Feature Article

Effectiveness of a community-based program for suicide prevention among elders with early-stage dementia: A controlled observational study

Jong-Pill Kim, PhD, RN [a], Jinhyang Yang, PhD, GNP, RN [b],*

[a] Department of Nursing, Jinju Health College, Jinju, South Korea
[b] Department of Nursing, Institute of Health Science, Inje University, 75 Bokjiro, Busanjingu, Busan, 47392, South Korea

ARTICLE INFO

ABSTRACT

The purpose of this study was to develop a small-group-focused suicide prevention program for elders with early-stage dementia and to assess its effects. This was a quasi-experimental study with a control group pretest—posttest design. A total of 62 elders diagnosed with early-stage dementia who were receiving care services at nine daycare centers in J City Korea participated in this study. The experimental group participated in the suicide prevention program twice a week for 5 weeks with a pretest and two posttests The developed suicide prevention program had a significant effect on the perceived health status, social support, depression, and suicidal ideation of elders with early-stage dementia. Nurses should integrate risk factors such as depression and protective factors such as health status and social support into a suicide prevention program. This community-based program in geriatric nursing practice can be effective in preventing suicide among elders with early-stage dementia.

© 2016 Elsevier Inc. All rights reserved.

Introduction

As a geriatric disease, dementia is increasing at a rapid rate commensurate with the increase in the elderly population. The prevalence rate of dementia in elders over 65 years has increased from 8.7% in 2008 to 9.6% in 2014, and it is estimated to reach 10.4% by 2020, according to a 2014 report compiled by the Korean Ministry of Health and Welfare.[1] A study conducted by the Korean National Health Insurance Service revealed that a large proportion (48.7%) of beneficiaries of long-term care insurance were elders with dementia, and the annual medical cost for dementia was 3.1 million won per person, much higher than that for cardiovascular disease (1.32 million won) or diabetes (.59 million won).[2] Moreover, the increase in the population of elderly patients with dementia is becoming a major issue not only for patients themselves but also for their families, local communities, and the nation.

Dementia is a progressive disease that causes cognitive impairment, anxiety, depression, changes in personality, and a range of behavioral and psychological symptoms, as well as physical symptoms that decrease activities of daily living. This places a considerable burden on the patients and their family.[3] Consequently, family disputes and dramatic events such as the suicide of elders with dementia and subsequent suicide of family members have been reported through various media.[4] Nonetheless, no systematic approach to the diverse range of issues associated with dementia exists, despite the presence since July 2008 of a long-term care insurance system for elders that were intended to lessen the burden on families associated with the healthcare needs of elders with dementia.

Recent studies have increasingly identified early-stage dementia as a risk factor for suicide in the elderly population. Elders with early-stage cognitive impairment who are aware of their dementia have greater suicidal ideation than do non-impaired elders.[5–7] The level of depression among elders with early-stage dementia was three to four times greater[5] than that among elders of a similar age without dementia. Given that depression is highly correlated with suicide attempts,[6,8] adequate intervention programs for suicide prevention should be developed for individuals with early-stage dementia and protective factors should be improved.

Suicide prevention programs for elders with early-stage dementia must be based on an understanding of factors related to suicide so that the program can effectively address these factors. Previous research and intervention studies on elderly suicide[8–13]

and on elders with dementia[3,14] have addressed these issues separately. Only a few previous studies have examined suicide-related factors[5,10] and characteristics[6,7] of elders with dementia. Furthermore, very little is known about interventions addressing suicide prevention among elders with early-stage dementia.

The increasing prevalence of dementia, and the suicide rate among elders with early-stage dementia, is now capturing the attention of the healthcare and medical fields, whose members agree on the need to identify the relevant factors and to take preventative action.[6] Previous studies have identified depression, limitations in the activities of daily living,[5] economic stress, functional decline,[10] and a lack of social support[6,7] as predictors of suicide among elders with early-stage dementia. Similarly, depression, poorly perceived health, low participation in social activities, and inadequate social support[8,11,12] have been identified as predictors of suicide among elderly populations.

In this study, an intervention program for suicide prevention in elders with early-stage dementia was developed that aimed to increase perceived health, activities of daily living, and social support, and to reduce depression, ultimately decreasing participants' suicidal ideation. It was anticipated that the suicide prevention program would foster a healthy lifestyle in elders by preventing suicidal behaviors in advance and by facilitating therapeutic relationships with other people. Therefore, the purpose of this study was to develop and evaluate the effects of a suicide prevention program for elders with early-stage dementia based on small-group activities.

We aimed to develop a suicide prevention program based on small-group activities for elders with early-stage dementia and to test the effects of this program on elders' suicidal ideation, perceived health, activities of daily living, social support, depression, examining the effects from a time lapse perspective. The study hypotheses follow.

Hypothesis 1: The experimental group will show a lower level of suicidal ideation compared with the control group.

Hypothesis 2: Participants who participate in the suicide prevention program (experimental group) will show a higher level of perceived health status compared with those who did not participate in the program (control group);

Hypothesis 3: The experimental group will show a higher level of activities of daily living compared with the control group;

Hypothesis 4: The experimental group will show a higher level of social support compared with the control group;

Hypothesis 5: The experimental group will show a lower level of depression compared with the control group;

Methods

Study design

This was an experimental study with a control group pretest–posttest design. It aimed to evaluate the effects of a suicide prevention program based on small-group activities on elders' perceived health, activities of daily living, social support, depression, and suicidal ideation, with the goal of reducing the degree of suicidal ideation among elders with early-stage dementia.

Setting and samples

The study participants were elders who had been diagnosed with dementia by Korea's Long-term Care Insurance Service. They were under the care of daycare centers in J City, Korea. The authors visited all of the 18 daycare centers in the city to ask for voluntary participation, and permission from 9 center directors was obtained after the study goals had been explained. The volunteers were

contacted personally. The experimental and control groups were randomly determined using even and odd numbers. The nine daycare centers were numbered from 1 to 9 and then the group was split into an experimental group (2, 4, 6, and 8) and a control group (1, 3, 5, 7, and 9). Each center had six to nine participants who were all elders satisfied the inclusion criteria and consented to participate in the study. The program was provided on different days in each center (2, 4, 6 and 8). The study started with 66 participants (32 in the experimental group and 34 in the control group). One of the participants dropped out from the experimental group, and three were lost from the control group, for personal reasons, leaving 62 participants overall in the study (Fig. 1). The daycare centers with experimental and control groups had similar human resources, physical environments, and programming within the facility. Furthermore, experimental effects could be prevented, as the facilities were some distance away from each other.

Individuals with intellectual disabilities, a history of psychosis, or experience with similar suicide prevention programs were excluded during the selection process. The detailed selection criteria are listed below. With regard to cognitive function, among those classified with severe dementia, participants who scored in the 16- to 19-point range on the Korean Mini-Mental Status Exam (MMSE-KC), indicating early-stage dementia, including questionable dementia, were selected. Those with scores higher than 5 for suicidal ideation on the Suicidal Ideation Scale (SIS) were selected based on an earlier finding that the average score among elders with early-stage dementia was about 5 points.[5] In addition, participants with scores higher than 5 on the Korean version of the Geriatric Depression Scale Short Form (GDSSF-K) were selected, considering that the cutoff score for depression on the GDSSF-K is 5.[15] In sum, the inclusion criteria were as follows: (a) a score of 16–19 on the MMSE-KC among those classified with severe dementia by the Long-term Care Insurance Service; (b) a score > 5 on the SIS; (c) a score > 5 on the GDSSF-K; and (d) able to communicate.

G*Power software (ver. 3.1.2) was used to determine the sample size, and 28 participants per group were calculated as the minimum sample size with the following settings: significance level of repeated-measures ANOVA, .05; power of test, .80; medium effect size, .25; number of repeated-measures, 3; and correlation between repeated-measure values, .50. Considering a dropout rate of 20%, 66 participants were selected in total, including 32 elders in the experimental group and 34 in the control group.

Ethical considerations

Approval for this study was obtained from the Institutional Review Board of our university (2-1041024-AB-N-01-20141211-HR-126). The study purpose and procedure were explained during the selection process, and only participants who agreed to voluntary participation were enrolled. Those who were selected were informed that they could withdraw from the program at any time without penalty. Written informed consent was obtained from elders who agreed to participate. Furthermore, in recognition of any potential ethical issues that might arise, after completion of the study, members of the control group also received the same suicide prevention program that was provided to the experimental group.

Measurements

Cognitive function

The Mini-Mental State Exam (MMSE) portion of the Korean version of the Consortium to Establish a Registry for Alzheimer's (CERAD) inventory (MMSE-KC) was used to measure cognitive function. MMSE-KC is a cognitive function index for the elders that is used to evaluate orientation to time (5 points), orientation to place (5
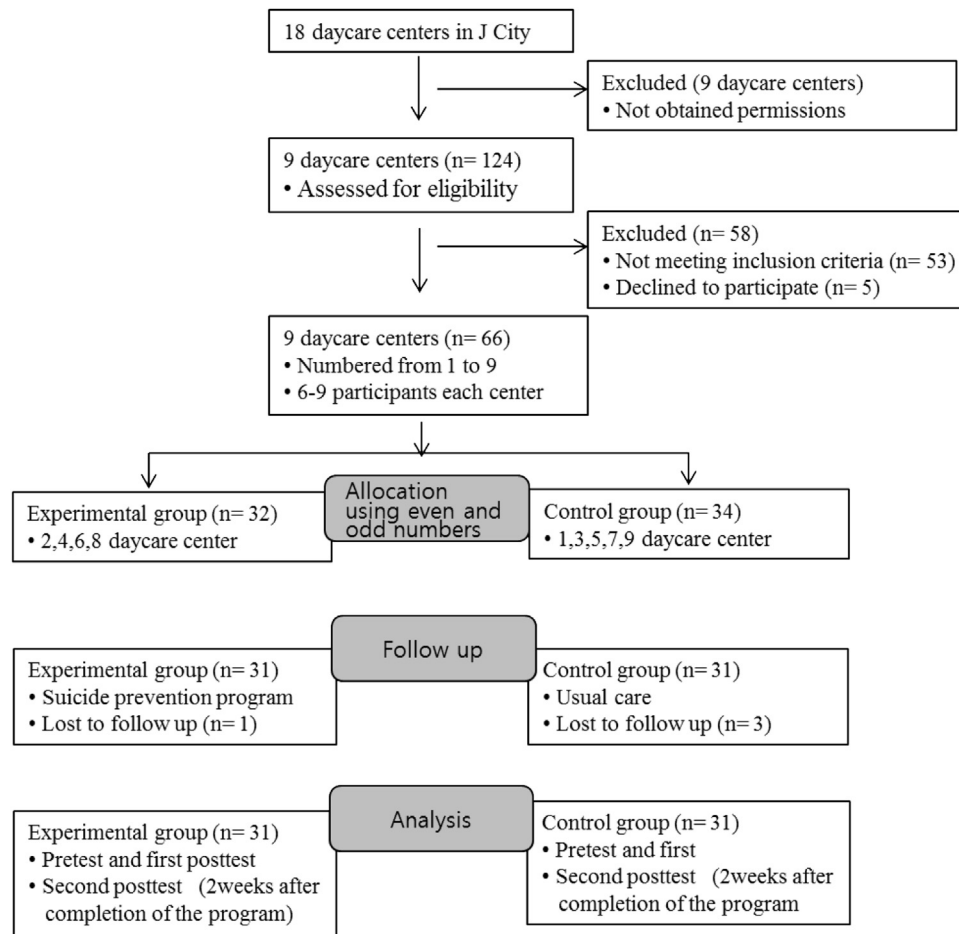
Fig. 1. Flow diagram of the study.

points), registration (3 points), recall (3 points), attention and calculation (5 points), language (3 points), and abstract thinking and judgment (6 points). The instrument consists of 30 items, each answered either 'yes' (1 point) or 'no' (0 points). Higher scores indicate better cognitive functioning. The severity of dementia was classified as follows: normal if the score was ≥24 points; questionable dementia if it was 20–23 points; early-stage dementia if it was 16–19 points; moderate dementia if it was 10–15 points; and severe dementia if the score was ≤9 points, following Lee et al[16] the Cronbach's alpha for the instrument in this study was .70.

Suicidal ideation

The Suicidal Ideation Scale (SIS) developed by Harlow, Newcomb, and Bentler[17] and translated by Kim[8] was used to measure the level of suicidal ideation. This instrument consists of five items measured on a 5-point Likert scale ranging from 0 to 4, with higher scores indicating higher levels of suicidal ideation. The Cronbach's alpha for the instrument[8] was reported as .74; the value in this study was .75. All of these instruments were approved for use in this study.

Perceived health status

The instrument developed by Speake et al[18] and translated by the authors was used to measure perceived health status in elders with early-stage dementia. The questionnaire was used after a content validity test was performed by a group of professionals comprising two nurses, two doctors, and two nursing professors in a facility specializing in dementia. The content validity index (CVI) of all items was above .80. This instrument consists of three items measuring current health status, health status compared with others of the same age, and satisfaction with one's health status compared with 1 year ago. Each item was measured on a 3-point Likert scale ranging from 1 to 3, with higher scores indicating better perceived health status. The Cronbach's alpha for the instrument in this study was .82.

Activities of daily living

The instrument developed by Mahoney and Barthel[19] and adapted by Park et al[20] was used to measure activities of daily living. This instrument consists of 12 items scored using a 3-point Likert scale ranging from 1 to 3, with higher scores indicating higher levels of activities of daily living. The Cronbach's alpha for the instrument[20] was previously reported to be .91; the value in this study was .89.

Social support

The instrument developed by Vaux et al[21] and adapted by Bae[12] was used to measure the level of social support. This instrument consists of 20 items representing three main components of social support: family, friends, and others. Items 3, 9, 12, 15, 18, and 19 are reverse-scored. Each item is scored on a 5-point Likert scale ranging from 1 to 5, with higher scores indicating higher levels of social support. The Cronbach's alpha for the instrument[21] was reported as .89; the value in this study was .83.

Depression

The Geriatric Depression Scale Short Form-Korean version (GDSSF-K) was used to measure the level of depression. This instrument, developed by Yesavage and Sheikh,[22] consists of 15 items that are answered either 'yes' (1 point) or 'no' (0 points), yielding a final score of 1–15, with higher scores indicating more severe depression. The Cronbach's alpha for the instrument in this study was .70.

Procedure

Program development

The conceptual foundation for the development of this suicide prevention program development for elders with early-stage dementia was derived from Kim's elderly suicidal ideation model[8] based on Emerson's social exchange theory[23] and Durkheim's social integration theory,[24] as well as from previous studies on dementia and suicide in elderly populations (Fig. 2). The program developed in this study was designed to incorporate exchange resources, social integration, and psychological factors, and was followed by program implementation and consequences. First, exchange resources include economic status and health status. According to social exchange theory, social interaction is a process of exchanging material and non-material resources among individuals. This intervention program was focused on improving perceived health status and activities of daily living, but not economic resources, as elderly individuals with early-stage dementia tend to have low resource exchange value due to their declining health and reduced economic status. Second, social integration refers to the presence of family and community support. The support of family, friends, and community members was a primary focus of the program because elders with early-stage dementia often become distant from their friends as they leave their occupation and associated social activities. In addition, the breakdown of family relationships caused by personality changes and conflicts with family members due to dementia symptoms was considered an important factor. Third, psychological factors refer particularly to depression, which is the single best predictor of suicide in elderly people. The program also focused on reducing depression, as the majority of elders with dementia experience depression.[5,8,10] The aim of this suicide prevention program, based on relevant theories, was to enhance exchange resources and social integration and to reduce depression. A detailed strategy for addressing each factor is suggested below in the description of the program's implementation. Finally, the consequence of interest was a reduction in suicidal ideation among elders with early-stage dementia through implementation of this program.

Weekly topics for the program were selected based on the program's conceptual framework by analyzing previous research and evaluating the needs of the participants. The weekly topics are as follows: (a) Week 1: (1) Program orientation, (2) "How do I take care of my health?" (understanding elder healthcare); (b) Week 2: (3) "How do I manage being old in my mind?" (understanding depression), (4) "Why do I feel so strange?" (understanding dementia); (c) Week 3: (5) "I don't want to live like this" (understanding suicidal ideation), (6) "Can I ask for help from those around me?" (use of community resources for elders with dementia); (d) Week 4: (7) "Who can help me at home?" (use of family-related resources), (8) "I want to be loved and respected" (how to improve relationships with other people); (e) Week 5: (9) "I want to spend my old age well" (growing old in happiness), (10) "Life is highly valuable" (writing a life-respect pledge). The suicide prevention program was finalized once the suitability of the content, the duration, and the implementation method were discussed by a group of professionals to confirm the validity of the draft program. The weekly content of the suicide prevention program is shown in Table 1.

Program implementation

The program was conducted twice a week for 5 weeks, and each session lasted for 90 min. The number of sessions and duration of the suicide prevention program were based on the results of a previous meta-analysis[7,25,26] that examined the effects of interventions for suicide prevention. That study found that the most common duration for such programs was 10–19 sessions and that programs for elders were most effective when appropriate time was allocated because excessive program duration might decrease their motivation to participate. Every week, the group was divided into four smaller groups of six to nine elders, and each element of the program was presented on predetermined days. Each session was divided into five phases, including topic orientation (5 min), humor and laughter with rhythmic activity (15 min), education on the topic at hand (15 min), topic-related experience and sharing (15 min), supporting activity (15 min), healthcare evaluation and education (5 min), physical activity (15–20 min). Phase 1: Topic orientation addressed the importance of the weekly topic and raised the participant's interest. To maximize the effect of this segment, it was presented in the form of storytelling, based on
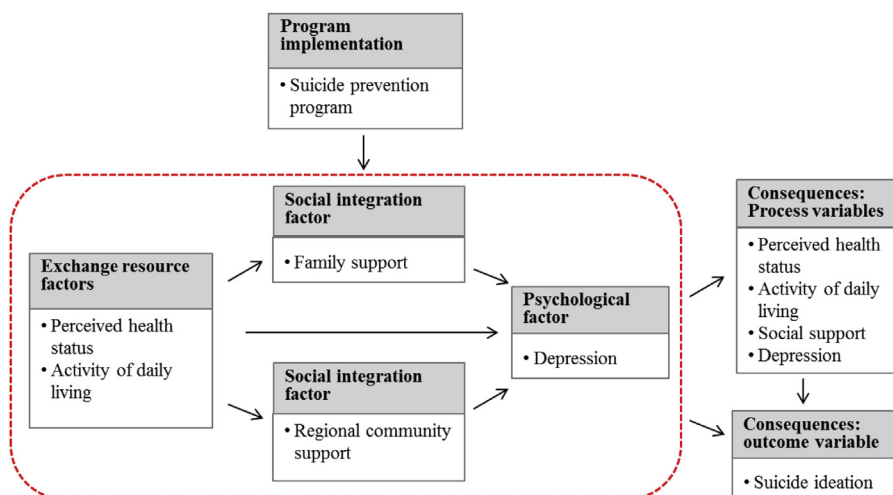

Fig. 2. Conceptual framework of the study.

Table 1
Outline of suicide prevention program for elders with early-stage dementia.

Session	Title	Purpose	Components of activities
1	Program orientation	Understand the purpose and contents of the program	Phase 1: Orientation to the topic (5 min) • Story-telling using handouts
2	How do I take care of my health?	Understand elders' healthcare	
3	How do I manage being old in my mind?	Understand depression	Phase 2: Strengthening psychological factors (15 min) • Humor and laughter with singing, dancing, clapping, and concentrating on here and now
4	Why do I feel so strange?	Understand dementia	
5	I don't want to live like this.	Understand suicidal ideation	
6	Can I ask for help from those around me?	Use community resources for elders with dementia	Phase 3: Strengthening social integration factors (45 min) • Education for each session using multimedia (15 min)
7	Who can help me at home?	Use family-related resources	• Sharing experiences related to the topic with one another (15 min) • Social support from family, other participants, and staff (15 min)
8	I want to be loved and respected.	Improve relationships with other people	
9	I want to spend my old age well.	Grow old in happiness	Phase 4: Strengthening exchange resources (15—20 min) • Health evaluation and education
10	Life is highly valuable to me.	Write a life-respect pledge	• Improving activity of daily living with muscle strengthening and range of motion
			Phase 5: Evaluation (5 min) • Program evaluation for the day • Support and encouragement

information collected through interviews with participants and their family in a preliminary study. Phase 2: Laughter therapy, singing, and rhythmic activities were included to reduce depression. First, simple laugher therapy was used to ease tension, and each participant was asked, 'How are you feeling now?' to prevent any sense of alienation. The focus was placed on psychological support by encouraging participants to express their feelings if they felt sad or troubled. In addition, the participants were led in singing a song of their choice, together with a rhythmic dance such as five-beat clapping, to induce active participation and encourage concentration. Phase 3: This phase was intended to enhance social integration. It consisted of education about the weekly topic, topic-related experience and sharing, and support from family, peers, and the local community. For social support, the participation of family members, peers, and facility staff were encouraged. First, a booklet on dementia was provided to family members to promote program participation and family support. Then, family members participated in the program, and a 'letter of love' was exchanged in each session. Moreover, a self-help group was formed from each small-group to encourage appropriate understanding of each person's problems by talking freely with group members and gaining peer support. Facility staff (social workers, nurses, and care workers) were encouraged to participate in the program, both to foster therapeutic relationships with participants and to provide community support. Phase 4: This phase, designed to enhance exchange resources, consisted of a health status check, healthcare education, and activities that enhanced participants' daily activity level. Vital signs, glucose level, weight, and flexibility of the body were measured before the start of sessions 1 and 10. Based on this information, healthcare education was carried out on a case-by-case basis to check individual health status. Muscle strengthening and range of motion exercises were implemented as physical activities in each session to promote interest in healthcare and better self-management. Phase 5: The evaluation phase was developed to motivate program participation through reflection on each day's session and on the past week's sessions. Positive reinforcement strategies, such as compliments and encouragement regarding their program experience, were used (Table 1).

This suicide prevention program for elders with early-stage dementia was operated by the authors, with the help of the facility staff. The program was provided either in the morning or in the afternoon, depending on each facility's schedule. The program was run in rooms provided by each daycare center; the rooms were approximately 26 m^2 in size, which was large enough for six to nine participants to interact with one another. In addition, the surroundings were prepared to prevent external disturbance. Finally, considering participants' age, the floor of the room was kept warm, cushioned carpets were laid, and a seating plan was made so that participants could lean against the wall.

Data collection

After explaining the purpose, method, and ethical aspects of the study, we obtained written consent prior to the pretest from 66 participants selected from among nine daycare centers. The pretest, first posttest, and second posttest were then administered to the experimental and control groups in the following timeframe. The pretest, a self-report survey, was completed before the first week of the program in one of two ways: (a) the participants wrote the answers themselves, or (b) for those who were illiterate, a research assistant answered on participants' behalves by reading the closed-ended questions aloud and marking the appropriate responses. The pretest took about 15—20 min.

The first posttest was performed immediately after the end of the 5-week suicide prevention program, and the second posttest was performed 2 weeks after the program's end (i.e., at week 7) to observe changes in the effect over time. The second posttest was performed after 2 weeks due to the potential for participant dropout and considering the minimal period over which the effects might dissipate after the first posttest. The pretest and two post-tests were administered to the control group in the same way as to the experimental group. The first and second posttests were also administered to the control group over the same period and using the same method.

The purpose and detailed procedure of this study were explained to two nurses with several years' experience in geriatric hospitals, who were recruited as research assistants. They familiarized themselves with the survey methodology and then read the survey questions to participants who were illiterate; interrater error was minimized by completing two surveys for each such participant. The research assistants were responsible for data collection and input; the authors were only involved in participant selection, interviews, and program implementation.

Table 2
Characteristics of the experimental and control groups ($N = 62$).

Characteristics	Categories	Experimental group ($n = 31$) n (%)	Control group ($n = 31$) n (%)	Total N (%)	x^2	p
Age (yr)	65—79	10 (32.3)	7 (22.6)	17 (27.4)	.74	.691
	80—89	16 (51.6)	18 (58.1)	34 (54.8)		
	≥90	5 (16.1)	6 (19.3)	11 (17.8)		
	Mean ± SD	81.04 ± 11.95	79.64 ± 15.60	82.45 ± 6.55		
Gender	Male	9 (29.0)	5 (16.2)	14 (22.6)	1.48	.181
	Female	22 (81.0)	26 (83.8)	48 (77.4)		
Education	None	17 (54.8)	17 (54.8)	34 (54.8)	5.31	.151[a]
	Elementary	7 (22.6)	10 (32.2)	17 (27.4)		
	Middle school	0 (.0)	2 (6.5)	2 (3.3)		
	≥ High school	7 (22.6)	2 (6.5)	9 (14.5)		
Economic status	Low	11 (35.4)	11 (35.4)	22 (35.5)	.00	1.000
	Moderate	15 (48.4)	15 (48.4)	30 (48.4)		
	High	5 (16.2)	5 (16.2)	10 (16.1)		
Living arrangement	Alone	6 (19.4)	7 (22.6)	13 (21.0)	.79	.672
	With a spouse	9 (29.0)	6 (19.3)	15 (24.2)		
	With children	16 (51.6)	18 (58.1)	34 (54.8)		
Spouse	Yes	10 (32.2)	9 (29.0)	19 (30.6)	.08	.500
	No	21 (67.8)	22 (71.0)	43 (69.4)		
Religious affiliation	Yes	17 (54.8)	23 (74.2)	40 (64.5)	2.54	.092
	None	14 (45.2)	8 (25.8)	22 (35.5)		
Dementia	Alzheimer's	14 (45.2)	16 (51.6)	30 (48.4)	.26	.400
	Vascular	17 (54.8)	15 (48.4)	32 (51.6)		

[a] Fisher's exact test.

Data analysis

The data were analyzed using the SPSS for Windows software (ver. 21.0; SPSS Inc., Chicago, IL, USA) as follows: (a) descriptive statistics were used to analyze general and disease-related characteristics of the participants, and the χ^2-test was used to test for differences between the two groups; (b) differences between the two groups on the dependent variables were analyzed using t-tests; (c) repeated-measures MANOVA and ANOVA were used to analyze differences in dependent variables between the two groups from a time lapse perspective. Additionally, missing data were excluded from the analysis by using the SPSS 21.0.

Results

Differences in group characteristics and research variables

The participants were mostly in their 80s (54.8%), but a substantial minority were under 80 years of age (27.4%); the average

Table 3
Repeated-measures MANOVA and MANOVA using repeated-measures ANOVA on dependent variables ($N = 62$).

Variables	Source		Value	F	p
All dependent variables	Group	Wilks' Lambda	.61	7.22	<.001
	Time	Wilks' Lambda	.22	17.92	<.001
	Time × Group	Wilks' Lambda	.41	7.25	<.001
Suicidal ideation	Group			18.68	<.001
	Time	Wilks' Lambda	.36	53.28	<.001
	Time × Group	Wilks' Lambda	.62	18.34	<.001
Perceived health status	Group			2.80	.099
	Time	Wilks' Lambda	.97	.79	.460
	Time × Group	Wilks' Lambda	.82	6.39	.003
Activity of daily living	Group			.99	.323
	Time	Wilks' Lambda	.71	11.89	<.001
	Time × Group	Wilks' Lambda	.97	.99	.375
Social support	Group			26.02	<.001
	Time	Wilks' Lambda	.47	33.36	<.001
	Time × Group	Wilks' Lambda	.80	7.28	.001
Depression	Group			14.04	<.001
	Time	Wilks' Lambda	.50	29.19	<.001
	Time × Group	Wilks' Lambda	.50	29.02	<.001

age (SD) was 82.45 (±6.55) years. Of the 62 participants, 22.6% were male, and 77.4% were female. Their education level was in the order of none (54.8%), elementary school (27.4%), and high school or more (14.5%). Their economic status was in order of 'moderate' (48.4%), 'low' (33.5%), and 'high' (16.1%). The general education level and economic status of the participants were relatively low, as stated. Participants most often lived with their children (54.8%), followed by living with a spouse (24.2%) and living alone (21.0%). The majority of participants did not have a spouse (69.4%), but most claimed a religious affiliation (64.5%). The forms of dementia reported were Alzheimer's (48.4%) and vascular dementia (51.6%). Tests for differences in general and disease-related characteristics between the experimental and control group revealed no significant differences in age, gender, education, economic status, living arrangement, presence of a spouse, religious affiliation, or type of dementia (Table 2). Additionally, the tests for differences between the groups in cognitive function, suicidal ideation, perceived health status, activities of daily living, social support, and depression prior to the experiment revealed no significant differences.

Hypothesis test

The results of the repeated-measures MANOVA performed to test hypotheses by considering correlations in five dependent variables are presented in Table 3. Significant differences were identified between the groups ($F = 7.22$, $p < .001$) and with the time lapse ($F = 17.92$, $p < .001$). In addition, the interaction between time lapse and group was significant ($F = 7.25$, $p < .001$).

Hypothesis 1

The results of the repeated-measures ANOVA testing hypothesis 1 are presented in Table 3. Significant differences were identified between the groups in the degree of suicidal ideation, both initially ($F = 18.68$, $p < .001$) and with the time lapse ($F = 53.28$, $p < .001$). In addition, the interaction between time lapse and group was significant ($F = 18.34$, $p < .001$). Therefore, hypothesis 1 was supported (Table 3). The initial level of suicidal ideation in the experimental group was 8.03, which decreased to 4.26 at the first posttest, and increased to 4.68 at the final test. In the control group,

Table 4
Comparisons of dependent variables between two groups according to time lapse ($N = 62$).

Variables	Categories	Experimental group ($n = 31$)	Control group ($n = 31$)	t	p
		Mean ± SD	Mean ± SD		
Suicidal ideation	Pretest	8.03 ± 1.94	7.74 ± 1.50	.66	.513
	Posttest 1	4.26 ± 1.39	6.90 ± 1.83	−6.40	<.001
	Posttest 2	4.68 ± 1.40	6.74 ± 1.71	−5.20	<.001
Perceived health status	Pretest	4.90 ± 1.30	5.19 ± 1.52	−.81	.421
	Posttest 1	5.68 ± 1.70	4.84 ± 1.34	2.15	.035
	Posttest 2	5.65 ± 1.66	4.61 ± 1.17	2.82	.006
Activity of daily living	Pretest	27.65 ± 5.44	26.51 ± 3.51	.97	.335
	Posttest 1	29.48 ± .09	29.00 ± 3.27	.51	.609
	Posttest 2	29.16 ± 3.80	28.10 ± 3.15	1.20	.235
Social support	Pretest	57.52 ± 6.87	55.42 ± 6.24	1.26	.213
	Posttest 1	67.48 ± 5.72	59.23 ± 6.50	5.31	<.001
	Posttest 2	67.52 ± 5.01	59.00 ± 6.07	6.02	<.001
Depression	Pretest	11.03 ± 2.12	10.35 ± 2.06	1.28	.207
	Posttest 1	6.74 ± 1.90	10.48 ± 2.47	−6.68	<.001
	Posttest 2	8.19 ± 2.01	10.06 ± 1.88	−3.79	<.001

the initial level of suicidal ideation was 7.74, which also slightly decreased to 6.90 at the first posttest, followed by 6.74 at the second posttest (Table 4).

Hypothesis 2

The results of the repeated-measures ANOVA performed to test hypothesis 2 are presented in Table 3. There were no significant differences between the groups in perceived health status ($F = 2.80$, $p = .099$), even with the time lapse ($F = .79$, $p = .460$), but the interaction effect between time lapse and groups revealed a significant difference ($F = 6.39$, $p = .003$). Thus, hypothesis 2 was supported (Table 3). The initial level of perceived health status in the experimental group was 4.90 and increased to 5.68 at the first posttest, followed by 5.65 at the final test. In the control group, the initial level of perceived health status was 5.19 and this slightly decreased to 4.84 and 4.61 at the two posttests (Table 4).

Hypothesis 3

The results of the repeated-measures ANOVA testing hypothesis 3 are presented in Table 3. Initially, there were no significant differences between the groups in activities of daily living ($F = 0.99$, $p = .323$), but significant differences appeared as time passed ($F = 11.89$, $p < .001$). However, the interaction effect between time lapse and groups revealed no significant effects ($F = .99$, $p = .375$). Thus, hypothesis 3 was not supported (Table 3). The initial level of perceived health status in the experimental group was 27.65 and this increased slightly to 29.48 at the first posttest, before decreasing to 29.16 at the final test. In the control group, the initial level of perceived health status was 26.51, which slightly increased to 29.00 and 28.10 at the two posttests (Table 4).

Hypothesis 4

The results of the repeated-measures ANOVA for hypothesis 4 are presented in Table 3. Significant differences were found between the groups in social support, both initially ($F = 26.02$, $p < .001$) and with the time lapse ($F = 33.36$, $p < .001$). In addition, the interaction between time lapse and groups revealed significant effects ($F = 7.28$, $p = .001$). Thus, hypothesis 4 was supported (Table 3). The initial level of social support in the experimental group was 57.52 and this increased to 67.48 at the first posttest, followed by 67.52 at the final test. In the control group, the initial level of social support was 55.42 and this also slightly increased to 59.23 and 59.00 at the two posttests (Table 4).

Hypothesis 5

The results of the repeated-measures ANOVA performed to test hypothesis 5 are presented in Table 3. Significant differences were found between the groups in degree of depression, both initially ($F = 14.04$, $p < .001$) and with the time lapse ($F = 29.19$, $p < .001$). In addition, the interaction between time lapse and groups revealed significant effects ($F = 29.02$, $p < .001$). Therefore, hypothesis 5 was supported (Table 3). The initial level of depression in the experimental group was 11.03, which decreased to 6.74 at the first posttest, and increased to 8.19 at the final test. In the control group, the initial level of depression was 10.35, which slightly increased to 10.48, and then decreased to 10.06 at the final test (Table 4).

Discussion

The experimental group, whose members took the suicide prevention program developed in this study, showed significant increases in their perceived health status and social support and significant decreases in depression and suicidal ideation. These effects remained significant at the second posttest, demonstrating that the program had an effect over the study time period in terms of the prevention of suicide in elders with early-stage dementia. However, the program concerning the activities of daily living should be supplemented by a reevaluation of the various factors related to the intervention, as there was no significant difference between the groups in activities of daily living.

Integrated, multidimensional programs that incorporate exchange resources (health status), social integration (social support), and psychological factors (depression) are likely to be most effective for elders with early-stage dementia. Systematic reviews[7,25,26] of existing elderly suicide prevention programs have shown that most studies used the measure of suicidal ideation to evaluate the outcome of the intervention. However, a considerable number of studies have focused only on the reduction of risk factors such as depression; only rarely have they aimed to improve protective factors such as health status and social support. Thus, a multidimensional approach to elderly suicide prevention intervention should focus both on reduction of risk factors and enhancement of protective factors by encouraging participation by family members, friends, and members of community. Then suicidal ideation should be evaluated as an outcome variable.[27]

Suicidal ideation decreased significantly in the experimental group after the suicide prevention program compared with that in the control group. This result was similar to that of another study[13] that presented a suicide prevention program to normal elders,

aiming to reduce suicidal ideation by enhancing support from individuals, family, and the community. Elders with early-stage dementia have insight into the disease, but they are less able to participate in various social activities due to the decline in their cognitive and physical functions, a situation that may increase the risk of suicide.[7] Thus, elders with early-stage dementia require considerable attention. In addition, it is necessary for family, friends, and community members to take early actions, playing the role of suicide gatekeeper to prevent the suicide of elders with early-stage dementia.

In the present study, the perceived health status of the experimental group significantly increased after the suicide prevention program compared with that of the control group. Analyses prior to the experiment revealed that a majority of elders with early-stage dementia (45.3%) perceived their health as poor relative to that of their peers of a similar age. It is important to foster a positive perception of one's health by reducing physical dysfunction or decline; most elders who attempted suicide had experienced decline or loss in physical functioning.[9] The perceived health status of the experimental group is considered to have improved in the present study due to the therapeutic effects of physical activity, as well as the health status evaluation and health education that were included in each session.

There was no significant difference between the groups in activities of daily living after program completion, suggesting that the suicide prevention program had no effect in this regard. This finding contrasts with those from Holthoff et al[28] and Lee and Kim[29] on activities of daily living among elders with Alzheimer's disease. They reported a significant increase in activities of daily living following programs of therapeutic physical activity over 12 weeks in Holthoff et al[28] and horticulture therapy over 4 weeks in Lee and Kim.[29] Therefore, the program of activities of daily living should be supplemented in the future by reevaluating the duration, intensity, and content of this intervention with a view to maintain elders' motivation to participate.

Social support increased significantly in the experimental group after the suicide prevention program compared with the control group. The social support system is known to help elders manage their stress from daily living and to enhance emotional and physical well-being.[8,11] In particular, coping with various risk factors related to elders' suicidal ideation requires crucial support and intervention from family, friends, and community.[13] Elders who attempted suicide were found to have no communication with their children and no close friends, and their participation in social activities was very poor.[30] A study that analyzed community-based suicide reduction programs[31] found that improving interpersonal skills, building peer support, and encouraging participation by family members and community were very important for the program's effectiveness. In the present study, family members' participation in the suicide prevention program and letter exchanges with family members was carried out to enhance family support. Moreover, small booklets on how to care for elders with early-stage dementia were provided to promote families' understanding of elders with early-stage dementia. In addition, self-help groups focused on peer support were formed by encouraging participants to talk with each other and to become gatekeepers for one another in terms of suicide prevention. The facility staff participated in group counseling to create therapeutic relationships, and they engaged in each activity of the suicide prevention program to enhance community support. Social support for participants in the experimental group seems to have benefited from the inclusion of these activities in the suicide prevention program.

The depression scores of the experimental group decreased significantly after the suicide prevention program compared with those of the control group. Laughter therapy, together with singing and dancing, was performed as an intervention to reduce depression in this study. In a meta-analysis, Cuipers et al[32] reported that psychological approaches such as play are more effective than cognitive-behavioral therapy or drug treatment in depression management with elders. The degree of depression in elders is known to be the most important predictor of suicidal ideation[5,9,10] and is also a factor that aggravates dementia.[14] Depression is very common in elders, and was found to be the main risk factor of suicide, but intervention studies are lacking.[7] Therefore, it is very important to detect depression in advance and to actively intervene in depression if suicide prevention strategies are to be effective.

Health status and social support need to be enhanced and psychological factors such as depression needs to be reduced for a suicide prevention program to be effective. The degree of perceived health status and social support among participants increased significantly, whereas depression and suicidal ideation decreased significantly, following participation in the suicide prevention program developed in this study. Appropriate use of this community-based program in geriatric nursing practice can be effective in preventing suicide among elders with early-stage dementia.

Conclusion

The suicide prevention program introduced in this study not only improved perceived health status and social support but also decreased depression and suicidal ideation in elders with early-stage dementia. However, several factors such as the duration, intensity, and content of physical activity therapy should be reevaluated in the future, to improve the activities of daily living in this population. We noticed that the community-based program for suicide prevention for elders with early-stage dementia could facilitate existing practices of health behaviors and suicide prevention. Therefore, the results of this study have implications for geriatric nursing care and health education, especially among elders with early-stage dementia. It is necessary for nurses to integrate risk factors such as depression and protective factors such as health status and social support into a suicide prevention program to obtain more effective results. In addition, nurses should take into consideration family, friends, and community members to reach vulnerable older adults. Further studies are needed to develop a comprehensive and tailored suicide prevention program by improving the range of activities of daily living and understanding the experience of suicidality among elders with early-stage dementia.

References

1. Seoul National University Bundang Hospital. *Survey on Dementia Care of Korea*. Seoul, Korea: Ministry of Health and Welfare; 2013.
2. National Health Insurance Service. *2014 Long Term Care Insurance Statistical Yearbook*. Seoul, Korea: National Health Insurance Service; 2015.
3. Lee GJ, Lee KL, Yang S, et al. Quality of life and the associated factors in dementia. *J Korean Acad Psychiatr Ment Health Nurs*. 2008;173:273—280.
4. Kang IB, Park SK. *Suicide Rates Are High Among the Elderly with Dementia*, http://news.chosun.com/site/data/html_dir/2012/11/09/2012110900100.html; 2012. Accessed 07.03.2016.
5. Kim JP, Hyun MY. Depression and suicidal ideation in elders with dementia. *J Korean Acad Nurs*. 2013;432:296—303.
6. Draper B, Peisah C, Snowdon J, et al. Early dementia diagnosis and the risk of suicide and euthanasia. *Alzheimers Dement*. 2010;61:75—82.
7. Fassberg MM, van Orden KA, Duberstein P, et al. A systematic review of social factors and suicidal behavior in older adulthood. *Int J Environ Res Public Health*. 2012;93:722—745.
8. Kim HS. A study on epistemology of Korean elder's suicidal thought. *J Korea Gerontol Soc*. 2002;221:159—172.
9. Kim HS, Kim BS. Path analysis on elderly suicide. *Korean J Couns Psychother*. 2007;193:801—818.
10. Seyfried LS, Kales HC, Ignacio RV, et al. Predictors of suicide in patients with dementia. *Alzheimers Dement*. 2011;76:567—573.

11. Kleiman EM, Liu RT. Social support as a protective factor in suicide: findings from two nationally representative samples. *J Affect Disord*. 2013;1502:540–545.

12. Bae J. Structural equational modeling for elderly suicidal thoughts. *Soc Sci Rev*. 2005;232:343–375.

13. Jo KH, Kim YK. Development and application of a multidimensional suicide prevention program for Korean elders by utilizing a community network. *Taehan Kanho Hakhoe Chi*. 2008;383:372–382.

14. Bennett S, Thomas AJ. Depression and dementia: cause, consequence or coincidence? *Maturitas*. 2014;792:184–190.

15. Kee B. A preliminary study for the standardization of a geriatric depression scale short form-Korean version. *J Korean Neuropsychiatr Assoc*. 1996;352:298–307.

16. Lee DY, Lee KU, Lee JH, et al. A normative study of the mini-mental state examination in the Korean elderly. *J Korean Neuropsychiatr Assoc*. 2002;413:508–525.

17. Harlow LL, Newcomb MD, Bentler PM. Depression, self-derogation, substance use, and suicide ideation: lack of purpose in life as a mediational factor. *J Clin Psychol*. 1986;421:5–21.

18. Speake DL, Cowart ME, Pellet K. Health perceptions and lifestyles of the elderly. *Res Nurs Health*. 1989;122:93–100.

19. Mahoney FI, Barthel DW. Functional evaluation: the Barthel index. *Md State Med J*. 1965;14:61–65.

20. Park JH, Cho SW, Shon HS. Reliability of functional status measurements in elderly people. *J Korean Neuropsychiatr Assoc*. 1995;342:475–481.

21. Vaux A, Phillips J, Holly L, et al. The social support appraisals (SS-A) scale: studies of reliability and validity. *Am J Community Psychol*. 1986;142:195–218.

22. Yesavage JA, Sheikh JI. 9/Geriatric Depression Scale (GDS) recent evidence and development of a shorter violence. *Clin Gerontol*. 1986;51-2:165–173.

23. Emerson RM. Social exchange theory. *Annu Rev Sociol*; 1976;335–362.

24. Durkheim E. *Suicide: A Study in Sociology*. New York: Free Press; 1950.

25. Park H, Bae J. Efficient suicide prevention intervention: meta-analysis. *J Korean Acad Psychiatr Ment Health Nurs*. 2013;224:273–284.

26. Lapierre S, Erlangsen A, Waern M, et al. A systematic review of elderly suicide prevention programs. *Crisis*. 2011;322:88–98.

27. Ridani R, Shand FL, Christensen H, et al. Suicide prevention in Australian aboriginal communities: a review of past and present programs. *Suicide Life Threat Behav*. 2015;451:111–140.

28. Holthoff VA, Marschner K, Scharf M, et al. Effects of physical activity training in patients with Alzheimer's dementia: results of a pilot RCT study. *PLoS One*. 2015;104:e0121478.

29. Lee YJ, Kim SM. The effect of horticultural program on cognitive function, activities of daily living (ADL) and hand grip strength of institutionalized dementia patients. *Korean J Adult Nurs*. 2004;161:123–134.

30. Szanto K, Dombrovski AY, Sahakian BJ, et al. Social emotion recognition, social functioning, and attempted suicide in late-life depression. *Am J Geriatr Psychiatry*. 2012;203:257–265.

31. Jones S, Walker C, Miles AC, et al. A rural, community-based suicide awareness and intervention program. *Rural Remote Health*. 2015;151:2972.

32. Cuijpers P, Karyotaki E, Pot AM, et al. Managing depression in older age: psychological interventions. *Maturitas*. 2014;792:160–169.