

The Effects of Subliminal Music with Balance Imagery Training on Balance and Concentration

Purpose: The purpose of this study was to estimate the effects of subliminal music with balance imagery training on balance and concentration.

Methods: The participants were 45 seniors in an undergraduate school in Korea. The subliminal music with balance imagery training intervention was carried out for 20 minutes. Other interventions were also carried out for 20 minutes. 12 seniors(Group A) listened to subliminal music with balance imagery training, 12 seniors(Group B) listened to subliminal music, 11 seniors(Group C) received balance imagery training, and 10 seniors(Group D) had no intervention(Control group). The grid test is related to measured levels of concentration intensity. Romberg one legged standing test was carried out for 30 seconds. The collected data was analyzed by one-paired t test and one way ANOVA using the SPSS Windows 12 ver. program.

Results: The major findings of this study were as follows: Concentration levels of Group A and C improved, and balance levels of Group C and D improved. There was a statistically significant decrease in concentration between Group A and B, Group A and C after intervention.

Conclusion: These findings suggest that listening to subliminal music with balance imagery training may be useful in managing concentration in seniors. So it provides basic information for further concentration on improving education on music with balance imagery training.

Key words: Subliminal Music; Balance Imagery Training; Balance; Concentration

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INTRODUCTION

As aging processes several features of the human body slowly deteriorate. In addition, performance and balance abilities used in order to maintain posture control also are degraded. Due to the deterioration of postural control abilities, the biggest problem that the elderly face is falling. In the United States, the experience of falling in elderly has been reported frequently. 30–50% of those over 65 years old and 40% of those over 80 years old fell at least once a year(1). Sattin stated that falls in the elderly may affect the psychological quality of life, increase overall functional impairment, as well as be the physical cause of accidental death(2). Gerome et al. also claimed that due to aging, physical decline and the

overall deterioration of bodily functions occurs, resulting in loss of balance and ability to adjust vision(3). Elderly people whose visual abilities decrease will lose their ability to adjust body balance. Thus, falling has a harmful influence on the lives of the elderly and several ways to prevent falls have been proposed.

In recent years, various types of training that include musculoskeletal and sensory systems of the body and increase the psychological effects of treatment are emerging. Through music, sensationing subliminal music therapy method is known to be effective.

Music with melody, rhythm, harmony, tone and meaning combined impact on thoughts, feelings and physique. For therapeutic effects of music, Yang suggests

that music that promotes mental stability and gives vigor to the body is helpful in strengthening and can lead to interest or intimacy for easy access from the treated group(4). Meanwhile, essential elements that make up the rhythm of music are connected sensually and instinctively. When rhythmic auditory stimulation from the outside comes in, because controlled behavior has been based on the circadian rhythm, physical rehabilitation indicates a positive effect(5). By properly using and combining promotion tools from other sectors, participation of the subjects and seeking relief of symptoms is important for the synergistic effect(4).

The positive effect of music is continually studied through many fields and times. Among these, in 1969, music was used to enhance mental training for astronauts of Apollo 11 who first landed on the 'Sea of Tranquility'. Since then, music has been successfully developed. The method used is called the subliminal(subliminal effect: the subconscious effect). When an external stimulus such as visual and auditory is given to people, there is a limitation which predicts whether or not a reaction may appear. This is called the stimulus threshold. Subliminal effect is caused by inserting stimulation of these less than the threshold which would influence subconsciousness(6).

Recently, subliminal effect uses auditory stimulus in an attempt to change human subconscious from negative thinking to positive thinking and it has also been made a functional album that promotes awareness, smoking cessation, weight control, prenatal education, memory, concentration and relaxation.

Dufour suggested that it is possible to affect to the perception of visual motion by using the auditory stimulus without conscious access(7), and Kim reported that visual-physical demonstration, which is combined with subliminal music, resulted in positive effect to enhance concentration(6).

Meanwhile, imagery practice is another way to induce physical ability by using senses. This means the psychological process which is used to achieve the internal demonstration of imagery practice(8), the focus of study about this effect is whether imagining practice prior to physical activity actually improve the result or not(9). For this, imagery practice contains all types of sense, such as sight, hearing, feeling, and kinesthesia are utilized. These are all used to make clear imagery practice(8).

Studies about exercise and learning effect increased after the discovery of Jacobson that imagining practice generates subtle electronic stimulus on muscles(10). Seavourne and other scholars, reported that

when a ski racer imagined his skiing, he actually responded in his muscles, and they also proved the effectiveness of imagery practice on karate practice(11). Also, Hamson reported imagining practice produces positive effect if the trainer and physiotherapist applied it to their rehabilitation program of sports damage(12).

So far some studies on the subliminal effect still continues, but scientific support seems to be very weak.

Therefore, the purpose of this study is to suggest that the new approach to maintain physical ability in the elderly and enhance it by searching for the effects of subliminal music combined with balanced imagining practice to concentration and balance.

MATERIALS AND METHODS

Subjects

For this study, 50 elderly subjects without experience or background participated in study.

The subjects knew the purpose of the study, and they participated voluntarily. The subjects who scored over 24 point on the MMSE-K and were able to walk 10m without assistance of another person were selected. 45 subjects participated in this study, excluding 5 participants who didn't match up the criteria for cognition and balance ability.

The following is their qualifications.

- 1) Seniors who did not take drugs and had unstable blood pressure or diabetes that interfered with balance and mobility assessment.
- 2) No participants with Parkinson's disease, stroke, multiple sclerosis and heart disease.
- 3) Total replacement arthroplasty in orthopedic surgery for the elderly who have no experience at lower extremity.
- 4) No deficiency in the vestibular system.
- 5) Elderly who understood without vision, hearing impairment.

Procedure

Subjects were divided into experimental groups A, B, C and control group D. Four of the group are shown in Table 1.

Balance test and concentration test were conducted before tests to experimental and control groups (measured before treatment). Each treatment progressed during 20 minutes, as shown in Table 1.

Table 1. Subjects group

Group	Treatment
A	subliminal music and balance imagery training
B	listen to the subliminal music
C	balance imagery training
D	free stability

At this point, background music needed for the A and B groups in order to improve concentration were used. Group C received balance imagery training without music, and group D was enabled to freely stable conditions. All received 20 minutes of training.

Imagery practice of balance was conducted for the four groups. Groups A and C were asked to imagine balance testing by holding one leg up. At this point, subjects received linguistic feedback for balance imagery training. Concentration and balance was tested after 20 minutes treatment of each groups.

Concentration Test

This study used a grid-plate for measurement of concentration. Grid-plate is widely used in eastern Europe which is made of each horizontal 18.8cm and vertical 17.5cm and make all 100 blank after that drew each 10 lines, this blank of hundred filled from 0 to 99 by random. Subjects filled diagonal line from regular numbers to next number with the "start" command of experimenters and grid-plate, and ability to draw diagonal lines were also measured 2 minutes. High levels mean high concentration(6).

Romberg One Legged Standing Test

When measuring balance test results, ability to keep balance was measured with a stopwatch from 1 to 100, a method commonly performed in clinical practice to measure the time step test(Romberg one legged standing test) conducted on solid ground in a quiet laboratory. The starting position of balance tests is putting the hand on the waist and not moving the hand, and standing with one leg held upright(13).

Subjects participate to simple dress, and them explained position of each requirement, and studied

after setting an example. Balance testing was measured by a maximum of 30 seconds, 30 seconds or milliseconds; up, when Broken Balance tests were stopped. Accuracy of this experiment was repeated two times(14).

Balance Imagery Training

For Balance Imagery Training, all subjects maintained balance by closing their eyes to avoid visual stimulation. The goal was to focus the spirit on their physical activity(15). Imagining behavior for the balance tests was done by one leg being held on the rest of one's stance to maintain balance. Verbal feedback was given to provide more specific training.

Measurement Tools

Measurement tools used in this study are shown in Table 2.

Table 2. Measurement tools in test

Name	Model	Company	Produce country
Subliminal Music	Musical Vitamin	Ains Digital	Japan
Stopwatch	KS201	Korea Sport	Korea

Data Analysis

The data obtained through experimentation, using the 12.0 version of SPSS for WINDOW, was processed. Study using data characteristics proved KS test (Kolmogorov-Smirnov Test) by a normal distribution.

Differences in cognitive ability between groups used to ANOVA were verified. Paired t-test was applied for concentration and balance. Musical and balance imagine training, concentration and balance of treatment group comparisons for applying a one-way ANOVA showed significant differences between groups for the post-test(post-hoc) by using the Scheffe method to determine a significant difference. Statistical significance of all data was set at .05.

RESULTS

General Charateristic of Subjects

The subjects participated in the experiment were 45 healthy elderly. Group A and B had 12 patients,

group C had 11 people, and group D consisted of 10 patients. Age distribution of subjects was a minimum

of 61 years old, the highest was 86, and average age was 72.09 years old(Table 3).

Table 3. General characteristic of subjects

Group	N	Age(years)	Height(cm)	Weight(kg)
		Mean±SD	Mean±SD	Mean±SD
A	12	69.75±7.38	156.75±6.00	54.68±9.13
B	12	76.50±8.37	158.75±7.57	52.33±9.75
C	11	5.18±6.10	164.00±6.07	60.64±10.88
D	10	66.20±3.36	162.40±8.51	64.40±10.24

* A: subliminal music+ balance imagery training; B: subliminal music; C: balance imagery training; D: control

Comparison of Cognitive Level Each of Groups

In contrast, cognitive levels did not differ between groups($p>.05$)(Table 4).

Table 4. MMSE–K homogeneity test

Group	MMSE–K(score)	F	p
	Mean±SD		
A	25.34±.98	1.73	.177
B	25.17±1.28		
C	25.09±.94		
D	26.30±2.11		

Comparison of Pre and Post Treatment of Concentration for Each Group

Group A showed an increase in concentration after treatment ($p<.05$). Group B and D showed increase in concentration at measurement after treatment, but did not differ in group($p>.05$). Group C also showed increase in concentration after treatment($p<.05$) (Table 5).

Table 5. Concentration before and after comparison test result in groups

Group	N		Mean±SD	t	p
A	12	before treatment	11.58± 5.98	-3.480	.005
		after treatment	15.92± 4.91		
B	12	before treatment	8.75± 5.29	-1.506	.160
		after treatment	10.50± 4.31		
C	11	before treatment	7.36± 2.54	-2.834	.018
		after treatment	9.91± 4.41		
D	10	before treatment	11.80± 4.69	-2.121	.063
		after treatment	12.80± 3.79		

Comparison Pre and Post Treatment of Balance for Each Group

Group A and B showed increase in balance at

measurement after treatment, but did not differ in group($p>.05$). In groups C and D, balance maintenance time increased after measurement than before ($p<.05$)(Table 6).

Table 6. Balance before and after comparison test results in groups

Group	N		Mean±SD	t	p
A	12	before treatment	18,02±10,89	-1,982	.073
		after treatment	22,96±8,98		
B	12	before treatment	14,68±10,71	-1,794	.100
		after treatment	18,48±10,25		
C	11	before treatment	14,72±8,18	-2,262	.047
		after treatment	17,17±8,51		
D	10	before treatment	16,69±8,14	-2,298	.047
		after treatment	21,28±6,88		

Comparison of Balance and Concentration for Each Group

At comparison between groups, concentration and

balance appeared to differ after treatment, but not between groups before treatment, balance before treatment, and balance after treatment($p>.05$) (Table 7).

Table 7. Comparison between groups of concentration and balance

	Group	Mean±SD	F	p
Concentration before treatment	A	11,58± 5,98	2,222	.100
	B	8,75± 5,29		
	C	7,36± 2,54		
	D	11,80± 4,69		
Concentration after treatment	A	15,92± 4,91	4,505	.008
	B	10,50± 4,31		
	C	9,91± 4,41		
	D	12,80± 3,79		
Balance before treatment	A	18,02± 10,89	.444	.723
	B	14,68± 10,71		
	C	14,72± 8,18		
	D	16,69± 8,14		
Balance after treatment	A	22,96± 8,98	1,015	.396
	B	18,48± 10,25		
	C	17,17± 8,51		
	D	21,28± 6,88		

Post-mortem examinations used Scheffe method to find out differences between groups on concentration after treatment difference appeared between groups. Multiple comparison results, subliminal music and balance imagery training were applied to increase

concentration than to those who were not in subliminal music and balance imagery training groups($p<.05$). These did not differ between other groups($p>.05$) (Table 8).

Table 8. Multiple comparison between groups of concentration after treatment

(I) Group	(J) Group	Average Deviation (I-J)	p
A	B	5.417	.040
	C	6.008	.022
	D	3.117	.443
B	A	-5.417	.040
	C	.591	.991
	D	-2.300	.686
C	A	-6.008	.022
	B	-.591	.991
	D	-2.891	.526
D	A	-3.117	.443
	B	2.300	.686
	C	2.891	.526

DISCUSSION

Balance is an ability that gives major impact in all operation accomplishment of daily life and maintains the body. Balance is defined as the ability to maintain the centre of gravity above the supporting base (16). In addition, balancing is a complex process that includes mobility and stability and harmony as a dynamic phenomenon that uses visual system, vestibular system, auditory system, somatosensory system, motor system from various fields(17).

Teasdale reported that postural sway increases with age and the postural task becomes increasingly difficult for the elderly and it is more difficult for women than men(18). Decreased stability is associated with postural sway and has often been related to reduced peripheral sensibility in visual, vestibular and proprioceptive systems.

The decrease balance ability of old people also caused decrease in the independent functional activities, therefore, falls and collapses increase. However, improved balance ability increases the agility of body operation which enables increase in improvisation, balance, and coordination that control several body parts(19).

Therefore, in this study, clinical training in the subliminal music and application of the balance imagery training were verified to improve concentration and balance, which help the elderly and healthy life. In this study, the subliminal music and the balance imagery training combined group, the subliminal music group, the balance imagery training,

and control group measure concentration and balance were measured. Results showed that subliminal music and balance imagery training using a combination in the experimental group was found to significantly improve concentration.

In a similar study, the effects of concentration and exercise performance of the subliminal music and visual-motor behavior demonstration was studied. The results showed that the max of subliminal music and visual-motor behavior demonstration has positive effects on the improvement of concentration(6). In this study, balance imagery training group were improved balance and concentration. This results are similar to the results of the effect of imagery training on balance ability in elderly women(20). And there are the results of the imagery training and physical therapy on hemiplegia patient were improved upper extremity function and decreased pain(21). These results are support that the results of this study. In light of these results, subliminal music and balance imagery training has positive effect on the concentration and increase the effectiveness of therapy. More research should be implemented using subliminal music and physical therapy interventions. In light of these results, subliminal music has positive effect on the concentration.

CONCLUSION

In this study, the effects of subliminal music with balance imagery training on balance and concentration was conducted for observation.

As a result, subliminal music and balance imagery training that had been applied to the group improved concentration($p < .05$) rather those that did not receive training. Balance imagery training has been applied to the group to improve balance and concentration and showed positive results($p < .05$).

As results show, balance imagery training with a mix of subliminal music caused positive effects on concentration. It was verified that imagery balance exercise has a positive influence on the balance.

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