

The effects of a health mentoring education program on diabetes management for older adults

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Abstract

Purpose: This study aimed to examine the effects of education program to train elderly health mentors on diabetes knowledge, attitude of a health mentor, and skills (accuracy of self-measurement of blood glucose, guideline performance level of safety exercise, reaction to hypoglycemia and hyperglycemia) of the well-educated elderly.

Methods: A prospective stratified experimental design with intervention and control groups. The intervention group participated in a 6-week, 12-session education program that trained elder health mentor for 45 min each in diabetes management. Post-tests were conducted after six weeks to estimate the effects on the study variables.

Results: The mentoring program effectively increased knowledge on diabetes, attitude of a health mentor, skills on accuracy of self-measurement of blood glucose, performance level of safety exercise, reaction to hypoglycemia and hyperglycemia of the well-educated elderly.

Conclusions: This study will allow older persons with diabetes to serve in a mentor role in their communities and expand the labor resources of health mentor.

Introduction

Korea has quickly entered the aging society in the early 21st century [1]. Among the Korean elder populations in 2000, 35.5% were uneducated, and 39.0% were educated only at the elementary school level. However, by 2011, only 10.9% were uneducated, 35.4% were educated only at the elementary school level, and 33.8% of the population had at least a middle or high school education [2].

Today's elderly people with higher levels of education than before try to adapt themselves to aging by maximizing their own potential, instead of trying to survive simply, and have an increasingly stronger will to lead a healthy life by restoring physical functions and by maintaining independence. They try to solve the problems related to elderly people by themselves and make positive social participation to solve social problems. While elderly people need social service, they can participate in voluntary service and serve as a motive of social integration as socially important human resources [3]. The elder population needs to voluntarily establish health goals and solve their health issues with an interest in their community rather than rely on outside experts to solve their health issues. In addition, strength-based or resource-based approaches rather than issue-centered approaches are important for healthy aging [4].

Since highly-educated elderly people may have experiences and functions accumulated through their life as potential social manpower, their social participation can reveal the value of the aged intellectuals as social resources and enables utilization of their social capital, charitable donation, and return of social leaders to society [5]. Social participation in old age may give a positive ego image, having positive effects on the quality of life by improving living satisfaction, psychological stability, self-esteem, and happiness in life, by maintaining health, and by facilitating integration into a community [6].

The prevalence of diabetes in those over 65 in Korea was 20.5% or over twice the prevalence of diabetes in adults over 30 (9.8%). The number of deaths caused by diabetes in those over 65, per 100,000, was 178.4 for men and 152.3 for women in 2012 [1]. The rapidly increasing incidence of older adults with diabetes and its complications are major factors in increasing medical expenses and declining quality of life. However, complications from diabetes can be prevented and appropriate self-management can prevent complications. Self-management is one of the essential health promotion strategies to prevent impairment and improve quality of life and independence. Self-management for diabetes patients is a necessity and correct dietary therapy, regular exercise, periodic blood glucose checks, and drug or insulin administration must be maintained [7,8].

The level of self-care in diabetes patients is still so low that the development of nursing strategies to increase self-care behavior is regarded as a very important issue [3,7]. Only a limited number of studies have been conducted on older persons with diabetes; these have examined motivation counseling, exercise programs [9-12], and nutrition education [7]. Diabetics can face a diversity of problematic situations, which make it difficult to do self-care during the long duration of the condition, and the level of self-care is still low for diabetics; therefore, nursing strategies for allowing them to improve self-care behavior are regarded as very important [7].

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An elderly health mentor, who refers to an elderly person trained to provide an environment for reducing health risk factors and promoting health of those in the same age bracket, teaches the need for healthy life practice and self-health management skills to targets through official or unofficial networks for the purposes of health promotion and disease prevention, supports healthy life practice, and creates atmospheres and environments for healthy life practice [8]. Choi and Kim [9] found that the self-help program using elderly community health mentors brought about significant improvement in physical strength, cognitive functions, depression, and the quality of life and Kim [10] reported that the intervention provided by trained elderly volunteers as health mentors improved physical health status, depression, social functions, and satisfaction with social support for the elderly living alone and that health mentors could not only improve their own health management capacities but also have positive effects on emotional and physical health of many targets within a community.

In addition, most programs were conducted by professionals, such as doctors and nurses, who were investigators, and studies in which health mentors conduct the programs for older adults are rare [8].

This study was intended to develop and apply an elder health mentoring education program on diabetes management with a focus on networking to mentor and mentee. The specific objective was to examine the effects of an elder health mentoring education program on diabetes knowledge, attitude, self-management behaviors (blood glucose self-measurement accuracy, the performance of exercise safety guidelines, hypoglycemia, and hyperglycemia reactions) in elder health mentors.

Methods

Study design

This study is a prospective stratified experimental study to verify the effects of the elderly health mentoring education program for elderly diabetes self-management on the knowledge of elderly mentor about diabetes, the diabetes health mentor's attitude and the change in diabetes self-management actions.

Participants

Participants were selected from among older persons over 65, who finished at least high school and attended a senior welfare center in D and G cities in Korea. Recruitment was conducted by posting a notice in senior welfare centers for two weeks; 70 participants were selected from among voluntary applicants. The inclusion criteria were 1) finished at least high school, 2) not limited in activities of daily living, 3) able to communicate, 4) having no nervous or mental diseases, and 5) rated normal (not less than 24 points) in the Korean version of the Mini-Mental Screening Examination (MMSE-K). There were 35 participants in the intervention group and 35 participants in the control group. These numbers were determined with allowance for a dropout rate, based on the sample size of one group at 33 with an effect size of 0.35 at $\alpha \leq 0.05$ and power ($1-\beta$) of 0.80 according to Cohen's formula (1988). Participants were assigned to the test group or control group using a pairing method with stratification by age, sex, and education. This was done to prevent diffusion effects during the study. One participant in the intervention group dropped out due to personal reasons.

Ethical considerations

The Institutional Review Board at the University Medical Center

approved this study (IRB Protocol No; CR-13-052-L) and the collected information was kept confidential. All participants were assured that the information would never be used for any purpose other than this study and they received a letter explaining the study, the rights of participants, and instructions on how to participate. All participants provided consent forms and it was further explained that participants could withdraw consent whenever they wished at any point in the study. These rights were reiterated verbally before data collection. The control group got some rewards, such as vitamin c, hand lotion etc.

Elder health mentoring education program

In this study, the details of the program's educational content including the purpose, method, and evaluation that was delivered in each of the 12 sessions was determined following a pilot study and a thorough literature review. Content regarding the attitude of the health educator, methods used, and health education evaluations were selected. Hence, diet therapy, exercise therapy, and blood glucose control for older persons with diabetes were included. The educational content was chosen by collecting the opinions of experts including medical education professors, social workers, endocrinologists, endocrinology nurses, and nursing professors. The research team developed an educational booklet detailing the elder health mentoring education program on diabetes management (Table 1).

The control group was only given the educational booklet on diabetes self-management while the intervention group participated in 12 education sessions (twice weekly for 45 minutes over 6 weeks). The study was conducted from July 17, 2013, to August 23, 2013. The research team and invited experts were included in the programs, lectures, discussions, and question and answer sessions, which included modeling and participant practice. Education was conducted by invited experts in each field, such as nursing professors, a medical education professor, a nutritionist, a physical therapist, and a social worker.

During the program's progress, a connection was formed with an industry-academic cooperation team at DC University and a team and partnership made with the College of Nursing. In Week 1, education regarding the purpose and expected effects of the program, the general process, role and the responsibility of elder health mentors for elderly diabetes self-management and how to contact the research team were carried out, and an admission letter was presented to enhance the sense of belonging and efficacy. In Week 2, the symptoms and diagnosis of diabetes, blood pressure measurement, and blood glucose measurement were demonstrated and taught. In Week 3, general diabetes treatment and details of the latest treatments, drug/diet/exercise therapy, and complications were taught, and application of a diabetes notebook was also shown. Drug therapy and insulin therapy were taught in Week 4 while educator attitude and detailed teaching plan preparation were taught in Weeks 5 and 6. In Week 7, education on diabetes diet therapy, calorie calculation, and diet planning by the subjects themselves was carried out. In Week 8, the importance and effects of diabetes exercise therapy, the number of times and methods, aerobic exercise, flexibility exercise, and muscle strength exercise were taught and actual practice was implemented. Furthermore, a booklet regarding exercise methods was distributed. In Week 9, the role and activities of a community elderly health mentor for elderly diabetes self-management was taught. In Week 10, exercise, blood glucose, and blood pressure measurement practice were conducted and practical skill evaluation was performed.

Every week, the research team provided the intervention group with a pen and an educational booklet developed for the elder health mentoring education program, along with audiovisual materials, a

Table 1. Outline of educational sessions for elder health mentors.

| Week | Themes | Program contents | Time (min) | Educator | Teaching methods |
|------|---|---|------------|-----------------------------|--|
| 1 | Program orientation | The purpose and expected effects of the program, general process, and admission letter | 45 | Research assistants | Presentation, Lecture, Discussion, Q&A |
| 2 | What is diabetes? | Diabetes symptoms/diagnosis Blood pressure measurement Blood glucose measurement | 45 | Endocrinologist | Lecture, Discussion, Q&A Practical Skill |
| 3 | General content and latest diabetes treatment methods | Drugs/diet/exercise/complications Diabetes notebook application | 45 | Nursing Professor | Lecture, Discussion, Q&A Practical Skill |
| 4 | What is education? | <i>Educator attitude</i> Efficient communication skills Mentor's roles <i>Educator attitude of mentor</i> | 45 | Medical Education Professor | Lecture, Discussion, Q&A |
| 5 | Teaching plan preparation | Evaluation of the purpose, content, and educational methods | 45 | Medical Education Professor | Presentation, Lecture, Discussion, Q&A |
| 6 | Diabetes treatment | <i>Drug/Insulin therapy</i> | 45 | Endocrinologist | Presentation, Lecture, Discussion, Q&A, Demonstration |
| 7 | Diabetes treatment | Diet therapy Diet composition Calorie calculation | 45 | Endocrinology Nurse | Presentation, Lecture, Discussion, Q&A, Demonstration, Practical Skill |
| 8 | Diabetes treatment | Exercise therapy | 45 | Endocrinology Nurse | Discussion, Practical Skill |
| 9 | Diabetes treatment | Community resource utilization | 45 | Social Worker | Lecture, Discussion, Q&A |
| 10 | Practical skills evaluation on education | Exercise/blood glucose/pressure measurement Practical skills evaluation | 45 | Research assistants | Evaluation |
| 11 | Practical skills evaluation on education | Evaluation of the health educator's (mentor's) attitude and knowledge | 45 | Research assistants | Evaluation |
| 12 | Completion ceremony | Certificate presentation | 45 | Research assistants | |

blood glucose monitoring device, a blood pressure meter, a diabetes notebook, and food models needed for dietary composition. 34 participants attended mentors program except participants owing to house moving.

Measurement instruments

Health mentor's knowledge

Knowledge was evaluated in a process similar to that described in Sim et al. [13]. If applicable to the question, the score was 1 and, if non-applicable, the score was 0; higher scores reflected more knowledge on diabetes. For question composition, 20 questions were used, such as "What is the normal blood glucose two hours after a meal?" "What is included in the normal range of glycated hemoglobin?" "What is the goal of blood pressure regulation in diabetes patients?" and "If I have diabetes, what is the risk of diabetes in my children?" with six questions on general knowledge of diabetes, one question on treatment goals, three questions on diet, three questions on hypoglycemia, and seven questions on complications. At the time this tool was developed, Cronbach's alpha was .74 and, in this study, the Kuder-Richardson Formula 20 (KR20) was .61.

Health mentor's attitude

The measurement tool for the health mentor's attitude was based on questions derived from a theoretical background, with six questions on job commitment, and four questions on interpersonal relationship capability from the attitude change measurement tool developed by Seo [14]. This was modified and improved according to the study participants and the program content. Experts verified the modified content before use. There were 17 questions, such as "I would like to demonstrate my knowledge and skills as much as possible," "As a diabetes health mentor I want to enhance my knowledge and capabilities," "I want to perform my job thoroughly," and "I am protective as a diabetes health mentor," scored on a 7-point scale. At the time this tool was developed, Cronbach's alpha was .86 for job development and .81 for interpersonal

relationship capability. In this study, Cronbach's alpha was .90 for job commitment and .74 for interpersonal relationship capability.

Health mentor's self-management behaviors

Accuracy of blood glucose self-measurement: To investigate whether blood glucose was accurately measured, a tool developed by Lee et al. [15], based on data from the American Diabetes Association data and modified by Lee [16] was used. Eight questions were included with three subareas: test paper, user, and equipment. Examples include, "Did you check the effective date of the test paper?" "Did you check the code number conformity of the test paper?" and "Is the amount of blood used for the test paper appropriate?" This is a dichotomized scale (Yes/No) and the greater the score, the greater the accuracy of the blood glucose measurement. In this study, the Kuder-Richardson Formula 20 (KR20) was .84.

Performance levels of exercise safety guidelines: To measure the performance level of exercise safety guidelines in non-insulin dependent diabetes patients, the tool developed by Kwon [17] was used based on literature reviews and confirmed by experts for content validity. There were 16 questions, such as "I check blood glucose before exercising," "I start with light exercise and then gradually increase the time and intensity," "I wear jogging shoes to absorb shock," and "I drink the appropriate amount of water before and after exercise." It is also a dichotomized scale (Yes/No) and higher scores indicate better performance levels in exercise safety. In this study, the Kuder-Richardson Formula 20 (KR20) was .86.

Reactions to hypoglycemia and hyperglycemia: To investigate whether the safety reaction guidelines for hypoglycemia and hyperglycemia were accurately followed, a tool developed by the research team was used based on the Diabetes Education Guidelines for Educators in Type II Diabetes Clinical Research Centers designated by the Ministry of Health and Welfare [18] and the Standard Diabetes Education Material of the Korean Centers for Disease Control and Prevention [19]. This tool was confirmed by nursing and educational

experts for content validity. There were eight questions including “I can describe the factors affecting blood glucose regulation,” “I can describe reactions to hypoglycemia,” and “I can describe the preventive steps of hyperglycemia,” to name a few. It is also a dichotomized scale (Yes/No) and the higher the score, the greater the accuracy of safety reactions to hypoglycemia and hyperglycemia. In this study, the Kuder-Richardson Formula 20 (KR20) was 0.90.

Data collection methods

Data collection was performed with pre-test and post-test in order from July 17, 2013 to August 23, 2013. The pre-test was performed immediately prior to starting the program and the post investigation was performed immediately after completing the program. This study guaranteed anonymity and autonomy, and explained in advance those participants did not have to answer if they were uncomfortable with providing personal information. The questionnaire was distributed on-site and participants completed self-administered questionnaires in person. For participants with difficulty writing due to amblyopia, the research team and assistants trained in the survey read it aloud and recorded the answers. The time required to complete the questionnaire was approximately 35 minutes [20].

Data analysis

Data were analyzed using IBM SPSS Win Version 19.0. The general characteristics of the participants were analyzed using frequency, percentages and homogeneity test. Paired t-tests were used to measure changes and program effects in the intervention and control groups by 0.05 significance.

Results

General and health-related characteristics and homogeneity of the participants

There were 18 male (52.94%) and 16 female participants (47.06%) in the intervention group and 15 male (42.86%) and 20 female participants (57.14%) in the control group. There were 17 participants (50.00%) in their 60s and 70s with the same frequency. The majority of the participants in both groups, 15 participants (44.12%) in the test group and 12 participants (34.29%) in the control group, were Catholic. Regarding marital status, 26 participants (76.47%) in the intervention group and 23 participants (65.71%) in the control group had spouses. Most lived only with their spouse 23 participants (67.64%) in the intervention group and 19 participants (54.29%) in the control group. Twenty-two participants (64.70%) in the intervention group and 26 participants (74.29%) in the control group reported being in the “Socioeconomic status middle class.” Additional details about the two groups can be found in Table 2.

Concerning the results of homogeneity testing on dependent intervention group and the control group variables before intervention, knowledge of diabetes, health mentor’s attitude, blood glucose self-measurement accuracy, safety exercise guidelines performance level, reaction to hypoglycemia and hyperglycemia showed no significant difference between the two groups, so it was confirmed that the two groups were homogenous (Table 3).

Changes of knowledge, attitude, and self-management behaviors

Statistically significant differences were found in all factors (Table 4). The difference between the pre-test and the post-test on knowledge

Table 2. General and health-related characteristics and homogeneity of the subjects.

| Characteristics | Categories | Intervention group (n=34) | Control group (n=35) | χ^2 (p) |
|--------------------------|----------------|---------------------------|----------------------|--------------|
| | | n (%) | n (%) | |
| Gender | Male | 18 (52.94) | 15 (42.86) | 0.70 (.402) |
| | Female | 16 (47.06) | 20 (57.14) | |
| Age | 65–69 | 17 (50.00) | 12 (34.29) | 1.75 (.186) |
| | 70–79 | 17 (50.00) | 23 (65.71) | |
| Religion | Buddhist | 6 (17.65) | 8 (22.86) | 1.36 (.714) |
| | Catholic | 15 (44.12) | 12 (34.29) | |
| | Protestant | 5 (14.71) | 8 (22.86) | |
| | None | 8 (23.53) | 7 (20.00) | |
| Marital status | Yes | 26 (76.47) | 23 (65.71) | 0.97 (.325) |
| | No | 8 (23.53) | 12 (34.29) | |
| Living arrangements | With family | 6 (17.65) | 9 (25.72) | 1.30 (.522) |
| | Alone | 5 (14.71) | 7 (20.00) | |
| | A Spouse | 23 (67.64) | 19 (54.29) | |
| Socioeconomic status | High class | 2 (5.88) | 3 (8.57) | 3.19 (.364) |
| | Middle class | 22 (64.70) | 26 (74.29) | |
| | Low class | 5 (14.71) | 5 (14.28) | |
| | Unknown | 5 (14.71) | 1 (2.86) | |
| Presence of disease | Presence | 26 (76.47) | 23 (65.71) | 0.97 (.325) |
| | Absence | 8 (23.53) | 12 (34.29) | |
| Taking medicine | Yes | 26 (76.47) | 24 (68.57) | 0.54 (.463) |
| | No | 8 (23.53) | 11 (31.43) | |
| Exercise | Regular | 28 (82.35) | 21 (60.00) | 4.19 (.041) |
| | Irregular | 6 (17.65) | 14 (40.00) | |
| Smoking | Yes | 3 (8.82) | 1 (2.86) | 1.12 (.289) |
| | No | 31 (91.18) | 34 (97.14) | |
| Drinking | Yes | 14 (41.18) | 9 (25.72) | 1.86 (.173) |
| | No | 20 (58.82) | 26 (74.28) | |
| Regular diet | Very regular | 9 (26.47) | 13 (37.14) | 2.74 (.433) |
| | Regular | 18 (52.94) | 19 (54.29) | |
| | Irregular | 6 (17.65) | 3 (8.57) | |
| | Very irregular | 1 (2.94) | 0 (0.00) | |
| Sleep satisfaction | Poor | 1 (2.94) | 4 (11.43) | 2.93 (.403) |
| | Moderate | 18 (52.94) | 13 (37.14) | |
| | Good | 12 (35.29) | 15 (42.86) | |
| | Very good | 3 (8.82) | 3 (8.57) | |
| Subjective health status | Poor | 2 (5.88) | 3 (8.57) | 0.25 (.881) |
| | Moderate | 21 (61.76) | 20 (57.14) | |
| | Good | 11 (32.36) | 12 (34.29) | |

of diabetes was 2.85 ± 3.22 in the intervention group and 0.74 ± 3.35 in the control group ($t=2.44$, $p=.020$). The difference in the scores for the health mentor’ attitudes was 5.38 ± 11.44 in the intervention group and -1.37 ± 17.96 in the control group ($t=2.16$, $p=.038$).

There were also significant differences in blood glucose self-measurement accuracy (2.03 ± 2.97 in the intervention group and 0.11 ± 2.77 in the control group; $t=2.93$, $p=.006$), the performance levels of exercise safety guidelines (2.56 ± 3.74 in the intervention group and -0.29 ± 4.60 in the control group; $t=2.50$, $p=.017$), and reaction to hypoglycemia and hyperglycemia (3.15 ± 3.11 in the intervention group and 0.23 ± 3.24 in the control group; $t=4.13$, $p<.001$).

Table 3. Homogeneity test of research variables between intervention and control groups (N=69).

| Categories | Intervention group (n=34) | Control group (n=35) | Possible Range | t (p) |
|----------------------|---------------------------|----------------------|----------------|------------|
| | M ± SD | M ± SD | | |
| Knowledge | 11.00 ± 2.77 | 9.57 ± 3.18 | 0~20 | 1.99(.051) |
| Attitude | 83.18 ± 13.88 | 80.66 ± 16.61 | 17~119 | 0.68(.497) |
| Accuracy | 12.12 ± 2.53 | 11.74 ± 2.75 | 8~16 | 0.59(.558) |
| Exercise performance | 25.79 ± 3.84 | 25.83 ± 4.41 | 16~32 | 0.04(.973) |
| Reactions | 11.41 ± 2.93 | 11.63 ± 3.25 | 8~16 | 0.29(.772) |

Knowledge: Knowledge of diabetes; Attitude: Diabetes health mentor's attitude; Accuracy: Accuracy of blood glucose self-measurement; Exercise performance: Safety exercise guidelines performance; Reactions: Reactions to hypoglycemia and hyperglycemia.

Table 4. Change of research variables before and after on intervention and control group (N = 69).

| Categories | | Intervention group (n=34) | Difference | Control group (n=35) | Difference | t (p) |
|----------------------|-----------|---------------------------|--------------|----------------------|---------------|-------------|
| | | M ± SD | M ± SD | M ± SD | M ± SD | |
| Knowledge | Pre-test | 11.00 ± 2.77 | 2.85 ± 3.22 | 9.57 ± 3.18 | 0.74 ± 3.35 | 2.44 (.020) |
| | Post-test | 13.85 ± 2.30 | | 10.31 ± 2.96 | | |
| Attitude | Pre-test | 83.18 ± 13.88 | 5.38 ± 11.44 | 80.66 ± 16.61 | -1.37 ± 17.96 | 2.16 (.038) |
| | Post-test | 88.56 ± 12.88 | | 79.29 ± 16.66 | | |
| Accuracy | Pre-test | 12.12 ± 2.53 | 2.03 ± 2.97 | 11.74 ± 2.75 | 0.11 ± 2.77 | 2.93 (.006) |
| | Post-test | 14.15 ± 1.73 | | 11.86 ± 3.11 | | |
| Exercise performance | Pre-test | 25.79 ± 3.84 | 2.56 ± 3.74 | 25.83 ± 4.41 | -0.29 ± 4.60 | 2.50 (.017) |
| | Post-test | 28.35 ± 2.90 | | 25.54 ± 3.85 | | |
| Reactions | Pre-test | 11.41 ± 2.93 | 3.15 ± 3.11 | 11.63 ± 3.25 | 0.23 ± 3.24 | 4.13 (.000) |
| | Post-test | 14.56 ± 2.09 | | 11.86 ± 3.26 | | |

Knowledge: Knowledge of diabetes; Attitude: Diabetes health mentor's attitude; Accuracy: Accuracy of blood glucose self-measurement; Exercise performance: Safety exercise guidelines performance; Reactions: Reactions to hypoglycemia and hyperglycemia.

Discussion

In this study, a program focused on training elder health mentor to assist in the self-management of older persons with diabetes was developed and the effects of the program were analyzed. After completing the 12-session program, the knowledge scores of the intervention group that was trained in the elder health mentoring education program increased compared to the control group. In a study by Lee [21], factors related to health promotion activities of diabetes patients were analyzed after two sessions of three-hour, education segments on diabetes knowledge, diabetes management, and health actions using lectures, videos, CD images, cases, and discussions. The results showed that there was a significant difference in diabetes knowledge between the intervention group and the control group after education. Furthermore, Lee et al. [15] investigated the effects of education on diabetes knowledge, self-efficacy, self-management, and glucose control after a six-day hospitalization education program for 21 hospitalized patients with type II diabetes. The results showed that there was a significant difference in the knowledge level of diabetes immediately after discharge, after three months, and after six months. Thus, most diabetes education programs result in improved knowledge on diabetes [22].

Most previous studies focused on evaluating change in knowledge of diabetes in diabetes patients. These results show that structured education on diabetes is effective in increasing the knowledge of educated, older persons on diabetes, but not necessarily of diabetes patients.

In this study, the diabetes health mentor's attitudes significantly increased in the intervention group after completing the program. Foreign journals reported that the health mentors program participants demonstrated significantly improved attitudes toward team care [23].

The perception and the attitude of elder diabetes educators as an intervention strategy for older persons with diabetes remarkably affect treatment for patients [24]. In education methods creating an attitude change, attitude is defined as a consistent individual predisposition evaluated as good or bad on a certain target (a person or a thing) or a situation [14]. Peer mentors helps reduce problematic health behaviors depression and, in several randomized controlled trials, has contributed to improved diabetes management, including improving behaviors related to medication adherence, diet, exercise, and blood glucose monitoring. Peer mentors are beneficial when patients with chronic diseases are tackling challenging new medical tasks, such as insulin management [25].

Chaskin *et al.* [26] suggested the development of leadership, partnership, organization development, and community systematization to enhance community competence. Leadership is a skill exerting influence in motivating members to accomplish a set goal for the common interest and a process to motivate other people. It was reported that health-related interventions using supporters or volunteers in the community was particularly cost effective and effective on emotional and physical health; it was also revealed that intervention by trained older persons of about the same age was as effective on health promotion as intervention by experts [27].

The scores of blood glucose self-measurement accuracy, reaction to hypoglycemia and hyperglycemia, performance levels for exercise safety, and enhancement of diabetes self-management actions were higher in the test group than the control group after completing the program. This result shows that individualized education is more effective for skills acquisition in these aforementioned areas. This is also indicated in another study [28] in which the accuracy of blood glucose measurements was higher in individualized education groups than clustered education groups. In our results, it was shown that

individual guidance through structured practice for elder health mentor increased participant skills. In addition, another study showed that knowledge and beliefs about exercise needed to be increased in patients with non-insulin dependent diabetes to enhance exercise [29]. This program also provided knowledge, beliefs, and exercise safety behaviors through theory, practice, and evaluation. The intervention group results increased significantly. Reaction to hypoglycemia and hyperglycemia also increased significantly after program completion. It was decided that the increase was a result of the combination of education on knowledge and skills related to diabetes management as was also shown in previous studies [22]. These indicated a significant positive correlation with diabetes related knowledge and self-care behavior [22], such as glycated hemoglobin [22], and blood glucose control [30].

This study was performed to train elder health mentor to assist with the self-management of older persons with diabetes. The intellectual resources of older persons has been increasing owing to an increase in educated older persons willing to donate their resources and contribute to society. The authors believe that providing older persons with the opportunity to participate in society is meaningful. They decided that this aspect might contribute to improvement in the quality of life for study participants.

Through this study, the trained elder health mentor developed leadership skills and emphasized their development as health mentor through partnerships with experts.

According to study results from Stanford University published in September 2012, the Board of Health and Family Affairs in Fairfax County, Virginia, received subsidized funding from the Virginia state government to help older persons serve the community by enhancing community competence for older persons. They run the Virginia Chronic Disease Self-Management Program (CDSMP) known as "You Can Live Well!" The workshop trains older persons with chronic diseases, but none of those trained are medical specialists. They, in turn, talk to other older persons who have chronic disease. Health-related interventions with supporters or volunteers in the community are cost effective and effective for emotional and physical health. Furthermore, it was reported that interventions by trained older persons of about the same age was as effective at health promotion as that provided by experts [27].

This program, which applied an elder health mentor training strategy for elder diabetes management, is quite effective. More effective elder health mentor training strategies should be developed through exploratory studies on the process. Further studies should be conducted to examine the effects of health mentoring programs for older persons on dynamism, aging, ambulatory abilities, activities of daily living, management of chronic illnesses, or life span. Diabetic mentors who experienced self care can play the role of a mentor efficiently on the basis of their experience and this study has a limitation that it failed to involve elderly persons who had been diagnosed with diabetes and performed self-care for the condition for ≥ 6 months.

Conclusions

In this study, it was confirmed that the elder health mentoring education program was effective in increasing knowledge of diabetes and improving health mentor's attitudes, diabetes self-management.

Based on these results, the role of health mentor among older persons may expand in the future, which will increase the engagement and social demand of elders. This should result in improved self-

management capabilities of older persons with diabetes, which will decrease hospitalizations or complications, thereby reducing medical expenses.

A proposed follow-up to this study is to compare the effects of self-management education for older persons with diabetes performed by trained elder health mentor with that of experts.

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