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The effect of reflexology training on postural stability and postural sway in elderly women

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ABSTRACT

The purpose of this study was to investigate the effect of six weeks of reflexology exercises on postural stability and postural sway in active elderly women. 40 healthy women aged 60 to 80 years old were randomly divided into two experimental group (n = 20) and control group (n = 20). Before beginning any exercise program pretest with Biodex system were used. Post-test was performed in the same condition after six weeks of normal training and reflexology exercises. Reflexology is based on Byers's exercise instruction including three sessions a week, each session 30 minutes working on both legs (each leg 15 minutes). Experimental subjects did the reflexology exercises for six weeks plus their normal activities. Control subjects only perform their normal activities for the same duration. Descriptive and inferential statistics including independent t-test and paired t-test at a significant level of $p \leq 0.05$ were used to analyze the data. The results showed that postural stability and postural sway were significantly improved in experimental groups with open and closed eyes on both firm (hard) and foam surfaces. So, these findings indicated that six weeks reflexology which may effect on proprioceptive sense of one's own body position in space can lead to a better balance in elderly women with open and closed eyes.

Keywords: postural stability, postural sway, reflexology, active elderly women

INTRODUCTION

Nowadays, falls are one of the largest public health problems among elderly people due to the high morbidity, mortality and costs for the family and society (1). The main risk factors for falls in this population are related to functional limitations, history of falls, increasing age(1,4), muscle weakness, use of psychotropic drugs, environmental risks(1), the female gender and visual deficits (2). Researchers have reported that elderly women have a higher propensity for falls because of less lean body mass and muscle strength, a higher prevalence of chronic-degenerative diseases and exposure to domestic activities (2, 5). Every year, in Brazil and the United States (7), 30% of non-stititutionalized elderly people suffer falls. Approximately 5% of these cause fractures, especially in the hips(2). In the United States, the annual cost of treating hip fractures among elderly people caused by falls is 10 billion dollars(8). On the other hand, despite the high rate of fractures in Brazil, 12 million dollars is spent every year (9). To prevent falls, it is necessary to improve the reception conditions for sensory information from the vestibular, visual and somatosensory systems, so that the antigravity muscles are activated and balance is stimulated(10). One of the means applied for promoting the stimulation mentioned above is the practice of physical activities(11). Thus, it is recognized in the literature that physical activity practiced throughout life can diminish bone and muscle loss, and reduce the risk of fractures by up to 60 % (1, 3).

In addition, physical activity promotes increased muscle strength, aerobic conditioning, flexibility and balance, and reduces the risk of falls and improves quality of life (3, 13)

In recent years, the application of complementary and alternative therapies, including massage therapy, is increasing in therapy centers and communities. Massaging is defined as the technique of touching soft tissues of the body by hands in order to relieve the pain and increase the comfort in a patient (11). Reflexology, also known as reflex therapy, is one of the complementary treatments classified in hand massage treatment groups. It uses a special technique of touching or pushing the reflexology points on the palms and soles in order to make bio-physiological changes in the body.

Reflexology is based on the principle that there are reflex areas in the hands and feet which are in association with muscles, nerves, organs, glands and bones. Specific pressure on specific reflex points would activate the healing power and make balance in the body (13, 14). This technique should not be misinterpreted with massage. Reflexology is a form of pressure which is often done on the feet. Because feet are the most sensitive parts of the body and that is why they are considered as the best site for implementing reflexology (15, 16). Regular reflexology on the body can relieve the anxiety, cause relaxation and preserve health (12).

Kim and Cho conducted a study to determine the effects of foot reflexology on premenstrual symptoms and dysmenorrhea in 40 female college students. Mean score of premenstrual symptoms and dysmenorrhea pain reduced from 8.35 to 4.16 in the first menstrual cycle and to 3.25 in the second menstrual cycle by foot reflexology. The results indicated that implementing foot reflexology can be effective on reducing premenstrual symptoms and dysmenorrhea in female students (17). Furthermore, a study by Oleson and Flocco, aimed to determine the effects of ear, hand and foot reflexology on the premenstrual symptom of 35 women. The results indicated that there was a significant and considerable reduction in premenstrual symptoms in those who were in the real reflexology group (18). However, the purpose of this study was to systematically investigate the effects of foot reflexology on postural stability and postural sway in the elderly women.

MATERIALS AND METHODS

Setting and Sample:

This research is a semi-experimental design with pretest and posttest. 40 healthy old female between the ages of 60 to 80 years participated in this study. 40 subjects were randomly assigned into two groups of experimental (N=20) and control (N=20). Informed consent was obtained from each patient before entering the study. Reflexology training program was carried out for 6 weeks (three sessions of 30 minutes per week) while the control group did not receive any intervention.

Intervention:

The foot reflexology protocol was performed by the researcher on the experimental group under the surveillance of a physiotherapist for 18 sessions (6 weeks, 3 sessions each, each session 30 minutes). The patients had to lie down supinely on a bed in a quiet, bright location and remain in a completely relaxed state. Then the sole was gently massaged, and after that, with the heel held in one hand and the sole were given alternate ripple and smoke massages in a reciprocating motion [4, 13, 14, 15]. This treatment was performed for 30 minutes on the feet (15 minutes for each foot). Based on the reflexology code, at the end of each session, the patients were asked to take much water and liquids over the next 24 hours [13].

For each measurement time, the postural test consisted of four conditions of quiet stance: stance on a firm surface with eyes open (EO); stance on a firm surface with eyes closed (EC); stance on a foam surface (thickness 7 cm) with eyes open (FEO); and stance on a foam surface with eyes closed (FEC). Participants stood quietly while barefoot, with the head in a straight-ahead position, their arms along the body. During conditions with eyes open, they were instructed to look a black spot (with a diameter 2 cm) placed in white wall in the front at a 2 m distance. For each condition, three trials were performed. The duration of each trial was 90 s, followed by a short rest period. The twelve trials were presented randomly. The whole experiment time was about 25 min. Under these recommended conditions (three trials, sampling duration of 90 s, sampling frequency of 100 Hz and cut-off frequency of 10 Hz, visual and surface conditions), the high reliability of parameters has previously been reported in the literature(8). Descriptive and inferential statistics, including independent t-test and paired t-test, were used to analyze the data at a significant level of $p \leq 0.05$.

RESULTS

The data of the table 1, shows that there is a significant difference between both the experimental and control groups subjects' postural stability with eyes closed and with eyes open on firm surface, ($p \leq 0.03$, $p \leq 0.05$). Also, according to these data analysis and by using the independent t variable, a significant difference is observed between the postural stability of the control and experimental groups subjects with eyes open and with eyes closed on foam surface ($p \leq 0.04$ & $p \leq 0.03$). The data analysis by using the independent "t" showed that there are significant differences between the postural sway of experimental and control groups on firm surface with eyes open ($p \leq 0.001$) and eyes closed ($p \leq 0.004$). Also significant differences were observed between postural sway of experimental and control groups on foam surface with eyes open ($p \leq 0.001$) and eyes closed ($p \leq 0.001$).

Table1: The means and paired t test in static balance

Balance Index	Group	Pre test	Post test	t	sig
Postural Stability stance on a firm surface with eyes open	Experimental	2.76±1.4	2.05±1.09	2.32	0.03
	Control	2.06±0.89	2.07±0.84		
Postural Stability stance on a firm surface with eyes closed	Experimental	2.77±1.13	2.16±0.98	2.12	0.05
	Control	1.89±0.89	2.07±1.01		
Postural Stability stance on a foam surface with eyes open	Experimental	2.76±1.25	2.23±1.14	2.27	0.04
	Control	2.65±1.08	2.65±1.07		
Postural Stability stance on a foam surface with eyes closed	Experimental	3.93±1.02	3.3±1.01	3.12	0.003
	Control	3.54±1.11	3.52±1.09		
Postural Sway stance on a firm surface with eyes open	Experimental	0.98±0.35	0.62±0.26	3.14	0.001
	Control	0.79±0.32	0.80±0.3		
Postural Sway stance on a firm surface with eyes closed	Experimental	1.14±0.43	0.80±0.19	3.08	0.004
	Control	0.88±0.28	0.89±0.29		
Postural Sway stance on a foam surface with eyes open	Experimental	1.64±0.48	1.3±0.29	3.64	0.001
	Control	1.62±0.46	1.62±0.47		
Postural Sway stance on a foam surface with eyes closed	Experimental	3.15±0.56	2.54±0.48	0.61	0.001
	Control	3.007±0.8	3.01±0.81		

DISCUSSION AND CONCLUSION

The results showed that the reflexology exercises, improves the static balance in the postural stability index and postural sway with eyes open and with eyes closed on the firm and foam surfaces. But what mechanism is there in the reflexology exercises which can improve the balance? The imbalance of the body in the everyday life can impede the flow of the neurotic messages anywhere in the body, which means that the speed of neurotic messages' movement toward the muscles, body organs and the glands is somehow reduced. The reflexology science plays a great role in order to resolve the impediments and to improve the neurotic communications. This science, also enhances the endorphins secretion, which leads to the health and vigor improvement in the body (Ayngam, 1951); eventually bringing about the nerves peace, vasoconstriction reduction, blood current increase, inflation reduction and the eleven body systems' balance, the suppressed emotions resolution out of the stress and pressures, isolation reduction, positive subjective attitude reinforcement, and the lymphatic and immune system performance increase. The reflexology exercises, has positive effects in curing many diseases, especially in pain alleviation, neurotic blocks resolution, body tranquilizing, concentration level increase and it keeps the health in a balanced state. According to this science, if any member of the body is endangered with any kind of disease or disorder, this means that the vital energy is impeded in the meridian of that member or even in that very member. Since we have all the members and endorphin glands and even all the body in these reflex surfaces, firstly we can find the reflexes in the sole, hands and ears, by exciting or massaging them, and then by returning the natural energy current to the body, we will improve the patient's health. This mechanism, possibly by removing or reducing the pain points and by eliminating the energy block points, and increasing the concentration and the health, can improve the balance.

The Studies Supporting Reflexology

Although the studies conducted in the reflexology field, are mainly focused on the effects of these exercises on the pain alleviation in the patients, and the literature of the field is too narrow, and there was not any study similar to the present study for comparison and contrast; the results of this study, is compatible with those of Akbarpour (2012), Jessica et al (2012) and Vaillant et al (2008 & 2009), in case of the balance and postural control parameters(8,20,21).

Akbarpour, in his research conducted in 2012, investigated the effect of 6 weeks of leg reflexology exercises on the balance of healthy male elderly subjects. The results of this research showed that the reflexology exercises, improves the static balance. Vaillant et al (2009), conducted a research on the effect of sole and ankle massage in the elderly adults and its effect on the clinical balance. The results showed that only one session of sole and ankle massage, has a positive effect on the elderly adults' balance (21).

Jessica et al (2012), did a study titled "Massage for postural control in those with chronic ankle instability". The results showed that the ankle massage and not the shin muscle massage, urgently improves the postural control in those with chronic ankle instability (8). Vaillant et al (2008 & 2009), conducted a research on the effect of manipulation of the feet and ankles on postural control in elderly adults (20, 21). The purpose of the experiment was to investigate the therapeutic effect of manipulation of the feet and ankles on postural control in elderly adults. The results showed that after manipulation of the feet and ankles on postural control in elderly adults with eyes closed, the stability increased. Although massaging is different from the reflexology exercises, it seems that the mechanism of their effect is highly similar to one another. Nevertheless, in the studies mentioned, the domains, age groups, genders and the activities of the subjects are different.

The results of the study showed that the reflexology exercises, can improve the postural stability and postural sway in the active female elderly adults. These exercises, can reduce the risk of falling off and losing the balance in the elderly adults, and the possible influences on the deep sensory receivers and the individual's perception of his/her body condition in any environment, can improve the static balance in the elderly adults.

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