Interactions between Diabetes and Baseline Characteristics of Study Subjects related to the Quality of Life

Masoud Mirzaei¹, Hossein Lashkardoost² and Andishe Hamedi³*

¹Department of Cardiology, Faculty of Medicine, Shahid Sadoughi University of Medical Sciences, Iran
²Department of Public Health, North Khorasan University of Medical Sciences, Iran
³MSc in Epidemiology North Khorasan University of Medical Sciences, Iran

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*Corresponding author: Andishe Hamedi, MSc in Epidemiology, Shirvan Center of Higher Health Education, North Khorasan University of Medical Sciences, Shirvan, Iran, Tel: +985832240524; Email: ahamedi1364@gmail.com

Abstract

Aim: Today, quality of life has attracted more attention and there is a relationship between disease and quality of life. This study was conducted to evaluate the interactions between Diabetes and baseline characteristics related to the quality of life of individuals.

Method: This cross-sectional study was carried out on a random sample of 7533 subjects, using the Health Survey data in Yazd. For assessing the quality of life, SF8 questionnaire was used. Data were analyzed by using, Mann-Whitney and logistic regression model in SPSS19.

Results: There were, significantly different between quality of life in diabetics and non-diabetics individual, and this relationship can be generalized to the subscales of quality of life (P<0.001). The effect of diabetes-related interactions with baseline characteristics of study subjects which affecting quality of life has shown that becoming old OR=3.3 [95%CI: 2.06-5.3], female OR=1.5 [95%CI: 1.02-2.2], being single OR=2.7 [95%CI: 1.6-4.5], being obese OR=1.9 [95%CI: 1.7-2.2] and having high blood pressure OR=6.4 [95%CI: 1.5-26.7] is associated with decreasing quality of life, and increasing the level of education has a significant role in improving the quality of life OR=0.08 [95%CI: 0.01-0.6].

Conclusion: Since diabetic patient had lower quality of life than non-diabetics. It is suggested, to promote the quality of life of patients; Health authorities should plan the solutions for supporting and promoting patients with diabetes’ health.

Keywords: Quality of life; Diabetes mellitus; Risk factor; SF8

Abbreviations: QOL: Quality of Life; HDI: Human Development Index; DM: Diabetes Mellitus; NCDs: Non-Communicable Diseases (NCDs); SF8: Standard Form 8; BMI: Body Mass Index

Introduction

Diabetes mellitus (DM) is the most common endocrine disease in the world and is responsible for 4 million deaths per year. Overall, 9% of all deaths in the world caused by DM. DM cases will rise from 285 million in 2010 to 439 million in 2030 (54% growth). Globally, 371 million people and more than 4.4 million peoples in Iran are living with diabetes [1]. Prevalence of diabetes in Iran is third highest among the countries of the Middle East and North Africa. The prevalence of diabetes is not the same in different parts of the world. In developed countries most diabetics are older than 65 years old; however in developing countries the prevalence is higher among middle aged population [2]. Prevalence of diabetes in Yazd province, which is located in central of Iran, is 16.3% ranked first in Iran, also 22% of the Iranian population over 40 years of age have diabetes [3,4]. In a study conducted in 2011 in Iran, 35.1% increase in the prevalence of diabetes was reported [5]. Underlying causes of increase in DM, consisted of obesity, due to urbanization and aging population, so that is more dramatic in developing countries, including Iran [6].

Sedentary lifestyle and poor diet, body mass index (BMI) >30, low physical activity, smoking and blood pressure are modifiable risk factors of DM. In addition to these factors, uncontrollable factors such as age and sex are effective in diabetes [7]. Diabetes in all its forms imposes costs in human, social and economic
conditions in all countries and all income levels. Patients with diabetes are more than other people at risk of complications such as ocular disorders, cardiovascular disease, amputation and kidney failure [8]. Quality of life score can be used for general assessment of individuals and community health. Somewhere the quality of life indicates status of people living in a country or region and individual understanding of their position in life that are linked to their goals and expectations [9]. Determinants of quality of life are factors including health, political stability and security, family life, community life, climate and geography, job security, political freedom and material [10]. Population health has been affected due to rising living standards, advances in public health and medical care and thus satisfaction, in various aspects of human life. Indicators of quality of life among 194 countries have been assessed on an annual basis.

According to the human development index (HDI) 2007-2008 published by the United Nations Development Program, countries with HDI values in the range of 0.5-0.8 had been categorized in the middle level of human development. Iran with a score of 0.759 had been in the medium human development level [11]. According to the quality of life in Iranian provinces, life index of each province have been studied in three states, these include economic, environmental and social factors. During the rankings, it has been observed that the provinces of East Azerbaijan, Khuzestan and Tehran have had the highest quality of life index and the provinces of Bushehr, Hamedan and Yazd, had the lowest score [12]. Many studies have worked on the quality of life in patients with diabetes and had shown that these patients had low quality of life [13,14]. Few studies investigate the association between diabetes and quality of life, including in central of Iran, Yazd and compare with general population. This study examined the interactions between Diabetes and baseline characteristics related to the quality of life of individuals. The results of this study can be used by health authorities to plan appropriate interventions, to increase the quality of life of general population and patients and reduce complications of DM in the population.

Subjects

This study was conducted on a random sample of 7533 men and women using the Health Survey data in Yazd during the years 2014-2015 (YaHS). Yazd health study (YaHS) has been the most comprehensive study on the health and disease community in Yazd province.

Materials and Methods

In this study, people were questioned about various aspects of physical and mental health in Yazd. The population of this study is people in age range of 20-70 years old in Yazd city and the sample size of this study is 7533 people. The subjects are from 5 age groups: 20-29, 30-39, 40-49, 50-59 years, and 60-69 years old. The sampling method is based on population and is a two stage clustering. In the first stage, 200 clusters were randomly selected from the regions of Yazd city. At the next stage, according to the list of households in 2014, the clusters were selected. Then, by moving from the right of the cluster computer letters response was completed. The choice of the next household was at the distance of one house from the first house, if there were several households on the same plaque (for example, an apartment), the information was collected from the first unit and was continuously referred to the subsequent units.

We took an informed consent before participating in the study. The tool used to collect information was using a Yazd health questionnaire and interviews. The questionnaire contained 300 questions in various fields including quality of life and underlying variables such as age, sex, level of education, history of diabetes. The questions of this questionnaire were designed with the participation and interaction of all university faculties and research centers. After several consecutive sessions, consultation with the professors, necessary amendments carried out and the validity of the questionnaire was confirmed. To determine the reliability of the questionnaire, a pilot study was done. 200 people from Yazd were randomly selected and 0.8 Cronbach's alpha was obtained. Finally, a final questionnaire was developed. Questions of quality of life section of Yazd people's health survey is based on standard form 8 (SF8) questionnaires. SF8 includes 8 scales (general health, physical functioning, physical pain, vitality, social function, mental health and emotional role); SF8 is a general measure of quality of life that can measure and compare quality of life across a wide range of different groups of patients or healthy people. Validity and reliability of this questionnaire have been confirmed. According to a study conducted by Ware et al. [15] in the field of ranking and reviewing the SF8 questionnaire, the score for each question is zero to one hundred and the score for each dimension of quality of life is zero to one hundred. Non-parametric test, Mann-Whitney was used in this study, because there were no normal conditions (non-normality of quality of life variable). Value less than 0.05 was considered as a significant level. Also, to investigate the relationship between other baseline characteristics of study subjects on quality of life and interaction between diabetes and baseline characteristics logistic regression model was used. In this method, quality of life was divided into two lower and upper categories and those who scored between zero and 75 were placed in the middle and lower quality of life category, and those with a score of above 75 were placed in the category of high quality of life. P value less than 0.05 was considered as a significant level and data was analyzed using SPSS software.

Results

In this study, a total of 7533 subjects, including 49.7% males and 50.3% females, were studied. From them, there was 1146 diabetic patients (15.2%) and 6387 non-diabetic patients (84.8%). The demographic characteristic of the subject's shows in Table 1. In terms of quality of life, 64.1% of participants had high quality of life and 35.9% had a lower and middle level of quality of life. Relationship between quality of life and baseline
characteristics of study subjects shows in Table 2. The results of this table presented that older age, males, low educational level, hypertension, obesity, smokers and people with low physical activity have lower quality of life.

**Table 1**: Demographic characteristics of the subjects.

| Variables        | Frequency | Percent |
|------------------|-----------|---------|
| Age              |           |         |
| 20-29            | 1530      | 20.3    |
| 30-39            | 1496      | 19.9    |
| 40-49            | 1565      | 20.8    |
| 50-59            | 1482      | 19.7    |
| 60-69            | 1460      | 19.4    |
| Sex              |           |         |
| Male             | 3746      | 49.7    |
| Female           | 3787      | 50.3    |
| Educational level|           |         |
| illiterate       | 2141      | 28.4    |
| Under diploma    | 2075      | 27.5    |
| Diploma          | 2154      | 28.6    |
| Academic         | 1163      | 15.4    |
| Marriage status  |           |         |
| Single           | 885       | 11.7    |
| Married          | 6648      | 88.3    |
| Diabetics        |           |         |
| No               | 6387      | 84.8    |
| Yes              | 1146      | 15.2    |
| Quality of life  |           |         |
| Moderate & Low   | 3216      | 35.9    |
| High level       | 4317      | 64.1    |

**Table 2**: Relationship between quality of life and baseline characteristics of study subjects.

| Variables        | OR(95%CI)         | P-Value |
|------------------|-------------------|---------|
| Age              |                   |         |
| 20-29            | 1                 |         |
| 30-39            | 2.05(0.6-6.8)     | 0.24    |
| 40-49            | 1.9(0.5-6.5)      | 0.27    |
| 50-59            | 3.6(1.1-11.07)    | 0.02    |
| 60-69            | 5.03(1.7-14.8)    | 0.003   |
| Sex              |                   |         |
| Female           | 1                 |         |
| Male             | 1.1(0.6-2.05)     | 0.51    |
| Educational level|                   |         |
| illiterate       | 14.2(1.9-105.4)   | 0.009   |
| Under diploma    | 10.7(1.4-80.3)    | 0.02    |
| Diploma          | 3.7(0.4-30.8)     | 0.21    |
| Academic         | 1                 |         |
| Marriage status  |                   |         |
| Single           | 1.2(0.5-3.2)      | 0.6     |
| Married          | 1                 |         |
| Diabetics        |                   |         |
| No               | 1                 | <0.001  |
| Yes              | 2.7(2.3-3.3)      | <0.001  |
| High blood pressure|           |         |
| No               | 1                 |         |
| Yes              | 2.6(1.5-4.5)      | <0.001  |

Quality of life in diabetics and non-diabetics individual was significantly different, and this relationship can be generalized to the subscales of quality of life (P<0.001). According to Table 2, diabetes is known as a risk factor for being placed on the lower and middle levels of quality of life. Diabetics were 2.7 times at higher chance of being placed in the lower and middle level of quality of life than non-diabetic patients. Mean values on subscales and summary components of the SF8 according to gender shows in Table 3. The effect of diabetes-related interactions with other factors affecting quality of life showed that physical activity (P=0.72) and smoking (P=0.07) had not positive interaction with quality of life. Interaction between diabetes and baseline characteristics of study subjects in relation to quality of life of individual show in Table 4.

**Table 3**: Mean and standard deviation values on subscales and summary components of the SF8 according to gender.

| Dimensions of Quality of Life | M±SD          |
|-------------------------------|---------------|
| Physical function             | Men 14.7±22.8 |
|                               | Women 21.2±25 |
| Limitation due to physical problem | Men 15.9±22.9 |
|                               | Women 23.1±25.9 |
| Physical pain                 | Men 21.7±25 |
|                               | Women 30.8±27.3 |
| general health                | Men 28.1±21.7 |
|                               | Women 33.6±22.3 |
| Vitality                      | Men 29.5±23 |
|                               | Women 35.1±24.3 |
| Social Performance            | Men 13.4±21.3 |
|                               | Women 18±23.2 |
| Emotional performance         | Men 18.2±25 |
|                               | Women 25.6±27.9 |
| Mental health                 | Men 15.3±21.6 |
|                               | Women 20.3±23.2 |

*Significantly at a level of 0.05
Table 4: Interaction between diabetes and baseline characteristics of study subjects in relation to quality of life.

| Variables          | OR(95%CI)     | P-Value |
|--------------------|---------------|---------|
| Age                |               |         |
| 20-29              | 1             |         |
| 30-39              | 2.02(0.8-4.8) | 0.11    |
| 40-49              | 2.1(0.9-4.5)  | 0.052   |
| 50-59              | 2.9(1.6-5.03) | <0.001  |
| 60-69              | 3.3(2.06-5.3) | <0.001  |
| Sex                |               |         |
| Male               |               |         |
| Female             | 1.5(1.02-2.2) | 0.03    |
| Educational level  |               |         |
| Illiterate         | 1.02(0.6-1.6) | 0.92    |
| Under diploma      | 0.4(0.1-0.8)  | 0.01    |
| Diploma            | 0.08(0.01-0.6) | 0.017   |
| Academic           |               |         |
| Marriage status    |               |         |
| Single             | 2.7(1.6-4.5)  | <0.001  |
| Married            | 1             |         |
| High blood pressure|               |         |
| No                 |               |         |
| Yes                | 6.4(1.5-26.7) | 0.01    |
| BMI                |               |         |
| Normal             |               |         |
| Thin               | 1.02(0.6-1.7) | 0.93    |
| Overweight         | 1.3(1.1-1.5)  | <0.001  |
| Obese              | 1.9(1.7-2.2)  | <0.001  |
| Physical activity  |               |         |
| (per week)         |               |         |
| No                 |               |         |
| Yes                | 0.9(0.6-1.3)  | 0.72    |
| Smoking            |               |         |
| No                 |               |         |
| Yes                | 1.56(0.9-2.5) | 0.07    |

*Significantly at a level of 0.05

Discussion

This study showed that the quality of life in diabetics and non-diabetics was significantly different, and this relationship can be generalized to the subscales of quality of life. So that people with diabetes had lower scores in terms of quality of life than non-diabetics. In general, people with diabetes had lower scores in both general physical and mental aspects of quality of life than non-diabetics. Such studies also confirm our findings [16,17]. People with diabetes face many physical, psychological and social problems that can lead to a decline in their quality of life. Diabetes mellitus complications can also reduce the quality of life of affected people. Diabetes mellitus treatments, such as insulin use, nutritional limitations in the daily lives of patients can reduce their quality of life. Contrary to our study, some studies have also shown that there is no significant relationship between quality of life scores in different subscales in the two study groups [18]. Also this research revealed more quality of life scores in women. Overall, men have a lower quality of life than women in this study; that may be related to lifestyle of women in Yazd. Most studies have shown as well; Even, such studies explain differences among anti-diabetes treatments between men and women [18,19]; so that men had lower QOL score than women. But after assessing the interaction between diabetes and gender on quality of life, it was found that the quality of life of women with diabetes is lower than that of men. However, some studies suggested better quality of life in men compared with women [20]. People whom married, had better quality of life after assessing the interaction between diabetes and marriage status, it was found that single people with diabetes also had lower quality of life which was statistically significant. Probably better inhibition of the disease and its complications by patient due to emotional support from their family, can be substantial reason for this. Mohammadi [21] also confirms these findings. However, some studies in different cultures reported higher quality of life for single people [20]. Individuals with higher education had better quality of life. After assessing the interaction between diabetes and educational level in individual, it was found that people with higher education, although having diabetes, have a better quality of life and diabetes, have a negative effect on the quality of life of people with low levels of education. This result of our study was consistent with such studies [18,22,23]. Probably it may be because of their jobs; social condition and awareness about the disease and its preventive way, but some studies have indicated an inverse significant relationship between level of education and quality of life [24].

Increasing age in both-women and men had lower quality of life in this study similar to some studies [25]. The quality of life starts to reduce with aging from age 40 years which may be due to physical, emotional and self-care limitations or chronic complications of Non-Communicable Diseases (NCDs). Several studies have shown that being obese, decreased physical activity, smoking, high blood pressure, as risk factors for diabetes mellitus. On the other hand, these factors had a significant impact on people’s physical and mental health and were factors that affect the quality of life of individuals [26]. In the present study, it has also been shown that there is a positive interaction between diabetes and obesity and high blood pressure. People with hypertension and diabetes, as well as obese and diabetic people, have a higher chance of living in the lower level of quality of life. Such studies confirm this result [27-29]. Treatment for a medical condition may affect other existing illnesses, which leads to a further decline in quality of life. In addition, a medical condition (such as hypertension) may affect the behavior of the diabetic patient and thus has a negative effect on consequences of treatment. In the present study, there is a significant relationship between physical activity and quality of life in individuals. So that people who have physical activity during the week have a higher quality of life. Study conducted by Raphael confirms this result [30]. But no significant interactions between diabetes and physical activity of people with quality of life were observed. Also, there was a significant relationship between smoking status and quality of life in the study, so that smokers had a lower quality of life. A study conducted by Susan has reported similar result [31]. But no significant interactions...
between having diabetes and smoking people with their quality of life were observed.

There were some limitations in this study. The definition of diabetes in our study is based on the self-declaration of individuals. The main limitation of our study is its cross sectional design, it was impossible to show the cause-effect relationship; which just measure association not causation; Nevertheless, our study also has some advantages. This study is one of a large population-based study using appropriate sampling methods. Present study displayed the lower quality of life in patients with diabetes than non-diabetics. It is suggested, for promote the quality of life of this patient, health authorities should plan the solutions for supporting and promoting patients with diabetes’ health. This planning could be including: appropriate diabetic care such as self-care and health education, family education, blood glucose management, mental and social support etc. Also for conducting more subsequent studies, it was suggested the research about the impact of suitable methods in promotion of all aspects of health in patients with diabetes.

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