Comparison of the effect of patient-centred and family-centred education through smartphones on the quality of life of patients with type 2 diabetes: A quasi-experimental study

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Abstract

Diabetes is one of the most common non-communicable metabolic diseases with debilitating complications that affect the quality of life of patients. Therefore, the present study aimed to determine the effect of patient-centred and family-centred education via smartphone on the quality of life of type 2 diabetic patients. This is a quasi-experimental study with a three-group design (patient-centred education, family-centred education and patient-family-centred education) that was conducted on patients with type 2 diabetes and their families in 2022. Research subjects were selected by the purposive sampling method. The collected data were analyzed using SPSS ver. 21. The results showed no significant difference between the three groups in terms of age, sex, marital status, educational level and duration of diabetes. There was a significant difference between the three groups in terms of the mean total quality of life (QoL) score before and after the intervention ($p < 0.05$). In other words, in addition to having a better score than the previous intervention in the three groups after the intervention, the total QoL score was better in the patient-family-centred education group. The results of the present study showed that patient-family-centred education has a greater impact on QoL scores. Therefore, healthcare providers and policymakers should pay more attention to this issue.

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Introduction

Diabetes is one of the health challenges and its incidence rate is on the rise worldwide. It is predicted to be one of the most important causes of death and disability in the world over the next 25 years.[1] Diabetes causes major changes in most systems of the body and causes the immediate or late onset of the disease, which can eventually lead to death, disability, and high medical costs.[2] According to the reports, healthcare expenditures for diabetic patients are 4 times higher than that of non-diabetic individuals.[3] The quality of life (QoL) issue and its various aspects in chronic diseases, especially due to their duration and severity, undergo many changes in physical, psychological, social and economic dimensions. According to studies, chronic diseases have had negative effects on health and QoL.[4] Considering the nature of the disease and the long-term complications of diabetes, one of the ways to control the disease is to emphasize self-care behaviours.[5] The increasing trend of mobile phone use in human societies has introduced this device as a new remote care tool to establish communication between patients and health care providers.[6] One of the key empowerment components that have been considered by health educators is the participation of people to help improve their QoL.[7]

The patient's family plays different roles. One of the roles is to be a caregiver.[8] Empowerment refers to opportunities given by a professional team to the patient and family members to increase the ability and skills of family members to meet the needs of patients.[9]

Self-care education and empowerment of patients and their families leads to an increase in client satisfaction, improvement of QoL level, reduction in patient anxiety, as well as reduces the disease-related complications, increased participation in healthcare programs, increased client independence in the implementation of daily programs and increased family health.[10] The results of research on health promotion indicate that the family plays an essential and pivotal role in the prevention and treatment of diseases. In his study, Agrawal used the active presence of the family as a good social base to improve dietary adherence.[11] Larson et al. conducted a study titled "Investigating the Effect of Nurses' Educational and Supportive Programs on Stroke Patients and Their Spouses". The results of the study showed a significant difference between the two groups in terms of overall QoL score over time.[12] Therefore, QoL monitoring is the best tool to assess the health status of patients with chronic diseases and the response of these patients to treatment and care methods. Since the prevalence of this chronic disease is high in Iran and is associated with several complications, so, it is necessary to take measures to empower this group of patients and their families.[13] As the results of previous studies show, the caring behaviours of the patient and the family affect QoL; however, patients will face various disease-related problems without education for different reasons. The families, as people who help to care for the patient, are also effective in the patient's self-care behaviours due to ignorance of the disease and its complications. Education can be an effective approach to eliminating these factors that affect the patient and the family and help solve these problems. It also seems that the combination of patient- and family-centred education, which has not been addressed so far, is more effective than the individual patient or family education, which needs further relevant studies. Therefore, the present study aimed to determine the effect of patient-centred and family-centred education through smartphones on the QoL of patients with type 2 diabetes.

Materials and Methods

Design and participants

This is a quasi-experimental study that was performed on type 2 diabetes patients and their families who were referred to in Zabol Diabetes clinic in 2022. The study samples were selected using the purposive sampling method and randomly divided into three groups: 1, 2, and 3 interventions based on a random numbers table. Inclusion criteria included reading and writing literacy, patients aged 35-60 years old, confirmed type 2 diabetes, suffering from diabetes for six months after diagnosis, the ability to use mobile phones, tendency to participate in studying and absence of mental illnesses. Exclusion criteria also included hospitalization during the study period, being absent from training sessions and unwillingness to participate in the study. The sample size was determined 45 people (n=15 per group) by considering a confidence interval of 95%, test power=90% and using the sample size formula, based on the mean difference:

$$N = 2C X (\sqrt{SD12 + SD22}) / (M1 - M2)) 2 (22).[13]$$

Instruments

The data collection instrument was a two-part questionnaire. The first part contains demographic characteristics and individual characteristics and disease as well as (Age, sex, marital status, level of education, type of disease, drug use, and duration of the disease). The second part is the 12-item short-form health survey (SF-12). SF-12 is the moderated form of SF-36 that consists of 8 dimensions and is divided into two physical and psychological scales. Physical scales include four dimensions of general health (GH), physical functioning (PF), role physical (RP), and bodily pain (BP). The psychological scale consists of four dimensions of role limitations due to emotional problems, role emotional (RE), vitality (VT), mental health (MH), and social functioning (SF). The possible score range for each dimension and the total QoL is between 0 and 100, with scores 100 and 0 indicating the best and the worst QoL scores, respectively. The validity and reliability of

Table 1. Absolute frequency distribution and frequency percentage and mean and standard deviation of demographic variables of subjects in three groups.

Variable	Group Patient-centred mean (standard deviation) frequency (%)	Family-centred (standard deviation) frequency (%)	Patient and family-centred mean (standard deviation) frequency (%)
Age			
Mean (standard deviation)	55.07(6.67)	56.47(7.73)	55.33(7.35)
Sex			
Male	4(26.7)	8(53.3)	6(40)
Female	11(73.3)	7(46.7)	9(60)
Marital status			
Married	13(86.7)	15(100)	15(100)
Single	0	2(13.3)	0 0
Education level			
Reading and writing	6(40)	5(33.3)	3(20)
Diploma	6(40)	7(46.7)	8(53.3)
Bachelor and higher	3(20)	3(20)	4(26.7)
History of disease (year)			
Mean (standard deviation)	5.93(1.75)	5.60(2.58)	5.60(1.95)

the above questionnaire were measured by Montazeri et al. (2009), its reliability for the physical and psychological components was 0.73 and 0.72, respectively.[14]

Data collection

After obtaining the relevant permissions from the University Ethics Committee and obtaining the informed consent for participation of the research subjects based on the inclusion criteria, they were selected through the purposive sampling method and were divided into three groups; *i.e.* family-centred and patient-centred and patient-family-centred groups. The study was performed on patients with an active family member (family member who was the main caregiver of the patient at home and hospital and spent the highest time with the patient). The researcher then held a briefing to introduce himself to patients and their families (parents or children or spouses), explain the study objective and obtain their written consent and contact number to send educational content to them. SF-12 was completed by the studied subjects in person before training. Afterwards, educational materials on diet, exercise, and medicine were sent to patients and their families in person and via SMS (smartphones) due to the COVID-19 epidemic. The educational materials were also sent in the form of pamphlets; educational videos, or CDs depending on the facilities available for patients. Then, for two months, through mobile SMS, the educational materials were sent to patients and their families and the training process was followed up by telephone, email or referring to patients and patients' questions were answered. The study groups included family-centred patient-centred and patient-family-centred groups. At the end of the two-month follow-up, when patients were referred to the centre for treatment follow-up, they completed SF-12. The educational content was sent three times a week using smartphones to the intervention group. At the end of each session, the patient's questions regarding the educational content were answered. The educational content included: i) Exercise, type, and duration of daily activity, ii) Training the drug complications and use; iii) Familiarity with diet, type, amount and frequency of diet in these patients.[15].

Data analysis

The collected data were first coded and then analyzed using SPSS ver. 22. First, the normality of variables was initially investigated using the Shapiro-Wilk test. Demographic information was described by determining the absolute frequency and frequency percentage, mean and standard deviation. To perform the intergroup comparison, chi-square, one-way ANOVA and paired t-test tests were used. The confidence coefficient of the study was 95% and $p<0.05$ was considered as the significant level.

Ethical consideration

This study was approved by the Ethics Committee of Zabol University of Medical Sciences and the Ethics Committee of the

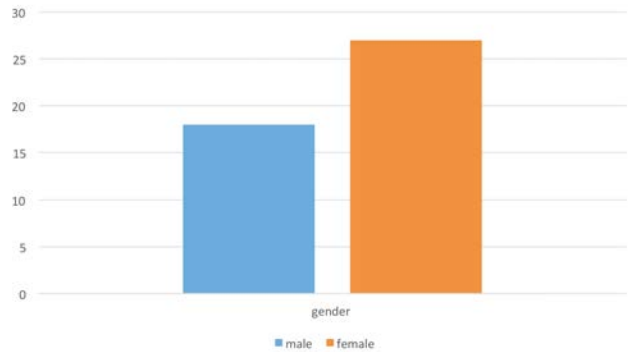

Figure 1. Gender of participants.

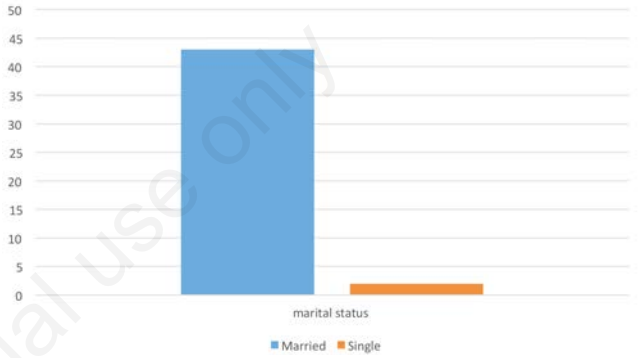

Figure 2. Marital status of participants.

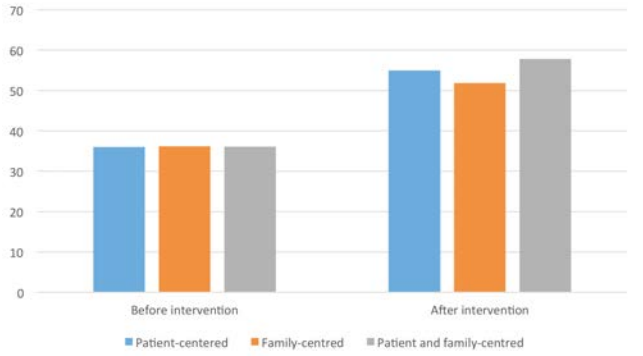

Figure 3. Quality of life of participants before and after intervention in three groups.

Table 2. Absolute frequency distribution and frequency percentage and mean and standard deviation of demographic variables of subjects in three groups.

Variable	Group		
	Patient-centred mean (standard deviation) frequency (%)	Family-centred (standard deviation) frequency (%)	Patient and family-centred mean (standard deviation) frequency (%)
Total quality of life score			
Before intervention	36.02(5.31)	36.19(4.71)	36.10(4.38)
After intervention	54.04(5.68)	51.85(2.89)	57.85(6.31)

place where the research was conducted (Ethic code: IR.ZBMU.REC.1399.161).

Results

The results of the demographic data analysis of the present study showed that the age range of the samples was between 35-56 years. Females made up most participants in the three groups. The Chi-square test showed no statistically significant difference between the three groups in terms of sex, education level, marital status, or history of the disease ($p>0.05$) (Table 1; Figure 1 and 2)

Regarding the results of investigating QoL, the one-way ANOVA test showed no significant difference between the three groups in terms of the total QoL score before and after intervention ($p>0.05$) (Table 2; Figure 3)

Also, a paired t-test showed a significant difference between the patient-centred, family-centred and patient and family-centred groups in terms of the mean total QoL score before and after the study ($p<0.05$). The quality of life in the patient and the family-centred group was better than in other groups. ($p<0.05$).

Discussion

The present study aimed to determine the effect of patient-based and family-centred education and a combination of patient-based and family-centred education through smartphones on the quality of life of patients with type 2 diabetes. Data analysis showed no significant difference between the three groups in terms of age, sex, marital status, education and duration of diabetes. The mean age of patients in the three groups was nearly 55 years and the duration of diabetes in the three groups was also nearly 5.5 years.

Data analysis indicated that the mean total QoL score in the patient-centred education group was significantly different from before and after the study ($p<0.05$). In other words, patients in the patient-centred education group had a better score in the post-intervention phase. In this regard, in their meta-analysis and systematic review, Aminuddin *et al.* showed that smartphone-based self-care and self-management interventions lead to improved self-efficacy, and self-care activities, thus improving the QoL of patients,[16] which is consistent with the results of the present study. In the present study, educational content included exercise, type and duration of daily activity, training on drug programs, the drug complication and use and familiarity with diet, type, rate and frequency of diet in these patients. In other words, educational content was designed to promote self-care and self-management capabilities. Therefore, similar to the study by Aminuddin *et al.*, the present study revealed that smartphone-based education on self-care activities and self-management promotes QoL of patients by increasing the empowerment and awareness of patients about self-care. Studies show that education-based promotion of self-care activities can improve the QoL of patients with type 2 diabetes. On the other hand, improvement of QoL increases the empowerment of patients in self-care activities.[17] Therefore, there is a reciprocal relationship between QoL and patient education. In the present study, the type of educational method including in-person and telephone was used. In a clinical trial, Rossi et al. investigated the effect of smartphone education on QoL, weight control and treatment satisfaction in patients with type 1 diabetes during the 6-month follow-up. They reported significantly lower glycosylated haemoglobin levels in the experimental group than in the control group. They also reported a significantly lower risk of hypoglycemia (86%) in the experimental group, and in general, the QoL of patients in the experimental group was significantly better after six months.[18] This study is consistent with the findings of the present study that suggests improved QoL after smartphone-based education. Smartphone-based education led to increased awareness and empowerment of patients in blood glucose control at its normal level; therefore, patients suffer from hyperglycemia-related morbidity and complications less frequently. There are also fewer cases of recurrent hypoglycemia, which occurs due to a lack of knowledge and proper insulin administration. Reducing the incidence of diabetes-related morbidity and complications can lead to increasing and promoting QoL of patients and treatment satisfaction. In a quasi-experimental study, Sabzevari et al. also investigated the effect of the implementation of a nurse's follow-up program on QoL of patients with type 2 diabetes in Kerman. They showed a significant difference between control and intervention groups in terms of the total QoL scores (overall score). In general, the experimental group had a better QoL score than the control group.[19] The results of this study are consistent with the findings of the present study. Thus, based on the results of these two studies, the telephone follow-up program has been able to improve the QoL of the studied clients.

The results of the present study also showed a significant increase in the mean total QoL score of the family-centred group after the intervention ($p<0.05$). In this regard, Garcia et al. investigated the effect of family-centred education through telephone follow-up on the glucose levels of patients with diabetes. They showed that patients had a better QoL after the intervention. There was also a significant decrease in glycosylated haemoglobin levels and an improvement in the knowledge and self-efficacy of patients.[20] The results of this study are consistent with the present study. Hu et al. also reported an improvement in the QoL of diabetes patients after smartphone-family-centred education.[21] The results of this study are also consistent with the results of the present study. According to the results of these studies, it can be concluded that family education and family members' involvement can be used as an effective patient education strategy because, family members, in addition to supporting and encouraging patients, can act as caregivers for patients by increasing their awareness. Fewer studies have investigated the effect of family-centred education on QoL as well as the effect of smartphone training on improving the QoL of diabetic patients, such as self-efficacy and self-care. Katebi *et al.* showed that the total QoL score of the family-centred education group is significantly higher after intervention,[22] which is consistent with the results of the present study so that QoL scores increased in patients undergoing family-centred education in both studies. Family-centred education can effectively improve the QoL of diabetic patients, so, the patient's family members should be used as members of the treatment team to maintain and improve the QoL of diabetic patients. In another study, Ebrahimi *et al.* investigated the effect of family-centred education on QoL of patients with type 2 diabetes. In this clinical trial, 12-week training was performed on patients' families. The results showed that the total QoL score of patients was significantly higher in the post-training phase.[23] The results of the above study are also consistent with the findings of the present study which showed better QoL scores in patients undergoing family-centred education. Also, the results of comparing the patient-centred education with the combination of patient and family-centred education showed no significant difference in the mean total QoL scores of the study samples before the study. However, there was a signif-

icant difference in the total QoL scores of study samples after the intervention. There was no study comparing patient-centred education and patient-family-centred education. Fine *et al.* referred to patient-family-centred education as the best educational method.[24] Besides, various studies provide simultaneous education to patients and their families as an effective method and strategy in patient education.[25] However, the present study showed no significant difference between patient-centred education and patient-family-centred education, which may be due to the small sample size. Also, results of comparing family-centred education with patient-family-centred education showed a significant difference between the family-centred and the patient-family-centred education group in terms of the total QoL scores. That is, QoL scores were higher in the patient and family-centred group than the family-centred group. There was no significant difference between the family-centred group and the patient and family-centred group in terms of the total QoL scores. In other words, patients in the patient-centred and family-centred groups had a better total QoL score than the family-centred group. This difference reveals that patient-family-centred education is a more effective strategy for education. There was no study comparing simultaneous patient and family education with family training alone. It seems that patients and family-centred education seem to be a more effective patient education strategy. It is recommended to carry out further studies in this regard.

Conclusions

Patient, family and patient-family-centred education affected the quality of life. Therefore, nurses, physicians, patients and their families recommend that if patients and families are taking care of patients, use this method as one of the non-pharmacological methods to strengthen the quality of life of patients. Because patients follow up treatment more successfully when they experience a better quality of life. Considering the chronicity of diabetes and long-term patient involvement, it causes fatigue and a negative impact on their lives, thus the results of the current study can help improve the quality of life of these patients. To ensure better generalization, it is recommended to conduct the present study on a larger sample of patients and their families because family-patient-centred education is a more effective method in increasing the quality of life of patients.

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