25-30	277 (47.4)
>30	77 (13.2)
Total (n)	584 (100)
Occupation	
Unemployed	65 (11)
Homemaker	240 (40.5)
Retired	246 (41.5)
Employed	42 (7.1)
Total (n)	593 (100)
Income level (Toman)	
<500,000	179 (30.19)
500,000-1000,000	324 (54.64)
>1000,000	90 (15.18)
Total (n)	593 (100)
Education level	
Illiterate	256 (43.2)
Primary school	200 (33.7)
Middle school	38 (6.4)
High school	75 (12.6)

Table 1: Description of the study participants

Variable	Frequency (%)
Academic	24 (4)
Total (n)	593 (100)
Housing	
Own house	523 (88.2)
Rented	70 (11.8)
Total (n)	593 (100)
Living with	
Alone	36 (6.1)
Spouse	451 (76.1)
Children	106 (17.9)
Total (n)	593 (100)
Number of meetings with family (per month)	
1-2	41 (6.9)
4-8	293 (49.7)
12-16	256 (43.4)
Total (n)	590 (100)
Social activity	
Yes	256
No	337
Total (n)	593 (100)
Duration of Social activity (per week)	
0	348 (58.7)
1	136 (22.9)
2-3	71 (12)
>4	38 (6.4)
Total (n)	593 (100)
Smoking	
Current	53 (11.3)
Ex-smoker	77 (16.4)
Never	340 (72.3)
Total (n)	470 (100)
Co-morbidities	
Hypertension	374 (63.1)
Stroke	31 (5.2)
Heart disease	207 (34.9)
Osteoporosis	119 (20.1)
Kidney disease	107 (18)
Liver failure	12 (2)
Musculoskeletal diseases	135 (22.8)
Eye disease	354 (59.7)
Other	98 (16.5)
Medication	
None	15 (2.5)
Insulin	88 (14.8)
Metformin or Glibenclamide	163 (27.5)
Metformin &Glibenclamide	327 (55.1)
Total (n)	593 (100)
FBS level (mg/dL)	
<115	91 (15.35)
115-180	366 (56.66)
>180	166 (27.99)
Total (n)	593 (100)
Duration of diabetes(years)	
<3	80 (13.5)
4-9	218 (36.8)
>9	295 (49.7)
Total (n)	593 (100)

About 92.0% of the patients (n=542) had at least one of the co-morbidities listed in Table 1. In addition, high blood pressure and eye diseases were the most common co-morbidities (63.1% and 59.7%, respectively). The mean of self-reported duration of diabetes was 10.8(SD=9.3) years, and nearly half of the patients had been suffering from diabetes for more than 9 years. The mean level of FBS was 169 (SD=69.5) mg/dL, and this level was above 115 mg/dL in 87.0% of the participants. Moreover, 14.8% of the participants were using insulin, while 55.0% were taking Metformin and Glibenclamide medications to control diabetes.

The participants' mean DQoL score was 41.8 (SD=6.2), with the scores ranging from 22 to 59. This implies that the majority of the elderly diabetic patients had approximately mediocre QoL. The results revealed no significant difference between the age groups regarding DQoL scores [p-value=0.63] However, the scores of the male participants were slightly higher compared to those of the females [p-value<0.001, (CI: 3.69-26.67)] (Table 2).

The relationship between DQoL and socio-economic, demographic, and clinical variables is presented in Table 2. A univariate linear regression analysis was done to identify the factors having individual relationships with DQoL. These factors were sex, marital status, occupation (retired, employed), income level (500,000-1000,000 Toman, above 1000,000), education level (primary school, high school), living with spouse, having social activities, heart disease, stroke, duration of diabetes (>9 years) and FBS level (115-180 mg/dL, above 180 mg/dL) (Table 2).

The results of multivariate linear regression analysis are shown in Table 3. After adjustment for 6 significant factors, including occupation, income level, education level, living with spouse, heart disease, and stroke, FBS level (115-180mg/dL: relative mean difference=0.25, 95% CI=0.06-1.05; above 180 mg/dL: relative mean difference=0.14, 95% CI=0.03-0.79) and duration of diabetes (4-9 years: relative mean difference=0.22, 95% CI=0.04-1.06; above 9 years: relative mean difference=0.09, 95% CI=0.02-0.43) remained as two important clinical predictors of DQoL. The multiple R^2 showed that FBS with adjusted factors and duration of diabetes with adjusted factors could respectively explain 8% and 9% of the differences in QoL of the elderly diabetic patients.

Table 2: The univariate analysis for the relationship between socio-economic, demographic, and clinical variables and quality of life among the elderly diabetic patients

Variable	Relative mean difference	95% CI	P value
Age (years)			
60-70	Ref	--	--
>70	0.73	(0.20-2.61)	0.63
Sex			
Female	Ref	--	--
Male	9.92	(3.69-26.67)	0.001>
Marital status			
Married	Ref	--	--
Single ,divorced ,widowed	0.18	(0.048-0.67)	0.011
BMI			
<18.5	0.003	(0.00-0.0.24)	0.005
18.5-25	Ref	--	--
25-30	0.79	(0.14-4.42)	0.910
>30	0.24	(0.05-1.13)	0.093
Occupation			
Unemployed	Ref	--	--
Homemaker	0.97	(0.18-5.19)	0.97
Retired	10.41	(1.95-55.42)	0.006
Employed	27.89	(2.59-299.49)	0.006
Income level (Toman)			
<500,000	Ref	--	--
500,000-1000,000	9.81	(3.20-30.09)	0.001>
>1000,000	20.52	(4.33-97.13)	0.001>
Education level			
Illiterate	Ref	--	--
Primary school	3.21	(1.03-10.05)	0.04
Middle school	1.58	(0.194-12.93)	0.66
High school	31.19	(6.39-152.17)	0.001>
Academic	2.13	(0.162- 28.12)	0.56

Table 2: The univariate analysis for the relationship between socio-economic, demographic, and clinical variables and quality of life among the elderly diabetic patients

Variable	Relative mean difference	95% CI	P value
Housing			
Own house	Ref	--	--
Rented	0.24	(0.05-1.14)	0.07
Living with			
Alone	Ref	--	--
Spouse	8.62	(1.05-7.48)	0.04
Children	1.29	(0.12-13.41)	0.82
Number of meetings with family (per month)			
1-2	0.22	(0.02-1.74)	0.15
4-8	Ref	--	--
12-16	0.89	(0.31-2.53)	0.83
Social activity			
Yes	3.33	(1.21-9.15)	0.019
No	Ref	--	--
Duration of Social activity (per week)			
0	Ref	--	--
1	0.98	(0.28-3.38)	0.98
2-3	3.94	(0.80-19.30)	0.09
>4	6.55	(0.81-52.62)	0.07
Smoking			
Current	1.55	(0.25-9.49)	0.62
Ex-smoker	0.48	(0.10- 2.22)	0.34
Never	Ref	--	--
Co-morbidities			
Hypertension	0.47	(0.570-1.33)	0.156
Stroke	0.07	(0.008-0.719)	0.025
Heart disease	0.17	(0.06-0.49)	0.001
Osteoporosis	0.31	(0.09-1.10)	0.071
Kidney disease	0.57	(0.154-2.10)	0.399
Liver failure	0.26	(0.007-9.37)	0.465
Musculoskeletal diseases	0.36	(0.109-1.18)	0.094
Eye disease	0.81	(0.291-2.25)	0.689
Other	0.67	(0.174-2.61)	0.570
Medication			
None	Ref	--	--
Insulin	0.13	(0.004-4.23)	0.257
Metformin or Glibenclamide	0.35	(0.01-9.57)	0.536
Metformin &Glibenclamide	0.22	(0.008-5.65)	0.363
FBS level (mg/dL)			
<115	Ref	--	--
115-180	0.02	(0.054- 0.91)	0.032
>180	0.13	(0.029-0.668)	0.014
Duration of diabetes (years)			
<3	Ref	--	--
4-9	0.24	(0.049-1.19)	0.081
>9	0.09	(0.021-0.46)	0.003

Table 3: The multivariate analysis for the relationship between FBS and duration of diabetes and quality of life in the elderly diabetic patients

Variable	Relative mean difference	Adjusted R-squared (R2)	95% CI	P value
FBS level (mg/dL)*				
<115	Ref	0.08	--	--
115-180	0.25		(0.06- 1.05)	0.059
>180	0.16		(0.03-0.79)	0.024
Duration of diabetes (years)*				
<3	Ref	0.09	--	--
4-9	0.22		(0.04-1.06)	0.060
>9	0.09		(0.02-0.43)	0.002

*Adjusted for occupation, income level, education level, living with, stroke, and heart disease

Discussion

This study aimed to investigate the association between DQoL and some relevant factors among the elderly diabetic patients in Shiraz; and controlling the confounding effect of the characteristics related to DQoL. In this study, we found that the mean score of DQoL was nearly 42 and it was not significantly different between the age groups. Yet, the male participants obtained slightly higher scores compared to the female ones. Secondly, some factors, such as FBS level, duration of diabetes, sex, marital status, occupation, income level, education level, social activity, heart disease, and stroke had individual associations with DQoL. Finally, after adjusting the possible confounders in the multivariate regression model, the association between DQoL and FBS and duration of diabetes proved to be significant.

The differences found between the two genders confirmed the results of the previous studies,[11,21-23] suggesting lower QoL scores among females. This can be justified by sexual discrimination, lower physical activity, and physical and mental problems caused by menopause. Nonetheless, few studies have indicated better QoL in females.[24]

Regarding marital status, our results were in line with those of the previous literature,[25] indicating higher QoL among married cases living with their spouses. This might be due to the effects of physical and emotional supports. Studies have also shown that depression, suicide, and social problems were more related to single, widowed, or divorced individuals, but they were less likely to occur in married ones.[25,26]

Income and education level were two other variables that affected DQoL. Low education level and income can prevent the treatment adherence, which leads to poor control of blood sugar and greatly increases the likelihood of additional complications.[27]

In general, diabetic patients are faced with different associated co-morbidities. In the present study, the eight common diabetes co-morbidities in the elderly diabetic patients were investigated. According to the results, only stroke and heart disease were significantly associated with DQoL. It has been well documented in the medical literature that diabetic patients are at increased risk of developing cardiovascular disorders, including coronary artery disease and stroke. Ignoring concurrent disease management, however, can lead to ineffective control of diabetes risk factors and loss of opportunities to improve the patients' functioning, QoL, and mortality risk.[28]

Prior studies have come to controversial results regarding the relationship between duration of diabetes and DQoL.[27,29] In the present study, as the duration of diabetes increased, the score of DQoL decreased. Yet, it should be noted that QoL was not associated with age. This finding may be attributed to the occurrence of complications following long-term diabetes.[30]

FBS is the most common laboratory test used to determine the blood level of glucose after an overnight fasting. FBS level is 125 mg/dL or above in the patients suffering from diabetes. In our study, FBS level was above 125mg/dL in 75% of the patients despite taking pills and insulin. This indicates that their diabetes management strategies might have been inappropriate or inadequate. Therefore, it seems that they need to make changes in their diet, medicine, or exercise programs. Uncontrolled and frequent changes in blood sugar levels (called glycemic variability) leads to serious health problems (both physical and emotional). S Penckofer and colleagues found that frequent fluctuations in blood sugar levels in women with type 2 diabetes were associated with lower QoL and negative moods.[31] It is important to note that these blood sugar disorders can affect QoL and low QoL, in turn, can hamper diabetes control and increase high-risk complications.

The strong points of this study were inclusion of a large number of independent variables, its relatively large sample size, and its population-based nature which covered 13 diabetes centers in Shiraz. Yet, the findings of this study should be the target of further research including a comparable group of younger diabetic patients, seeking to identify whether QoL and its associated factors are similar among younger and older diabetic patients. On the other hand, the limitation of this study was that two of our main diabetes clinics were ophthalmologic centers, too and this might have been the main cause of the high prevalence of eye diseases in our study. Besides, patients' FBS level was measured in different laboratories which had different validities. Patients might not express some variables such as height, weight, and income level accurately. In general, aging may be accompanied with more amnesia and confusion; thus, the patients may not respond to questions with enough focus.

Conclusion

In conclusion, clinical and socio-demographic factors were the predictors of diabetic patients' QoL. According to the results, FBS and duration of diabetes were two important clinical predictors of DQoL. In this study, we only considered the patients' last blood test for measuring their blood sugar levels. Since diabetes is a chronic and continuous illness, future studies are recommended to measure the average of several blood tests in order to gain more reliable results.

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