The outcomes of peer-led diabetes education in comparison to education delivered by health professionals in Iranian patients

Zakieh Ahmadi1, Tabandeh Sadeghi2* and Marzeyeh Loripoor3
1Department of Nursing, School of Nursing and Midwifery, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, 2Department of Pediatric Nursing, School of Nursing and Midwifery; Non-Communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran and 3Department of Midwifery, School of Nursing and Midwifery; Geriatric Care Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran.
*Correspondence to: T. Sadeghi. E-mail: t.b_sadeghi@yahoo.com

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Abstract

Education is an important aspect of care for diabetic patients. This study aimed to compare the effect of education by health care provider and peer on self-care behaviors among Iranian patients with diabetes. In this clinical randomized control trial, we enrolled 120 patients with type 2 diabetes who were referred to the Diabetes Clinic at a university medical center hospital in an urban area of Iran. Participants were randomly allocated into three groups. Patients in care provider group (CPG) received additional education provided by a nurse, other than routine education in a Diabetes Clinic. Patients in peer education group (PEG) received education given by a peer. Patients in control group (CG) received the routine education in accordance with the usual procedures at the Diabetes Clinic. Data collected at baseline and 12 weeks (3 months) were demographic variables and diabetes self-care activities. Self-care behaviors post intervention differed significantly by group; PEG patients demonstrated the greatest improvement. CG patients’ self-care behaviors did not change significantly and were significantly lower than scores by CPG and PEG patients. In line with the World Health Organization recommendations, future studies are warranted to confirm the effectiveness of peer-led education among diabetic patients in the Iranian culture.

Introduction

Diabetes is a health risk and major cause of mortality and morbidity globally. Vascular complications of diabetes may lead to increased myocardial infarction and stroke, renal failure, blindness, and amputations [1]. The prevalence of diabetes across the globe is 6.4%, with a range from 3.8–10.2% in different geographical areas. In Iran, the 2013 data show that the prevalence of diabetes among people of 20–79-year old was 9.9% and with an estimated increase to 10.1% in 2035 [2].

Control of blood glucose levels to the normal ranges is the most important strategy for diabetes management [3]. Effective management of blood glucose requires the patient to accept responsibility to continue self-care behaviors and activities [4]. Self-care behaviors in diabetic patients can be referred to as patient’s decisions and activities toward disease adaptation and enhancement of their health status, which includes a healthy diet, exercise, self-monitoring of blood glucose levels, taking medications, and foot care [5, 6]. It also includes the prevention of complications, disabilities, and rehabilitation [7].

Inadequate self-care in patients with diabetes is a major problem across cultures. Inadequate self-care behaviors not only increases mortality rates, but also the costs of medication and laboratory tests and need for health services [8]. Supporting self-care
behaviors can result in improvements to health, reductions in health costs, better management of symptoms, and increased life expectancy [9]. Self-care is a significant component for diabetes education [10]. Nurses may play a significant role in teaching and empowering diabetes patients for the adherence of self-care and blood glucose control, which may also contribute to the improvement of patients’ quality of life, an important index in diabetes treatment [11]. Various studies have evaluated different diabetes education approaches including nursing model-based education [12], education through SMS, phone and mobile apps [13, 14], problem solving methods [15], and family-based education [16], all with varying results. Differences between the studies are the variations in methods for education of different groups with different efficacies. Hence, it is necessary to evaluate the effectiveness of different diabetes education approaches [17].

One educational method is peer education. A peer is defined as a person of the same social group of patients who believe they have the same abilities and maybe a tremendous inspiration in learning [18]. Peer education is an information exchange of attitudes and behaviors from individuals who are not specialists but have similar experiences [19]. The use of peer experiences to provide an educational program for patients with the same problems and lack the necessary skills to assess their disease symptoms can be useful. Peer administered educational programs can assist patients with coping and management of their disease [20]. Different studies have compared the peer education approach with health-care provider education in cardiac disease [21], hypertension [22], and AIDS [23, 24]. All reported contradictory results. For example, a study conducted in patients with cardiac failure showed that although both methods (CPE and PE) improved the patients’ quality of life, peer education was more long-lasting [21]. On the other hand, Whittle et al. compared this approach with a seminar for controlling hypertension and their findings showed no significant differences between the two groups [22]. For patients with diabetes, a study by Tang et al. showed that both methods (CPE and PE) assisted in improving diabetes outcome but peer education was more effective over the long-term [25]. Since no previous studies on the impact of peer education in Iranian patients were conducted and the results of the above mentioned studies are contradictory and warrant elucidation [21, 22, 25], our present study aimed to compare the effects of education by health-care provider and peer on self-care behaviors among Iranian patients with diabetes.

### Materials and methods

#### Trial design

This study was a clinical randomized control trial that compared the effects of education by health-care provider and peer on self-care behaviors among patients with diabetes. It was registered in the clinical trials with an ID for future follow-ups (Iranian Registry of Clinical Trials ID: IRCT2015122223190N1).

#### Sample size and randomization

We calculated the study sample size based on a comparison of the two means formula with an effect size of 10 for self-care behaviors and standard deviation of 13. Level of significance was set at $P<0.05$ and the study power was assumed to be 80%. We determined a sample size $n = 27$ patients for two groups and $n = 37$ for three groups. Considering the possibility of sample loss, 40 patients were allocated to each group. We randomly divided $N = 120$ patients into three groups. From these participants, three persons in the health-care provider group and one from the peer education group left the study due to lack of interest.

We randomly chose participants using a random numbers table. Random allocation of the participants was performed by the minimization method [26]. In this method, we initially categorized the patients based on key variables such as self-care behaviors score and gender. Afterwards, from those who met the inclusion criteria, the first participant was placed in one of the groups by a coin toss and the other participants were allocated to another.
group with a lower total of variables. In case of equality, we repeated the random allocation.

**Participants**

The research population consisted of all patients with diabetes who were referred to the Diabetes Clinic at a university medical center hospital in an urban area of Iran.

Inclusion criteria for the selection of participants in the study were as follows: 40-65 years of age, type 2 diabetes, history of diabetes for more than 6 months and willingness to take part in the study. Exclusion criteria included suffering from another acute or chronic physical disease (cardiac, respiratory, hepatic, musculoskeletal, or renal), and mental disorders.

**Data collection procedures**

Patients chosen for the study were subsequently contacted via telephone and provided information about the study. All contacted patients were assured that they could leave the study at any time they desired. Patients that agreed to participate met with one of the study researchers where each signed a written consent form. Subsequently, they completed summary of diabetes self-care activities questionnaire (SDSCA). Next, we used the minimization method of randomization to assign participants into three groups. Patients assigned to the care provider group (CPG) received additional education according to a designed educational program from a nurse as well as the standard education given in the Diabetes Clinic. Peer education group (PEG) received these educations by a peer. Control group (CG) patients received the standard education in accordance with the usual procedures at the clinic.

Inclusion criteria for selection of peer consisted of: good control of blood glucose, a few complications, ability to manage sessions, personal interest to collaborate and provide support, good social communication skills (e.g. good appearance, tone of voice, eye contact) and education higher than middle school. In order to select the peer, we consulted the chief physician and a nurse at the Diabetes Clinic. They introduced three patients excluded from the 120 participants who had good control of blood glucose based on test results in their files. The first author met with the three participants to select a potential peer and obtain his consent. Based on good communication, personal interest and ability to manage the session, the author approached the potential peer and provided him with a consent form to sign.

Subsequently, the chosen peer received training on managing sessions and implementing the educational program. The first author trained the peer an hour daily for two weeks. The training contents included: 1) basic knowledge to the understanding of diabetes, hypoglycemia recognition and prevention, and diabetes control criteria, 2) self-care behaviors that included self-monitoring of blood glucose levels, diet control, medication adherence, and foot care, 3) insulin-related education such as insulin types, effects, treatment, and injection techniques, and 4) interpersonal communication and teaching styles. Prior to each session, the research team coordinated the content with the peer and requested that he manage the classes according to his preferences (i.e. he uses his experiences and places them at the disposal of the study participants).

**Intervention**

**Diabetes education program**

Meeting plans included 12 weeks of education, one session per week during the first six weeks and one session every other week during the second 6 weeks. Each session lasted for 1 h. Sessions were held in groups of 20 patients.

Session content was designed based on the needs of a diabetes patient with particular attention to the main items of the SDSCA questionnaire such as diet control, physical activities, medication adherence and foot care which was all coordinated with the peer. The peer was asked to exchange his experience in diabetes control. Simultaneously, the control group received the clinic’s routine diabetes education program and did not undergo any intervention. After 12 weeks, we evaluated the self-care behaviors of all patients in the three groups.
**Instruments**

We used a demographic questionnaire (age, gender, education, illness duration) and SDSCA questionnaire for data collection. Smalls [27] used the SDSCA, as did Beraste et al. in a study in Iran [28].

The SDSCA questionnaire evaluates self-care behaviors of diabetic patients and consists of 15 questions that pertain to diet, physical activities, blood glucose control, foot care, and medication adherence. Answers are scored on a 0–7 scale according to the number of days each week in which those activities are performed. Total score of this questionnaire ranges from 0 to 105. The 8 questions about diet have a score range of 0–56, whereas one question each for physical activities and blood glucose control are scored from 0 to 7. Three questions about foot care have a 0–21 score range. Finally, two questions pertain to medication adherence with a 0–14 score range. Reliability and validity of the Persian version of SDSCA questionnaire have been confirmed by Beraste et al. [28] where they verified validity by content validity and calculated Cronbach’s Alpha coefficient for reliability at 0.88.

**Ethical consideration**

Ethical considerations of this study included obtaining permission from the Research Deputy of Rafsanjan University of Medical Sciences and the appropriate hospital authorities. We obtained written informed consent from patients prior to their participation. Participation was anonymous and voluntary. Patients were free to participate or leave the study at any time point. We fully explained all objectives of this research to the patients and assured them of confidentiality in terms of preservation and publication of medical data.

**Data analysis**

Data analysis was performed in SPSS V.18 using descriptive statistics (mean and standard deviation) and analytic statistics tests such as one-way ANOVA along with the paired t test, chi-square and Mann–Whitney U tests.

**Results**

Demographic results showed that females comprised the majority of participants in the three groups and were 40–55 years of age, with less than a high school diploma, and 1–10 years of illness duration. No significant difference existed between the three groups in terms of demographic characteristics (Table I).

After 12 weeks of educational intervention, seen in Table II we observed a significantly different mean score for self-care behaviors in the three groups (ANOVA, \( P = 0.004 \)). In a comparison between the groups using the Tukey post hoc test, a significant difference existed between the PEG and CG (\( P = 0.002 \)). We did not observe any significant difference between the CPG and CG (\( P = 0.16 \)) nor between the PEG and CPG (\( P = 0.28 \)).

Results of the paired comparison showed no significant difference in the mean score of self-care behaviors in the CG (\( P = 0.28 \)), however significant differences existed in the CPG (\( P = 0.001 \)) and PEG (\( P = 0.002 \)) before and after the intervention (Table II).

As seen in Table III, after the intervention, a significant difference existed between the three groups in terms of nutritional behaviors (ANOVA, \( P = 0.01 \)), physical activity (ANOVA, \( P = 0.01 \)), blood glucose control (ANOVA, \( P = 0.04 \)), and medication adherence (ANOVA, \( P = 0.001 \)). However, there was no significant difference between the three groups in foot care after the intervention (ANOVA, \( P = 0.29 \)).

**Discussion**

Results of this study showed significant differences in all self-care behaviors other than foot care between the three groups. A comparison between groups showed significant differences between the CG and PEG but not between the CPG and CG or the CPG and PEG. The findings of the current study indicated that the mean score of self-care behaviors increased significantly post-intervention in PEG and CPG groups. The only study that evaluated the
### Table I. Demographic characteristics of patients in care provider, peer and control groups

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Care provider group</th>
<th>Peer education group</th>
<th>Control group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16(40)</td>
<td>15(37.5)</td>
<td>15(37.5)</td>
<td>*P = 0.96</td>
</tr>
<tr>
<td>Female</td>
<td>24(60)</td>
<td>25(62.5)</td>
<td>25(62.5)</td>
<td></td>
</tr>
<tr>
<td>Age groups (years) N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40–55</td>
<td>18(45)</td>
<td>27(67.5)</td>
<td>27(67.5)</td>
<td>**P = 0.06</td>
</tr>
<tr>
<td>56–65</td>
<td>22(55)</td>
<td>13(32.5)</td>
<td>13(32.5)</td>
<td></td>
</tr>
<tr>
<td>Educational level N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>17(42.5)</td>
<td>11(27.5)</td>
<td>14(35.0)</td>
<td></td>
</tr>
<tr>
<td>Below diploma</td>
<td>17(42.5)</td>
<td>17(42.5)</td>
<td>11(27.5)</td>
<td>**P = 0.2</td>
</tr>
<tr>
<td>Diploma</td>
<td>2(5.0)</td>
<td>7(17.5)</td>
<td>9(22.5)</td>
<td></td>
</tr>
<tr>
<td>Above diploma</td>
<td>4(10.0)</td>
<td>5(12.5)</td>
<td>6(15.0)</td>
<td></td>
</tr>
<tr>
<td>Duration of diabetes (years) N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–10</td>
<td>23(57.5)</td>
<td>25(62.5)</td>
<td>24(60.0)</td>
<td>**P = 0.73</td>
</tr>
<tr>
<td>11–20</td>
<td>11(27.5)</td>
<td>13(32.5)</td>
<td>14(35.0)</td>
<td></td>
</tr>
<tr>
<td>21–30</td>
<td>6(15.0)</td>
<td>2(5.0)</td>
<td>2(5.0)</td>
<td></td>
</tr>
</tbody>
</table>

*Chi-square test.
**Mann–Whitney U test.

### Table II. Self-care behaviors in care provider, peer, and control groups before and after the intervention

<table>
<thead>
<tr>
<th>Group time</th>
<th>Care provider group Mean ± SD</th>
<th>Peer education group Mean ± SD</th>
<th>Control group Mean ± SD</th>
<th>ANOVA results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before intervention</td>
<td>51.70±11.93</td>
<td>55.82±16.05</td>
<td>53.62±13.26</td>
<td>df = 2 f = 0.49 *P = 0.61</td>
</tr>
<tr>
<td>After intervention</td>
<td>60.72±12.21</td>
<td>64.84±13.23</td>
<td>55.82±9.46</td>
<td>df = 2 f = 5.86 *P = 0.004</td>
</tr>
<tr>
<td>Paired T-test results</td>
<td>P = 0.001</td>
<td>P = 0.002</td>
<td>P = 0.28</td>
<td></td>
</tr>
</tbody>
</table>

*ANOVA.

### Table III. Dimensions of self-care behaviors in care provider, peer, and control groups before and after the intervention

<table>
<thead>
<tr>
<th>Time</th>
<th>Dimensions of self-care behaviors</th>
<th>Care provider group Mean±SD</th>
<th>Peer education group Mean±SD</th>
<th>Control group Mean±SD</th>
<th>*Test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before intervention</td>
<td>Nutritional behavior</td>
<td>24.97±6.71</td>
<td>26.32±7.56</td>
<td>25.52±8.47</td>
<td>P = 0.72</td>
</tr>
<tr>
<td></td>
<td>Physical activity</td>
<td>2.55±2.53</td>
<td>2.92±2.67</td>
<td>2.60±2.39</td>
<td>P = 0.77</td>
</tr>
<tr>
<td></td>
<td>Blood glucose control</td>
<td>1.12±1.57</td>
<td>1.67±1.84</td>
<td>1.35±1.36</td>
<td>P = 0.31</td>
</tr>
<tr>
<td></td>
<td>Foot care</td>
<td>10.85±4.59</td>
<td>11.95±5.41</td>
<td>11.90±4.63</td>
<td>P = 0.52</td>
</tr>
<tr>
<td></td>
<td>Drug behavior</td>
<td>12.20±2.70</td>
<td>11.45±3.52</td>
<td>12.25±2.80</td>
<td>P = 0.42</td>
</tr>
<tr>
<td>After intervention</td>
<td>Nutritional behavior</td>
<td>30.70±7.12</td>
<td>32.71±6.99</td>
<td>28.07±7.06</td>
<td>P = 0.01</td>
</tr>
<tr>
<td></td>
<td>Physical activity</td>
<td>3.75±2.49</td>
<td>5.05±2.29</td>
<td>3.55±2.59</td>
<td>P = 0.01</td>
</tr>
<tr>
<td></td>
<td>Blood glucose control</td>
<td>1.62±1.86</td>
<td>2.69±2.11</td>
<td>1.72±2.17</td>
<td>P = 0.04</td>
</tr>
<tr>
<td></td>
<td>Foot care</td>
<td>11.43±5.62</td>
<td>12.97±4.92</td>
<td>11.50±4.01</td>
<td>P = 0.29</td>
</tr>
<tr>
<td></td>
<td>Drug behavior</td>
<td>13.21±2.18</td>
<td>11.41±2.69</td>
<td>10.97±2.30</td>
<td>P = 0.00</td>
</tr>
</tbody>
</table>

*ANOVA.
effectiveness of peer telephone intervention for the enhancement of self-efficacy in type 2 diabetes in three groups namely; telecare by peer supporters (PS), telecare by diabetes specialist nurses (DSNs), and a control group—showed no significant differences in scores and outcomes specifically, self-efficacy scores, HbA1c, and other secondary outcome measures between the three groups [11]. Comparisons between this study and our present study are limited by different tools, outcome variables, and face-to-face education in our study. No study similar to ours with respect to comparison of self-care behaviors in three groups exists.

Up to date studies that compared the outcomes of self-care behaviors included two groups only. For example, Tang et al. conducted a study to evaluate the effectiveness of peers and health-care providers in supporting self-care behaviors in patients with diabetes. Their results showed that after a 6-month intervention, both groups had decreased HbA1C levels which was maintained after 12 months. After 18 months, the peer group maintained HbA1C levels but the health-care provider group had increased HbA1C levels [25]. This study used HbA1C for outcome tools and had 11 education sessions over 6 month. Future studies similar to ours, we suggest, should measure HbA1 levels after the duration of the intervention.

The results obtained by Whittle et al. were also consistent with the results of the present study. The authors reported that peer education was not more effective than seminar education [22]. A particular strength in our study was the presence of a control group with results suggesting the effective role of peers in improving self-care behaviors in diabetic patients.

Study results by Borzou et al. in cardiac patients in Iran show no significant difference between the mean score of quality of life in personal education and peer education [21]. We suggest that the dependent variable—quality of life—could have compromised their findings on self-care behaviors. On the other hand, it is likely that their results of higher quality of life post intervention could have been reflected by improvement in participants’ self-care behaviors, as confirmed in other studies.

Similarly, Sharif et al. reported a significant difference in the mean score of quality of life before and after peer education [29]. Of note, they studied patients with mastectomies in an attempt to evaluate the effect of peer education on quality of life in these patients. The current study included three diabetic groups and compared peer education with healthcare provider education and a control group. However, Sharif et al. [29] included two groups and they compared peer education with the control group.

Based on results from this study and above-mentioned studies, we suggest that both peer educators and health care providers who invest in teaching their diabetic patients equally empower patients with diabetes to overcome negative habits and promote diabetes self-care behaviors. Peer educators and health care providers motivate patients to adhere to their acquired knowledge and skills [30]. Ongoing education is crucial for patients with diabetes in order to maintain effective self-care throughout a lifetime of diabetes; however due to the shortage of resources (e.g. shortage of diabetes clinics, health care staff, and education facilities), it is not consistently delivered in most health care settings in Iran. In these cases, peer educators instead of health care providers can be used.

Overall, scholarly data show that compared to the control group, peer education is more effective than education by health-care providers.. Heisler et al. for example, supported that education by peer could lead to improvement in self-care behaviors, medication adherence, and reduced insulin needs in the peer group compared with the control group [31]. Philis-Tsimikas et al. reported findings consistent with the results of the present study, as they noted that there was a significant difference in the mean scores of HbA1c between the peer and control groups [32]. Both above mentioned studies used two groups opposed to three groups with a control group in our study. Moreover, both studies in their reporting of their results relied on HbA1C levels, which could be affected by medication and medical conditions such as anemia, hemoglobinopathy, renal and hepatic diseases.

Scientific data confirm that peer education can be a useful addition to routine care. In support of
previous studies [33–35], the peer in our present study provided participants with emotional support and encouragement for daily management of their diabetes. He provided participants an opportunity to reflect on diabetes management and establish goals such as a healthier diet, increased exercise levels, and better medication adherence. As a result, patients felt more confident in managing their diabetes. The reason for this improvement was reflected by the traditional and strong emotional bond between people in the Iranian culture. In Iran, individuals are deeply committed to tradition and people are expected to support one another. This enables Iranians feel more committed to each other, particularly in times of an illness. This traditional structure has highlighted the important role of peers in education. Although participants in this study were illiterate or had low education, the peer—a 46-year-old male with a diploma degree, was able to establish rapport and positive communication with them. Participants found the lay language of peer education easier to follow. Peer education with lay language is more comprehensive for people of less education. This was confirmed in other studies [36–39].

It is a difficult task for many people with diabetes to surrender health-damaging behaviors such as eating sweets. Many patients with diabetes perceive exercise, weight loss, and monitoring blood glucose levels as inconveniences [30]. Peer education offers courses in an interactive manner designed to enhance participants’ confidence levels in their ability to execute specific self-care tasks. Compared with education led by professionals, peer-led interventions are more easily held outside of normal working hours, which allow for more courses to be offered at varying times. Also, the time flexibility of peer education sessions could be more suitable for women who attend to household chores and child care. The finding of this study reflects the positive outcomes of peer education during a short period of time. Other studies are needed to determine the long-term outcomes of peer support in diabetic patients. Qualitative studies might shed lights on participants’ experiences in peer education.

Limitations

We selected participants from the same clinical settings and the probable interaction between participants was one of the limitations of this study. The study was performed in an urban area of Iran, which limited the generalizability of findings to non-urban areas. The length of the study was not sufficient to examine the long-term effects of peer education. Therefore, replicating this study in other regions in Iran to study the outcomes of peer education in diabetes and other chronic conditions are being warranted.

Conclusion

Peer education can improve self-care behaviors in patients with diabetes. This approach can be augmented to other educational methods for the prevention and management of diabetes in Iran and potentially other surrounding countries.

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Conflict of interest statement

None declared.
Comparing the peer and health professionals education

References


