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Original Article

The effects of meditation on physical performances and quality of life in healthy elderly subjects

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ABSTRACT

Background/Objective: To study the effects of meditation on physical functions and quality of life in the elderly.

Methods: This study compared the effects of meditation on physical health and quality of life in the elderly subjects. The meditation group (MG) received a meditation program consisting of 60-minute meditation sessions, 3 times a week for 8 weeks, while the control group (CG) received general health education. The outcomes that were measured included blood pressure, heart rate, six-minute walk distance test (6MWT) scores, five times sit to stand test (FTSST) scores, timed up and go test (TUGT) scores, functional reach test (FRT) scores and the results of a quality of life (QoL) assessment.

Results: The 42 subjects eligible to participate in the study were divided into two groups: the MG and the CG (21 subjects each). The median ages of the MG and CG were 73 and 71 years, respectively. After the eight-week period, two outcomes, TUGT and FRT, differed significantly between the MG and CG. The TUGT score was significantly lower in the MG than CG (6.4 vs. 8.3 sec; p value <0.01), while the FRT score was significantly higher in the MG than CG (26.0 vs. 21.0 cm; p value <0.01). The other outcomes were comparable between both groups including those of the 6MWT, FTSST, and QoL assessment.

Conclusion: The eight-week course of meditation significantly improved mobility, balance, and stability in healthy elderly subjects.

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INTRODUCTION

The elderly proportion of the population is increasing worldwide. The aging population has increasing prevalence rates of chronic diseases, disabilities, and functional impairments.[1-3] Increases in medical resources, rehabilitation programs, prevention programs, and interventions may be required in the future. In Japan, the elderly population accounted for 25.1% in 2013 and the malnutrition status in these elderly people is expected to be high.[4] Global prevalence of diabetes, which has increased by 2%, may be also be related to the 19% increase in the proportion of elderly people.[1]

Meditation is one of the alternative medicine with several health benefits in adults and elderly people including cognitive and physical function.[5-7] Meditation has been

shown to improve cognitive learning of 152 university students compared with controls.8 The cognitive score was significantly higher in meditation students than controls (130 vs. 127; p value 0.022). Because it is a relaxation technique, meditation may improve physical functions and psychological symptoms such as depression or anxiety.[9,10] Relaxation has been shown to lower blood pressure significantly and improve quality of life by 42%. Another review found that Buddhist meditation lowered diastolic blood pressure by 6.08 mmHg.[11] Meditation is believed to reduce physical stress and provide sustainable and positive exercise performance from a conscious effort.[5]

A breathing meditation, using rhythmic and mindfulness control, is a type of meditation. This meditation provides several health benefits such as increasing numbers of natural killer cell, reduction of smoking habit in 21% of smokers, or improvement of respiration in COPD patients.[12,13] However, there is limited data of physical health effects in the elderly persons who have declining in physical functions. This study aimed to evaluate the effects of breathing meditation on physical functions in the elderly subjects by using a comparison study.

METHODS

This study compared the effects of meditation versus control on physical health and quality of life in elderly subjects. The study was conducted at the Elderly Club, Muang District, Khon Kaen, Thailand between June 2015 and October 2016. The study enrolled healthy elderly subjects aged 60-80. Subjects were excluded if they regularly meditated or experienced pain (visual analogue scale of more than 5), suffered from any co-morbid diseases that may limit exercise capacity, had physical disabilities or defects, had communication problems such as hearing or vision defects, or did not complete the study protocol. Informed consent was obtained prior to study participation. The study protocol was approved by the ethics committee in human research, Khon Kaen University (HE572088).

All eligible subjects were randomly assigned to either the meditation group (MG) or the control group (CG). The MG received meditation program consisting of 60-minute meditation sessions, 3 times a week for 8 weeks, while the CG received general health education. Subjects in the MG group performed meditation together regularly in a quiet room. The program included 20 minutes of warm-up; 40 minutes of meditation; and 20 minutes of cool-down. During the warm-up and cool-down periods, subjects performed muscle stretching and relaxing guided by the leaders. For the meditation period, the subjects performed breathing meditation under the Buddhism principles. A position used in the study was similar to the sitting position of the Budha on the floor (https://goo.gl/MMm3Qp). The breathing technique used in the study by asking the subjects to catch their breaths as in- and out- throughout the 40-minute period. Subjects were also asked to close their eyes, be consciously and keep their minds peace and blank; try not to think of anything. There was no music or other religious lesson given during the meditation period.[13] The meditation interventions were performed under room temperature condition with guidance of the leader. The leader is a professional physical therapist who has practiced breathing exercise for more than 15 years.

Baseline characteristics and outcomes were measured at the baseline and the end of the study. The outcomes that were measured included blood pressure, heart rate, six-minute walk distance test (6MWT) scores, five times sit to stand test (FTSST) scores, timed up and go test (TUGT) scores, functional reach test (FRT) scores and the results of a quality of life (QoL) assessment. All measurements in the MG group were performed after meditation.

Blood pressure was measured using a Dinamap 1846 SX.[14,15] The 6MWT score used was the longest distance walked out of two attempts. Subjects were requested to walk continuously in along a square on 30 m linoleum hallway marked in 1 m increment.[16] The FTSST was performed by standing up from and siting down in a standard chair three times. The starting position is sitting on a 43-45 cm chair with arms folded across the chest and back against the chair. The fastest time was recorded.[17]

The TUGT consisted of subjects standing up from a standard armchair, walking a distance of 3-meters, turning, and walking back to sit in the chair again. The procedure is performed three times and the fastest time was recorded.[18] The FRT consisted of subjects standing close to a wall and reaching as far as possible along it. The measurement was taken from the starting position to the end position by using the 3rd metacarpal head as a reference point. The farthest reach was recorded.[19] QoL was assessed by using the Thai version of the WHOQoL.[20,21] It consists of 26 items regarding overall QoL and general health (2 items), physical health (7 items), psychological health (6 items), social relationships (3 items), and environmental health (8 items).

Statistical analyses

Sample size calculation. There was no previous study of meditation effect on the elderly persons. Assuming that meditation may have similar effect to the aerobic exercise, the 6MWT improvement compared with controls, the effect size was 33.79 and the standard deviation was 39.38.[14] With the formula for two group comparison, the required sample size per each group was 17 participants with power of 80% and confidence of 95%.[22] A dropout rate of 20% (four participants) was applied; there were totally 21 persons in each group.

At the end of the study, the outcomes the two groups were compared using the Wilcoxon Rank Sum test. The Sign Rank test was used to compare the differences between the baseline and end-of-study outcome variables in each group. Analyses were performed in per protocol fashion and using STATA software version 10.1 (College station, Texas, USA). A P-value of less than 0.05 was considered statistically significant.

RESULTS

The 42 subjects eligible to participate in the study were divided into two groups: the MG and the CG (21 subjects each). Of those, 4 subjects in each group were excluded due to failure to complete the prescribed regimen. In total, there were 17 healthy elderly subjects in each group. All subjects were Buddhist. The median ages of the MG and CG were 73 and 71 years, respectively. The MG group had fewer but not statistically significant male subjects than the CG (17.65% vs. 41.18%) as shown in Table 1. Only heart rate in the MG was significantly lower than the CG (76 vs. 93; p value <0.01).

Table 1. Anthropometric and baseline characteristics of subjects

Data/Groups	CG (n=17)	MG (n=17)	p value
Sex, number (%)			0.13
male	7 (41.18)	3 (17.65)	
female	10 (58.82)	14 (82.35)	
Age (year)	71 (68-73)	73 (68-75)	0.33
Weight (kg)	60 (59-62)	55 (52-65)	0.17
Height (cm)	158 (154-163)	151 (149-154)	0.52
BMI (kg/m^2)	24.2 (22.9-25.5)	24.1 (22.4-26.9)	0.65
SBP (mmHg)	129 (118-135)	133 (126-136)	0.46
DBP (mmHg)	91 (85-97)	88 (83-91)	0.19
HR (beat/minute)	93 (88-98)	76 (69-85)	<0.01

Note: values are median (first and third quartile values). CG=control group; MG=meditation group; kg=kilogram; cm=centimeter; m=meter; mmHg=millimeter Mercury; BMI=body mass index; SBP=systolic blood pressure; DBP=diastolic blood pressure; HR=heart rate.

At baseline, all outcomes were not statistically different between both groups (Table 2; baseline subheading). After the eight-week period, two outcomes, TUGT and FRT, differed significantly between the MG and CG. The TUGT score was significantly lower in the MG than CG (6.4 vs. 8.3 sec; p value <0.01), while the FRT score was significantly higher in the MG than CG (26.0 vs. 21.0 cm; p value <0.01) as shown in table 2; end of the study subheading. The other outcomes were comparable between both groups including those of the 6MWT, FTSST, and QoL assessment (Table 2). Only the groups' TUGT scores differed significantly between baseline and end of study (Table 3). The TUGT in the CG had increased significantly, from 6.7 sec to 8.6 sec. The score had decreased significantly in the MG from 6.6 sec to 6.4 sec (Table 3).

DISCUSSION

This study showed that the eight-week course of meditation improved mobility, balance, and stability in the healthy elderly subjects compared with control subjects (Table 2). The significant improvement of TUGT scores indicated better mobility and balance in the subjects. This may reduce risk of falling. There is little data evaluating meditation's possible relationship to falls or physical function in the elderly. A study in Taiwan showed that Chinese meditation improved physical and mental abilities in young adults.[23] Yoga, which is similar to meditation in its focus on relaxation and mindfulness, has been shown to reduce the number of falls in the elderly subjects.[24,25] Thirteen elderly subjects who performed a 12-week yoga course showed significantly TUGT scores (p=0.045).[25] This study showed that the improvement of mobility and balance by meditation may be seen after an intervention of eight weeks. The TUGT scores were also significantly better than the baseline in both groups. This suggests that that eight weeks of meditation improved TUGT scores from the baseline and eight weeks without caused TUGT scores worsen. Another possible mechanism of meditation on physical function is that meditation reduced pain and possibly improve muscle strengths. A previous study showed that a 8-week-mediation reduced pain at rest from 59.3 to 40.8 of visual analogue scale.[26]

Meditation's role in improving stability in the elderly was shown by significant higher scores on the FRT (Table 2). Elderly subjects in the MG were able to reach forward in a standing position a median of 26 cm, while those in the CG were only able to reach 21 cm. Yang et al showed that Taichi and meditation improved mobility function compared with a control group.[27] These improvements can be explained by the stimulation of the vestibular system while engaged in meditation. The meditation group had a 47% higher vestibular score than the control.[27] Even though FRT results after the eight weeks of meditation did not differ from the baseline (Table 3), it was significantly different from the CG (21 vs. 26 cm; p value <0.01).

The MG had statistically non-significant effects on 6MWT scores, FTSST scores, and QoL assessment results compared with the CG (Table 2). These findings may be explained by the underlying mechanism of meditation. The improvement of 6MWT and FTSST scores require aerobic exercises and muscle strengthening.[14,28] The QoL assessment was comprised of several aspects, some of which may

Table 2. Differences of outcome variables between groups at the baseline and the end of study

Variables	MG (n=17)	CG (n=17)	p value
Baseline			
6MWT (m)	444.0 (326.6-474.9)	421.4 (392.4-464.2)	0.69
FTSST (sec)	7.1 (5.9-8.3)	7.0 (6.2-8.7)	0.73
TUGT (sec)	6.6 (6.4-7.5)	6.9 (6.5-7.0)	0.31
FRT (cm)	24.0 (21.5-26.0)	22.0 (20.0-25.0)	0.70
QoL	105 (95-111)	96 (93-107)	0.31
End of study			
6MWT (m)	406.2 (385.0-484.4)	431.0 (402.1-452.9)	0.93
FTSST (sec)	6.3 (5.7-8.0)	7.2 (6.8-8.4)	0.16
TUGT (sec)	6.4 (5.5-7.2)	8.6 (7.2-9.4)	<0.01
FRT (cm)	26.0 (21.5-33.0)	21.0 (18.0-23.0)	<0.01
QoL	104 (97-115)	98 (93-105)	0.29

Note: values are mean (SD). CG=control group; MG=meditation group; 6MWT=six minute walk distance test; FTSST=five times sit to stand test; TUGT=time up and go test; FRT=functional reach test; QoL=quality of life assessment; m=meter; sec=second; cm=centimeter.

Table 3. Differences of outcome variables between baseline and end of study of the control and meditation group

Groups/Factors	Baseline	End of study	Median difference	95% CI of median difference	p value
Meditation group					
6MWT (m)	444.0 (326.6-474.9)	406.2 (385.0-484.4)	-11.2	-73.7, 38.5	0.28
FTSST (sec)	7.1 (5.9-8.3)	6.3 (5.7-8.0)	-2.3	-0.8, 1.0	0.47
TUGT (sec)	6.6 (6.4-7.5)	6.4 (5.5-7.2)	0.7	0.1, 1.3	0.02
FRT (cm)	24.0 (21.5-26.0)	26.0 (21.5-33.0)	-2.5	-9.0, -1.8	0.28
QoL	105 (95-111)	104 (97-115)	-1.0	-9.0, - 8.0	0.66
Control group					
6MWT (m)	421.4 (392.4-464.2)	431.0 (402.1-452.9)	-21.4	-60.5, -40.3	0.43
FTSST (sec)	7.0 (6.2-8.7)	7.2 (6.8-8.6)	-0.4	-1.1, -0.3	0.24
TUGT (sec)	6.9 (6.5-6.7)	8.6 (7.2-9.4)	-1.2	-2.0, -0.4	<0.01
FRT (cm)	22.0 (20.0-25.0)	21.0 (18.0-23.0)	2.5	-0.5, -4.5	0.08
QoL	96 (93-107)	98 (93-105)	-2.0	-7.0, 5.5	0.53

Note: values are mean (SD). CI=confidence interval; 6MWT=six minute walk distance test; FTSST=five times sit to stand test; TUGT=time up and go test; FRT=functional reach test; QoL=quality of life assessment; m=meter; sec=second; cm=centimeter.

be improved by meditation, resulting in statistically non-significant improvement of QoL.

This study's main strength is that it was designed as randomized controlled trial. However, it also had some limitations, such the small number of participants and duration of intervention. Some outcomes may be significant in a larger sample size or with longer intervention. Mobility and stability, however, were shown to improve significantly in this study population. Most subjects in the MG were female despite randomized design. Finally, the functional decline in the CG may not be due to health education but may be from their own status. Our subjects were quite old (71 and 73 years) resulting in functional decline.[29,30]

In conclusion, the eight-week course of meditation significantly improved mobility, balance, and stability in healthy elderly subjects.

CONFLICTS OF INTEREST STATEMENT

All contributing authors declare no conflicts of interest.

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