Received: 24 June 2018 | Revised: 24 May 2019 | Accepted: 17 June 2019

DOI: 10.1111/jjns.12286

ORIGINAL ARTICLE

JAPAN JOURNAL OF NURSING SCIENCE WILEY

Effects of Fumanet exercise on Korean older adults with mild dementia

Sun Mi Lee[1] | **Jaewon Joung**[2] | **Sung Hee Shin**[3]

[1]Seongbuk Center for Dementia, Seoul, South Korea

[2]Department of Nursing, Semyung University, Jecheon, South Korea

[3]College of Nursing Science, Kyung Hee University, Seoul, South Korea

Correspondence
Sung Hee Shin, College of Nursing Science, Kyung Hee University 26 Kyunghee-daero, Dongdaemun-gu, Seoul 02447, Korea.
Email: sunghshin@khu.ac.kr

Abstract

Aim: This study aimed to examine the effects of Fumanet exercise on cognitive function, walking ability, and depression in older adults with mild dementia.

Methods: A quasi-experimental pre- and post-test design with a non-equivalent control group was used. Participants were 45 patients with mild dementia (experimental group = 22, control group = 23). In the experimental group, Fumanet exercise was performed 60 minutes per day, once per week for 8 weeks. Data were analyzed using descriptive statistics, *t* test, Chi-square, Fisher's exact test, and two-way repeated measures analysis of variance.

Results: Gait ability in the experimental group was significantly improved compared with the control group ($F = 9.08$, $P = .004$). There were no significant differences in cognitive function or depression between the experimental and control groups. Although the intervention did not show a reduction in depression, participants exhibited a high participation rate and brighter mood with increasing sessions.

Conclusions: It was confirmed that Fumanet exercise is an effective nursing intervention to improve gait ability among older adults with mild dementia.

KEYWORDS

cognition, dementia, depression, gait, older adults

1 | INTRODUCTION

The number of older people worldwide is increasing, and about 47 million people worldwide are suffering from dementia; it is estimated that this number will increase to 131 million by 2050 (Prince, Comas-Herrera, Knapp, Guerchet, & Karagiannidou, 2016). As of August 2017, Korea in particular became an "aged society," where more than 14% of the population is comprised of people older than 65 years and is expected to become a "super-aged society" by 2025, when more than 25% of the people will be older than 65 (Statistics Korea, 2017). The growth rate of the older adult population in Korea is highest in the world, and consequently, the number of dementia patients is also skyrocketing. According to the Korean National Institute for Dementia, the prevalence rate of dementia among Korean elders is 10%, costing the nation 13 trillion won in total and 20 million won per individual annually. Moreover, over 2.7 million people are speculated to be caring for family members diagnosed with dementia (National Institute of Dementia, 2017); thus, dementia has emerged as an increasingly severe societal problem. Therefore, the Korean government has taken measures such as claiming national responsibility for dementia (National Institute of Dementia, 2017). Nevertheless, the government and relevant parties have yet to devise groundbreaking prevention methods and

innovative cures. Early intervention is known to help maintain cognitive function in dementia patients; thus, it may be more practical to aim at slowing disease progression in patients with mild dementia rather than to eliminate the disease (Robinson, Tang, & Taylor, 2015).

Cognitive function and walking ability are benchmarks for assessing the degree of dementia, and dysfunction in these areas may cause depression in dementia patients (Kim & Hyun, 2013; Kim & Kim, 2015). In fact, 86.2% of dementia patients experienced depression, the most important factor influencing suicide intentions (Kim & Hyun, 2013). Depression also broadly aggravates decline in cognitive abilities in the brain (Kim & Kim, 2015). Thus, dementia requires multidimensional and interdisciplinary interventions, due to its complex combination of cognitive functions and emotional symptoms.

Exercise slows the degradation of physical and cognitive abilities and everyday functions, prevents disabilities (Littbrand, Stenvall, & Rosendahl, 2011), and significantly reduces depression (Edwards, Gardiner, Ritchie, Baldwin, & Sands, 2008; Lee, Park, & Kim, 2011). Therefore, exercise is included as a non-pharmaceutical intervention in hospitals and rehabilitation centers for dementia patients (Littbrand et al., 2011). Moreover, various studies have been conducted to confirm the efficacy of single-task exercise programs such as "Otago Exercise," which includes retraining mild dementia patients in muscular strength and balance (Lee et al., 2011), exercise integrating aerobic and strength workouts (Hong, 2014), and circular task-oriented exercise (Jung & Kim, 2014). However, preceding research has shown that rather than single-task exercise, dual-task training (Kim & Kim, 2015) or multiple-task training, in which two or more tasks are performed simultaneously and continuously (Yokokawa et al., 2015) may be more effective for older adults with various problems, because performing multiple tasks shows extensive brain activation and prefrontal lobe stimulation compared to single-task performance (Al-Yahya et al., 2016).

Fumanet exercise was developed in Japan in 2005 as an integrated task exercise (Kitazawa et al., 2015). Fumanet exercises are performed by combining left and right step sequences along with dance routines, with increasing difficulty, gradually escalating from easy to hard. The performer must avoid stepping on squares that are drawn on the floor (Sompo Japan Research Institute Inc, 2010). Fumanet has been used in Japan since its first introduction and has been proven to be both safe and effective in positively influencing cognitive and physical abilities and emotions of older adults (Kitazawa et al., 2015; Tanaka, Wilson, Kitazawa, & Yata, 2017; Yokokawa et al., 2015). However, Fumanet has yet to receive adequate research attention. In addition, preceding studies have focused on healthy older adults, and not on whether Fumanet can help patients with mild dementia enhance their performance or slow degradation. As Korea becomes an aged society and the dementia population rises, an integrated task exercise that has been proven to help with preventing dementia symptoms is necessary. Accordingly, this study aims to apply Fumanet exercise to patients with mild dementia and evaluate changes in cognitive and gait abilities as well as the degree of depression, to verify the usefulness of this program for not only healthy older adults but also for patients with mild dementia. The study hypotheses were as follows.

1. The group completing Fumanet exercise will have a higher level of cognitive functions than the control group.
2. The group completing Fumanet exercise will have a lower time in the Timed Up & Go task (TUG) than the control group.
3. The group completing Fumanet exercise will have a lower level of depression than the control group.

2 | METHODS

2.1 | Design

This study had a pre-and post-test quasi-experimental design with a non-equivalent control group to examine the effects of Fumanet exercise on cognitive function, gait ability, and depression in older adults with mild dementia.

2.2 | Participants

The study was conducted with 45 older adults (experimental group, 22; control group, 23) diagnosed with dementia by psychiatrists, aged 65 years or older, and attending a dementia center located in Seoul. After posting an announcement for research participation in the center, those who agreed to take part in the study were included as participants. In order to prevent cross-contamination of the experimental procedures, experimental group members were recruited from those who visited the center on Monday, Wednesday, and Friday, and control group members were recruited from those who visited on Tuesday, Thursday, and Saturday. Specific inclusion criteria were as follows: (a) persons with mild dementia with a score of 0.5 to 1 on the Clinical Dementia Rating (CDR); (b) not visually impaired; (c) able to walk at least 10 m on his/her own, even if requiring an aid; and (d) without psychiatric disorders except dementia.

The required sample size was calculated as 42 participants (21 experimental and 21 control). Power analysis was performed using G*Power 3.1.9.2., with a significance level of .05, power of .80, and effect size of .80, according

to a previous study (Jung, 2005). Considering the possibility of dropouts, 24 participants were recruited in each group. However, two participants (one male, one female) in the experimental group and one (male) in the control group were absent for more than two sessions due to personal circumstances. Thus, the study used data from 22 experimental participants and 23 control participants in the final analysis.

2.3 | Intervention: Fumanet exercise

Fumanet exercise is an experimental treatment developed by Kazutoshi Kitazawa in Japan to improve the mobility and emotional state of older adults and prevent dementia. The exercise uses a set of two rows of nets, each net having a width of three rows and length of four columns. Thus, the entire set has three rows and eight columns, with each square having a 50 cm side. Participants take various steps, avoiding stepping on the squares while adding songs and dances to the routine. Participants perform the exercises in a generally pleasant atmosphere (Kitazawa et al., 2015). Fumanet exercise differs from other existing exercises in that it focuses not only on muscle strength but also on the "learning process." If a performer makes a small mistake or completely wrong move, this often induces laughter among participants, making them smile, and generating positive energy (Sompo Japan Research Institute Inc, 2010). In this study, each participant's physical condition and safety were checked, and his/her feet were then relaxed and stretched before starting the exercise. Subsequently, one person at a time, participants took a step in one direction with their assistants, while other participants sat on a chair and sang until it was their turn to take the steps. Once all the participants were finished with their steps, they were offered refreshments and time to share their thoughts about the exercise and exchange compliments. This configuration was repeated in each session (Table 1).

2.4 | Instruments

2.4.1 | Cognitive function

The Korean version of the Mini-Mental State Examination (MMSE-K; Kwon & Park, 1989) was used to measure cognitive function of study participants. The MMSE-K is a cognitive function scale for older adults that evaluates time-orientation, place-orientation, memory registration, memory recall, attention and calculation, language, comprehension, and judgment. The total score ranges from 0 to 30, with higher scores indicating higher cognitive function. The inter-tester reliability of the original instrument was 0.99 (Kwon & Park, 1989), and in this study, it was 0.80.

2.4.2 | Gait ability

Walking ability was assessed using the TUG task, which quickly evaluates basic motility and balance (Podsiadlo & Richardson, 1991). The time taken to get up from a chair, walk 3 m away, and then sit back on the chair was measured. A researcher took TUG time measurements three times using a stopwatch, and an average of the three TUG times was used. The shorter the time, the higher the walking ability.

2.4.3 | Depression

The 15-item Korean version of the Geriatric Depression Scale Short-Form (SGDS-K; Cho et al., 1999) was used, which is based on the Geriatric Depression Scale Short-Form (SGDS; Yesavage & Sheikh, 1986), which in turn is a shortened version of the Geriatric Depression Scale (GDS; Yesavage et al., 1982). The tool is a given a score of 0 for "yes," and 1 for "no," with total scores ranging from 0 to 15. The scores for negative questions (1, 5, 7, 11, 13) are reversed. The higher the score, the higher the severity of depression. The reliability of the original instrument was

TABLE 1 Fumanet exercise (60 min)

Category			Content	Exercise (min)	Participation
Opening warm up		Physical status check	Check physical status and safety of participants	2	Together
Exercise	Group	Walking on the chair	Move one's feet and relax	3	
		Stretching	Range of motion exercise	10	
	Individual	Warm up	Perform basic steps (no. 1,2,3)	10	By rotation
		Step task 1	Perform no. 4 step (3 steps)	10	
		Step task 2	Perform no. 5 step (4 steps)	10	
Finishing stage		Rest	Drink water and check condition	5	Together
		Wrap up	Talk about feeling and compliment someone else	10	

confirmed with a value of Cronbach's α of .89; in this study, Cronbach's α was .89.

2.5 | Ethical considerations and procedures

This study was reviewed and approved by the Human Participants Institutional Review Board. The researcher explained the goals and procedures of the study to participants and their legal representatives before the study began, clarified that collected data would only be used for research purposes and that participation would remain anonymous and confidential. In addition, the researcher explained that consent to participate could be withdrawn at any time; the participants signed a written consent form.

The period of data collection was from June 30 to September 3, 2015. General characteristics of participants, including age, gender, education, religion, spouse, and dementia type were collected from individual charts. Information regarding cognitive function, gait ability, and depression was collected by two research assistants. Measurements were conducted for both the experimental and control groups, before and after the intervention.

The intervention was carried out directly by the researcher, and four nurses were selected as research assistants to ensure smooth progress. Before the start of the study, the assistant researchers were educated on the goals and details of the exercise program, necessary preparations for each session, and safety precautions. The research assistants were usually placed next to the participating dementia patients to prevent safety accidents such as falls and were provided with specified written programs to avoid deviating from the protocol. The researcher and four assistants completed a Fumanet Supporter Training Course provided by the non-profit corporation, "Regional Health Improvement Committee One Two Three" and obtained privately registered licenses (registry No. 2014–5,798) before participating in the study.

The intervention involved one 60 minute session of Fumanet exercise per week over 8 weeks, in accordance with the research protocol of exercise designer Kitazawa (Kitazawa et al., 2015). The 24 subjects in the experimental group were divided into two smaller groups. The control group participated in existing programs provided at the center during the study period and received the experimental intervention after completing the final questionnaires.

2.6 | Statistical analysis

Collected data were analyzed using SPSS/WIN 21.0. General characteristics of participants were analyzed using frequencies and percentages. *T* tests and Chi-square tests were used to assess homogeneity of general characteristics between the experimental and control groups. The Kolmogorov–Smirnov test was used to test the normality of the dependent variables in the experimental and control groups, and *t* test and Mann–Whitney *U* test were used to test the homogeneity between the two groups in terms of the dependent variables. Hypothesis testing was conducted using a two-way repeated measures analysis of variance, and when there was an interaction between time and group, this was analyzed with pairwise comparisons in a calibrated manner.

TABLE 2 Homogeneity test of general characteristics ($N = 45$)

Categories	Subcategories	Experimental group ($n = 22$) n (%) or M ± SD	Control group ($n = 23$) n (%) or M ± SD	t or χ^2	P
Age, y		76.0 ± 6.7	75.9 ± 4.2	0.05	.958
Education, y		8.00 ± 3.83	9.48 ± 4.87	−1.13	.265
Gender	Male	12 (55)	11 (46)	0.20	.652
	Female	10 (45)	12 (54)		
Spouse*	Yes	17 (77)	18 (75)	0.41	.524
	No	4 (23)	6 (25)		
Dementia diagnosis*	AD	17 (77)	21 (92)	0.401	.334
	VD	1 (4.5)	1 (4)		
	UD	1 (4.5)	1 (4)		
	Etc	3 (14)	0		

Abbreviations: AD, Alzheimer's disease; M, mean; SD, standard deviation; UD, unspecified dementia; VD, vascular dementia.
*Fisher's exact test.

3 | RESULTS

3.1 | General and health-related characteristics

Age, education level, gender, presence of a spouse, and dementia diagnosis were examined as general characteristics of participants (Table 2). Mean age was 76.0 (*SD* = 6.7) years in the experimental and 75.9 (*SD* = 4.2) years in the control group. The gender ratio of the two groups was almost the same. As for education, the experimental group had an average level of 8 years (*SD* = 3.83), while the control group's education level was 9.48 (*SD* = 4.8798). Most in both the experimental (77%) and the control group (75%) had spouses. Regarding dementia diagnosis, most in both the experimental (77%) and control group (92%) were diagnosed with Alzheimer's disease (AD). There were no significant differences between the experimental and control groups in general characteristics.

3.2 | Homogeneity of dependent variables

Participants' cognitive function, walking abilities, and depression were measured and compared between the two groups. Differences in cognitive function and walking ability were analyzed using the *t* test, and depression with the Mann–Whitney test, a nonparametric test, as the depression data were not normally distributed. The two groups were found to be homogeneous, as they did not show significant differences (Table 3).

3.3 | Cognitive function, walking ability, and depression after the intervention

There was no significant difference between the two groups in terms of cognitive functions ($F = 1.64$, $P = .207$), and no significant interaction between time and group ($F = 0.01$, $P = .929$; Table 4, Figure 1).

There was a significant difference for TUG time between the experimental group and the control group ($F = 9.08$, $P = .004$), and between the two time points ($F = 12.00$, $P = .001$). There was a meaningful interaction between group and time point ($F = 32.87$, $P < .001$). Pairwise comparisons between the experimental and control groups, conducted after adjusting for the interaction between group and time point, showed the following results. The mean TUG time of the control group before the intervention was 11.18 seconds, and after intervention 11.36 seconds; thus,

TABLE 3 Homogeneity test of dependent variables ($N = 45$)

	Experimental group ($n = 22$)	Control group ($n = 23$)		
Categories	**M ± *SD***	**M ± *SD***	***t* /*Z****	***P***
Cognitive function	20.10 ± 4.07	19.04 ± 3.78	0.90	.376
Gait ability	10.70 ± 1.04	11.18 ± 0.94	−1.62	.112
Depression	5.23 ± 4.09	3.74 ± 3.63	−1.40	.162

Abbreviations: M, mean; SD, standard deviation.
*Mann–Whitney test.

TABLE 4 Comparison of cognitive function, activity of daily living, gait ability and depression between two groups after Fumanet exercise

		Pre-test	Post-test			
Categories	**Group**	**EM ± *SD***	**EM ± *SD***	**Source**	***F***	***P***
Cognitive function	Exp.	20.09 ± 4.07	19.59 ± 3.79	Group	0.88	.353
	Con.	19.04 ± 3.78	18.61 ± 3.66	Time	1.64	.207
				Group*time	0.010	.929
Gait ability	Exp.	MD = −0.71, $P < .001$		Group	9.08	.004
		10.70 ± 1.04	9.99 ± 1.20	Time	12.00	.001
	Con.	MD = 0.18, $P = .112$		Group*time	32.87	<.001
		11.18 ± 0.94	11.36 ± 1.04			
Depression	Exp.	5.28 ± 4.09	4.32 ± 3.59	Group	1.23	.274
	Con.	3.74 ± 3.63	3.57 ± 3.40	Time	1.61	.212
				Group*time	0.74	.394

Abbreviations: Con., control group; Exp., experimental group; MD, mean difference; SD, standard deviation.

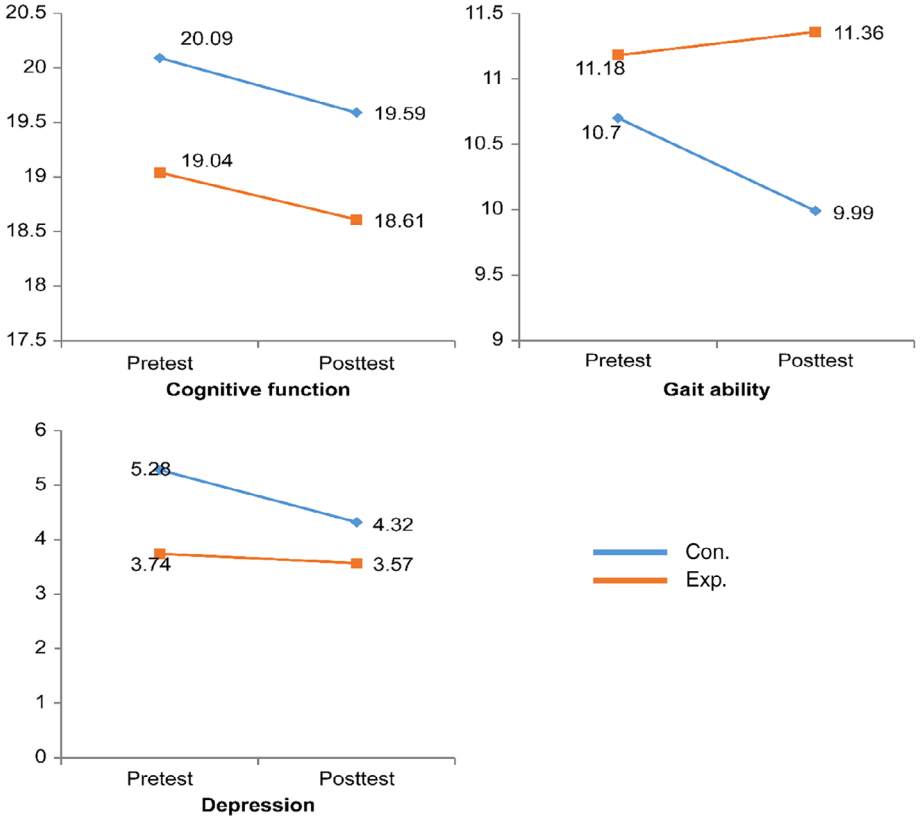

FIGURE 1 Comparison of cognitive function, gait ability, and depression between two groups after Fumanet exercise

the TUG time of the controls showed a slight but insignificant increase (mean difference [MD] = 0.18, $P = .112$). On the other hand, the mean TUG time of the experimental group before the intervention was 10.70 seconds and after the intervention 9.99 seconds; thus, there was a significant decrease (MD = −0.71, $P < .001$), confirming that Fumanet exercise was effective in enhancing the walking abilities of dementia patients (Table 4, Figure 1).

There was no significant difference between the experimental and control groups ($F = 1.23$, $P = .274$), or between the two time points ($F = 1.61$, $P = .212$), as there was no significant interaction between group and time point (F = 0.74, $P = .394$), (Table 4, Figure 1).

4 | DISCUSSION

This study investigated the effects of Fumanet exercise on older adults with mild dementia. Results showed that the walking ability of the experimental group significantly improved after the Fumanet program. Similar studies that have applied Fumanet exercise to healthy elders in regional communities yielded similar results, in that enhanced gait abilities were observed (Kim, Bang, Son, Oh, & Hwang, 2017; Kitazawa et al., 2015). Walking is considered to involve a higher level of cognitive function rather than just an automatic exercise function (Alexander & Hausdorff, 2008). Thus, double-task activities that stimulate both the body and cognition may be more appropriate to improve gait abilities (Yu, Lee, & Kim, 2014). Furthermore, it has been found that a multiple-task program is more effective in improving balance and gait ability than are dual tasks (Yokokawa et al., 2015) Therefore, it can be confirmed that a multiple-task training such as Fumanet exercise excels in improving the walking ability of patients with mild dementia.

However, Fumanet exercise failed to improve the cognitive function of older adults with mild dementia. Studies that showed improvement in cognitive function through Fumanet exercise (Kim et al., 2017; Kitazawa et al., 2015) involved healthy older adults. Research showing an improvement of cognitive function through dual tasks of exercise and cognition (Kim & Kim, 2015) was also conducted with older adults with mild cognitive impairments before they reached dementia. On the other hand, both the application of circulatory task-oriented exercise (Jung & Kim, 2014) and aerobic and strength exercise (Hong, 2014) to dementia patients did not support a cognitive function improvement effect. In this study, both the experimental and control groups showed lower cognitive function scores after the intervention than before, indicating that the cognitive decline of dementia patients is irreversible and attempts to enhance cognitive function through exercise may be inadequate. Nevertheless, a study showed that older adults with dementia who had been exercising for 5 months or longer showed sustained

and improved cognitive function (Lautenschlager et al., 2008), which suggests that a once-a-week, 8 week program did not provide enough exercise. Accordingly, it is necessary to reaffirm the effect of Fumanet exercise on older adults with mild dementia through a long-term intervention.

In this study, depression scores of both groups decreased, but the result was not statistically significant. One of the key features of Fumanet exercise is that it promotes positive energy and stimulates laughter (Kitazawa et al., 2015). However, while previous studies have verified enhanced motor capabilities, there was no previous research confirming improved emotional function. This contrasts with a study in which depression was reduced through Otago Exercise, an exercise to strengthen muscles and balance (Lee et al., 2011), and a study in which depression and anxiety were reduced through chair-based exercise (Edwards et al., 2008). The increase in physical activity may increase mental awareness and cognition, and reduce the degree of physical atrophy, leading to an increase in serotonin secretion, resulting in an antidepressant effect (Lee et al., 2011). However, the older adults with mild dementia participating in this study were already participating in other existing programs that could have affected their depression level, such as singing and art classes. This may be why there were no significant differences in depression levels between the two groups. In addition, according to a systematic review of short-term exercise interventions consisting of 3 to 12 weeks that were applied to dementia patients, only one of three studies confirmed a change in depressive mood (Fleiner, Leucht, Forstl, Zijlstra, & Haussermann, 2017). Thus, depression also needs to be reaffirmed through long-term interventions.

Although not included in the statistical analysis, it is notable that only one and two participants dropped out of the experimental and control group, respectively, and the remaining 23 and 22 participants completed the entire 8 week course. Even though older adults with dementia show positive physical and cognitive effects through exercise, these effects tend to disappear when exercise stops. This makes constant participation crucial (Hong, 2014), but it is rare that older adults complete their prescribed physical exercise (Kruger, Buchner, & Prohaska, 2009). Therefore, this study followed the exercise intensity and frequency (60 minutes once weekly for 8 weeks) laid out by Kitazawa et al. (2015), which considered the physical characteristics of older adults. Each session was designed not to be monotonous by introducing different steps every week. As a result, not only was the participation rate high, but participants' expressions also became brighter as the session progressed. Although the study could not prove statistical effects in terms of cognitive function improvement and depression reduction, the results proved the feasibility of applying the Fumanet exercise program to older adults with mild dementia. The results of this study suggest that Fumanet exercise is suitable as a nursing intervention for older adults with mild dementia in both hospitals and communities because it is simple and interesting.

This study has the following limitations. First, the study participants were not randomly chosen. Second, the study site was a dementia center, and the study could not control for other existing activity programs. Despite these limitations, this study is significant as it is the first to report the effects of Fumanet exercise on patients with mild dementia.

5 | CONCLUSIONS

The application of Fumanet exercise to patients with mild dementia was found to be an effective intervention for improving walking ability. In addition, this study confirmed the feasibility of this intervention for older adults with dementia having difficulty with continuous exercise by showing their continuous participation in a pleasant atmosphere. Therefore, it is suggested that the combination of Fumanet exercise and management of cognitive enhancers, which are non-pharmaceutical nursing interventions, will help improve cognitive function and quality of life in patients with mild dementia. Based on the results of this study, the following suggestions are made. First, it is suggested to apply Fumanet exercise to patients with mild cognitive impairment before the stage of dementia and to verify its effect. Second, the authors propose a long-term application of Fumanet exercise to verify its effects on cognitive function and depression.

ACKNOWLEDGMENTS

Thank you to all the participants and staff of the dementia center for their generous and considerable cooperation.

DISCLOSURE

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

S. L. and S. S. contributed to the conception and design of this study; S. L. performed the statistical analysis and drafted the manuscript; J. J. critically reviewed the manuscript; and S. S. supervised the entire study process. All authors read and approved the final manuscript.

REFERENCES

Alexander, N. B. & Hausdorff, J. M. (2008). Guest editorial: Linking thinking, walking, and falling. *Journals of Gerontology: Series A, Biological and Medical Science*, 63, 1325–1328.

Al-Yahya, E., Johansen-Berg, H., Kischka, U., Zarei, M., Cockburn, J. & Dawes, H. (2016). Prefrontal cortex activation while walking under dual-task conditions in stroke: A multimodal imaging study. *Neurorehabilation and Neural Repair*, 30, 591–599.

Cho, M. J., Bae, J. N., Suh, G. H., Hahm, B. J., Kim, J. K., Lee, D. W. *et al*. (1999). Validation of geriatric depression scale, Korean version (GDS) in the assessment of DSM-III-R major dep. *Journal of the Korean Neuropsychiatric Association*, 38, 48–63.

Edwards, N., Gardiner, M., Ritchie, D. M., Baldwin, K. & Sands, L. (2008). Effect of exercise on negative affect in residents in special care units with moderate to severe dementia. *Alzheimer Disease and Associated Disorders*, 22, 362–368.

Fleiner, T., Leucht, S., Forstl, H., Zijlstra, W. & Haussermann, P. (2017). Effects of short-term exercise interventions on behavioral and psychological symptoms in patients with dementia: A systematic review. *Journal of Alzheimer's Disease*, 55, 1583–1594.

Hong, S. E. (2014). Effects of multi-component exercise and retraining after detraining on functional fitness and cognitive function in elder people with mild dementia. *Korean Journal of Health Promotion*, 14, 33–42.

Jung, E. J. & Kim, W. B. (2014). The effects of task oriented circuit exercise on balance and cognition in mild dementia patients. *Journal of the Korean Society of Physical Medicine*, 9, 83–91.

Jung, Y. S. (2005). *A meta-analysis of the effects of exercise programs in the elderly*. (Unpublished doctoral thesis). Ewha Womens University, Seoul, Korea.

Kim, H. J., Bang, Y. S., Son, B. Y., Oh, E. J. & Hwang, M. J. (2017). The effects of Fumanet exercise program on fall down-related physical fitness factor and cognitive function in elderly people. *Journal of Korean Society of Integrative Medicine*, 5, 33–42.

Kim, J. P. & Hyun, M. Y. (2013). Depression and suicidal ideation in elders with dementia. *Journal of Korean Academy of Nursing*, 43, 296–303.

Kim, K. A. & Kim, O. S. (2015). The effects of exercise-cognitive combined dual-task program on cognitive function and depression in elderly with mild cognitive impairment. *Korean Journal of Adult Nursing*, 27, 707–717.

Kitazawa, K., Showa, S., Hiraoka, A., Fushiki, Y., Sakauchi, H. & Mori, M. (2015). Effect of a dual-task net-step exercise on cognitive and gait function in older adults. *Journal of Geriatric Physical Therapy*, 38, 133–140.

Kruger, J., Buchner, D. M. & Prohaska, T. R. (2009). The prescribed amount of physical activity in randomized clinical trials in older adults. *Gerontologist*, 49(S1), S100–S107.

Kwon, Y. C. & Park, J. H. (1989). Korean version of mini-mental state examination (MMSE-K) Part I: Development of the test for the elderly. *Journal of the Korean Neuro-psychiatric Association*, 28, 125–135.

Lautenschlager, N. T., Cox, K. L., Flicker, L., Foster, J. K., van Bockxmeer, F. M., Xiao, J. *et al*. (2008). Effect of physical activity on cognitive function in older adults at risk for Alzheimer disease: A randomized trial. *JAMA*, 300, 1027–1037.

Lee, B. H., Park, J. S. & Kim, N. R. (2011). The effect of physical activity program on cognitive function, physical performance, gait, quality of life and depression in the elderly with dementia. *Journal of Special Education & Rehabilitation Science*, 50, 307–328.

Littbrand, H., Stenvall, M. & Rosendahl, E. (2011). Applicability and effects of physical exercise on physical and cognitive functions and activities of daily living among people with dementia: A systematic review. *American Journal Physical Medicine and Rehabilitation*, 90, 495–518.

National Institute of Dementia. (2017). National Institute of Dementia Annual Report. Retrieved from https://www.nid.or.kr/info/dataroom_view.aspx?bid=168.

Podsiadlo, D. & Richardson, S. (1991). The timed "up & go": A test of basic functional mobility for frail elderly persons. *Journal of the American Geriatric Society*, 39, 142–148.

Prince, M., Comas-Herrera, A., Knapp, M., Guerchet, M. & Karagiannidou, M. (2016). *Improving healthcare for people living with dementia: Coverage, quality and costs now and in the future. World Alzheimer report 2016*. Alzheimer's: Disease International.

Robinson, L., Tang, E. & Taylor, J. P. (2015). Dementia: Timely diagnosis and early intervention. *British Medical Journal*, 350, 1–6.

Sompo Japan Nipponkoa Research Institute Inc. (2010). Disease management reporter in Japan (No. 18; Jun. 2010). Retrieved from http://www.sjnk-ri.co.jp/eng/disease/dmr.html

Statistics Korea. (2017). Social indicators in Korea. Daejeon. Available from URL: http://www.index.go.kr/potal/main/EachDtlPageDetail.do?idx_cd=1010.

Tanaka, M., Wilson, A. D., Kitazawa, K. & Yata, F. (2017). The Fumanet exercise program to prevent and postpone dementia-a cross cultural comparison. *Innovation in Aging*, 1(Suppl 1), 1184.

Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M. *et al*. (1982). Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research*, 17, 37–49.

Yesavage, J. A. & Sheikh, J. I. (1986). 9/Geriatric Depression Scale (GDS). *Clinical Gerontologist*, 5, 165–173.

Yokokawa, Y., Miyoshi, K., Nishikawa, R., Nishizawa, H., An Cheng, G. & Kai, I. (2015). Effects of the combined task training program using square-stepping nets on walking speed of healthy elderly. *Physiotherapy*, 101, e1697–e1698.

Yu, Y. J., Lee, K. K. & Kim, S. B. (2014). Effects of fear of falling and cognitive task on the obstacle gait in older adults. *The Official Journal of the Korean Association of Certified Exercise Professionals*, 16, 63–72.

How to cite this article: Lee SM, Joung J, Shin SH. Effects of Fumanet exercise on Korean older adults with mild dementia. *Jpn J Nurs Sci*. 2020;17:e12286. https://doi.org/10.1111/jjns.12286