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The effects of 8 weeks of yoga on postural control and the quality of life in 15-17 years old female hearing impaired adolescents

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ABSTRACT

Introduction: The most common disability in children and adults is hearing disabilities which are seen in different people with different levels. Since deaf and hearing-impaired children have their own limitations and problems in terms of physical and mental aspects, imbalance due to damage to sensory integration and motor development is one of the defect seen in most people with hearing disabilities. This study aimed to investigate the effects of 8 weeks of yoga on posture control and the quality of life in female hearing impaired adolescents. **Method:** this study is quasi-experimental and the samples were randomly selected by convenience sampling method. Twenty-eight 15-17 years old female students were selected from Mir Isfahan high school for hearing-impaired students (age: 15.59±1.84, tall: 151.643±5.5128, weight: 48.46±6.173). The students with moderate to severe hearing loss (30.10±5.88 dB) were selected. They were grouped into two control (15 students) and experimental group (13 students). The research tools were Stork Balance Stand Test, Y test, hearing impaired youth-related quality of life inventory. They did yoga three times a week and for 8 weeks. The data was analyzed by using ANOVA test and SPSS V.18 software. **Results:** doing yoga is effective (P≤%5). The results showed that there is a difference between the groups in terms of static and dynamic balance (P≤%5). In other words, when changes in the scores of the groups are investigated separately, increase in mentioned variables can be seen and there is significant difference between the patterns of changes within groups. The results showed that there is a different between the groups in terms of the quality of life (P≤%5). In other words, when changes in the scores of the groups are investigated separately, increase in mentioned variables can be seen and there is significant difference between the patterns of changes within groups. After 8 weeks of yoga, significant increase has been seen in static balance and dynamic balance (anterior, medial, lateral) of 15-17 years old girls (static balance (F=35.701, P=0.000), anterior dynamic balance (F=38.823, P=0.000), medial dynamic balance (F=35.402, P=0.000), lateral dynamic balance (F=40.094, P=0.000)) and also, the quality of life in hearing impaired adolescents has been enhanced (quality of life-physical dimension (F=40.094, P=0.000), quality of life-emotional aspect (F=30.337, P=0.000), quality of life-social dimension (F=13.505, P=0.001), quality of life (F=35.097, P=0.000)). **Conclusion:** the results showed that yoga exercises used in this research can be efficient training method for improving static balance, dynamic balance and quality of life in female hearing impaired adolescents. Therefore, it seems, this exercise protocol can be introduced and used as useful complementary method to reduce some problems in hearing-impaired adolescents.

Key words: postural control, yoga exercises, dynamic balance, static balance, quality of life, hearing impaired

INTRODUCTION

Hearing loss is the most common sensorineural defect in humans. The occurrence of pre-lingual deafness is about 1 in 1,000 births and more than 60% of cases are inherited. Deafness is a heterogeneous disorder and it can occur due to environmental, genetic causes or both of them (1). Hearing loss is stable or fluctuated disorders in the auditory system and affect human performance. The inner ear is a main member of the sense of hearing and body balance system. The snail-shaped part of ear is a hearing part of the inner ear. Utricle and saccule and semicircular cannels play an important role in balance system. There is perilymph fluid in the top and bottom of cochlear duct. Semicircle cannel disorder and cochlear disorder or disorder of snail-shaped par of 18th cranial nerve impact on balance system negatively. 65% of abnormal function is related to the cochlea and balance. Hearing-impaired children are weaker than hearing children in using their skills. On the other hand, there is a difference between hearing-impaired people and this demonstrates diversity of abilities in hearing-impaired children and the differences in language abilities are due to the degree of hearing loss, type of prosthesis, the beneficial use of residual hearing and quality of hearing rehabilitation training and other factors (3). Hearing impaired people have problems in coordination and speed of movement and maintenance of body balance. Balance disorder is the main cause of stiff walking, weakness of legs, poor maintenance of balance and hyper-kyphosis (2). The balance is a multi-sensory activities. Our sense of balance from embryonic development to adulthood is the result of operations of somatosensory, vestibular and visual systems. It is said that in healthy individuals, somatosensory, vestibular and visual systems provide 70%, 20% and 10% of sensory information necessary to maintain the balance on the stable surface (4). If people who have vestibular system impaired use their visual and proprioception systems, they can maintain their balance. Generally, body control requires a close partnership between proprioceptive sense and vestibular sense (5). All daily activities needs balance. Functional balance is taken account as a prerequisite to do a lot of static and dynamic activities that can be seen in daily life and it needs proper interaction between sensory and motor systems. Balance during weight transfer or voluntary movement (dynamic balance) emphasizes on balance responses at the time of imbalance and functional simulation (6). Dynamic postural control can be defined as performing functional task without engaging a part of supporting surface. Postural control is done using the data collected by mechanoreceptors in the lower extremities, trunk and mass in the area of supporting surface. There are several factors that can affect one's ability to maintain or regain their postural control and damage to the nervous system, optic nerve dysfunction, stress, vestibular mechanism and fatigue can be noted as the most important factors (7). According to WHO, the quality of life is full health status of physical, mental and social aspects. Health-related quality of life means individual's understanding and feeling of his own life that is described with three physical, mental and social dimensions. To improve health-related quality of life is the ultimate goal of rehabilitation of people with different health conditions are chronic diseases. According to the definition provided by WHO, quality of life is an individual's perception of life according to the culture and value system governing his living environment with their goals, expectations, standards and top priorities (8). Hearing impaired people's problems are often considered only in terms of the aspect of communication. Although communication problem is a major defect caused by hearing loss but it is possible that other physical problems are associated with hearing loss. In this regard, imbalance due to damage to sensory integration and motor development is one of the defects of most hearing impaired (9). Hesari et al. (2011) have investigated the effects of core stability training on static and dynamic balance in male hearing impaired students in their study. The results showed that balance training has a positive effect on the balance of the hearing disabled (9). Komei (2014) has investigated the effect of balance training on static and dynamic balance in hearing impaired students. The results showed the positive effects of training on dynamic and static balance in hearing impaired students (4). Yoga has been paid attention in order to meet the needs of physical health and inner peace. Doing yoga is effective in healing the wounds and in general, it strengthens robustness. Different good results have been reported by the people who have started to practice yoga in the mid and late years of their lives and with significant physical defects. They can regain their lost strength, flexibility, energy and level of health (13). According to yoga instructors, there is a positive attitude to life in this sport and this positive attitude promotes health and positive energy in people

(14). Khazaei et al. (2014) have studies the effects of selected yoga exercises on the dominant and non-dominant leg balance in middle-aged women. The results showed that yoga leads to an increase in static and dynamic balance of both legs and dynamic balance of non-dominant leg has been significantly improved more compared to dominant led but static balance of dominant and non-dominant legs have been increased to the same extent (15). Toga improves psychological conditions for controlling and managing stress, reducing anxiety and negative emotions and increasing positive emotions. Yoga as a low-cost and effective sport for all age groups, is a training program including Asana exercises (stretching and warm-up exercises) that all the muscles are stretched to the point of pain and muscle contraction and then Pranamaya exercises which have been done in a seated position with straight back and along with deep inhale and exhale with certain and coordinated rhythm and also, with holding breath for a short time to start the next step of exercises and the final stage includes meditation which is done after Pranamaya exercises and includes sleeping in the quiet, breathing with the right rhythm, isometric contractions of large muscles, stretching and relaxing and focusing (16).

Balance means maintaining good posture in both static and dynamic positions (8). Balancing is a result of interaction between different body systems, including internal factors (proprioception, hearing and eyesight) and muscular factors (9). Postural balancing on the static and dynamic conditions includes a balance of stable forces and is the need to receive sensory information from visual system, vestibular systems and somatosensory feedback. Multiple systems, involved in maintaining postural control, consist of musculoskeletal components, internal representations, adaptation mechanisms, sensory strategies and neuromuscular cooperation (10). Yoga is a type of exercise that takes place in a peace and quiet state and strengthens the muscles, nerves and internal organs and people of any age and with any situation can do it (5). So, yoga is a unique option for engaging these people in sport activities. At the time of doing yoga, participants pay attention to all the aspects of postural control in addition to controlling their breathing and put their body in good condition according to the exercise. In yoga, focusing plays an important role in increasing participants' awareness of environment and ability to control their bodies (15). Despite the importance of improving the health of people with hearing loss, no sufficient studies have been done on it in this age group. Present study has been conducted on the effects yoga on the balance in female hearing impaired adolescents.

Present study has been performed to answer these question: is yoga as effective factor in order to improve the balance in hearing impaired adolescents? Do yoga exercises impact on dynamic and static balance?

METHODS AND MATERIALS

This study is quasi-experimental. Its population includes all the 15-17 years old female students of Mir Isfahan high school for hearing-impaired students. The samples were randomly selected by convenience sampling method. A cross-sectional study was performed on 28 female students with severe to profound hearing loss. Their personal information is listed in table1. By examining the medical records of the population, the people with a history of upper and lower extremity injury and spine during the past six months and neuromuscular and skeletal problems were selected and the effects of 8 weeks of Hatha yoga on their static and dynamic balance and quality of life were investigated through pre-test and post-test. Inclusion criteria were: having hearing loss greater than 30 db and less than 90 db, 15-17 age range, female gender, having sensorineural hearing loss, not suffering multi disabilities, not suffering a specific disease, not participating in other sport training. 28 students volunteered to participate in this study. All participants filled in a consent form.

Firstly, Stork Balance Stand Test and Y test were introduced to the participants. They were explained to participants through body language, facial expressions or being run by the experimenter so that the participants understand how to run the tests. In order to eliminate the effect of learning, each participant was permitted to practice three times before the start of the test. All participants carried out the tests without

shoes (14). The tests were performed in school and at the certain time of the day. During running the test, if any problem was observed, required advice and guidance should be given to participants. Before running the test, the participants were performed stretching and warm-up exercises. The tests were run in a quiet room and without any factor disturbing the participants' attention (14). After measuring dynamic and static balance and filling in hearing impaired youth-related quality of life inventory approved by the Social Welfare and Rehabilitation Sciences University, adjusted Hatha yoga exercise program was used for 8 weeks (3 times a week, 75-90 minutes in each session) under the supervision of an experienced coach. In early sessions, the coach dedicated 15 minutes to general warm-up exercises, then, 30 minutes to do asana exercises (physical exercises) and pranayama exercises (breathing exercises) and relaxation (savasana) and during the upcoming sessions, the time of main exercises have been gradually increased (Table 1) (25,26). At the end of 24th sessions, participants were asked to participate in post-test.

The method of measuring static balance

Balance task in this study is to stand on dominant leg (stork stand test) and pick up non-dominant leg and to put hands on the iliac crest of the pelvis. The length of time that a person could stand in this situation was recorded by stopwatch and considered as an indicator of individual performance on the balance test (Reliability and validity = 0.66) (21). The errors that stopped the time of test were: lifting hands from the iliac crest of the pelvis, stepping, moving the leg that was on the ground, touching the ground with non-dominant leg and lifting the heel of dominant leg from the ground. It should be noted that the minimum duration was considered 10 seconds. If any mentioned error was seen, the stopwatch would be stopped (All balance tests were performed without shoes and with barefoot) (22). Descriptive statistics were used to classify the data and to calculate the central tendency (mean) and dispersion indicators (standard deviation) and inferential statistics were used to test the hypotheses and ANOVA test was used to investigate differences within the group. All calculations were performed using SPSS V.18 software. Significance level was considered $p<5\%$.

The method of measuring dynamic balance

In order to measure the dynamic balance, Y balance test was used. The validity of Y balance test for lower limbs was reported between 0.85 and 0.91 in the Intra-Rater Reliability and between 0.99 t0 1.00 in the Inter-Rater Reliability (23).

This device consists of a fixed plate that three rods are attached to it at an angle of 120 degrees. There is an animated marker on each graded rod that maximum distance can be achieved by pushing it. Y balance test has three anterior, internal-posterior and external-posterior directions. In order to measure the balance of non-dominant side, firstly, the participant places non-dominant leg on the fixed plate and then, in order to achieve the maximum distance, moves his non-dominant leg in the anterior, internal-posterior and external-posterior directions, respectively and then, returns to original condition of test. In order to measure the balance of dominant side, the participant places dominant leg on the fixed plate and uses non-dominant led to achieve the maximum distance. Achieve maximum distance was recorded according to the marker of graded rod. In order to eliminate the effect of learning, each participant was permitted to practice three times before the start of the test. The test was repeated three times for each organ and the highest score achieved for each direction was analyzed and in order to prevent fatigue, two minutes were dedicated for resting between the tests. Also, before starting the test, the dominant legs of participants were identified according to their desire to hit the ball (24, 25). Length of lower limb affect the achieved distance. For this reason, raw scores of balance based on the length of lower limb were normalized (24, 25). The errors which led to repeat the Y test were: 1- the participant's inability to maintain her stability on the fixed plate (for example, during the Y test, the free foot touches the ground and/or reliant foot is separated from the fixed plate); 2- free foot is separated from the marker of rod while the marker is moving (throwing the marker); 3- using the marker to maintain the stability; 4- individual's inability to return free foot to the starting position after achieving the score.

Achieved distance is divided on length of lower limb (cm) and then multiplied by 100 and is calculated as the percentage of the length of lower limb. In Y balance test, in addition to separately considering all three directions, a total score was calculated for dynamic balance as follows:

Total score= (anterior+ internal-posterior + external-posterior)*100/length of lower limb*3

The method of measuring quality of life

In order to measure quality of life in hearing-impaired adolescents, hearing impaired youth-related quality of life inventory was used. It has three physical, emotional and social aspects (18).

The inventory includes 38 questions in three physical (8 questions), emotional (17 questions) and social (13 questions) aspects. The inventory is personally filled out by hearing-impaired adolescents. The required time to fill out the inventory is about 15 minutes. It measures the hearing-impaired-related quality of life in terms of three mentioned aspects and finally, a total score is calculated. The aspects are measured in the score range of 0-100 that the higher score represents the higher quality of life and also, indicates that the quality of life is less affected by hearing loss. Content validity of the inventory was approved and reported 0.79 by 14 experts. Its validity and reliability were measured in a study on a sample of 255 hearing-impaired students of the schools for normal students and the schools for exceptional students in Tehran Town. Internal correlation of it was reported 0.89 according to Cronbach's alpha and internal correlations of three physical, emotional and social aspects were reported 0.77, 0.83 and 0.73, respectively (Saadati Borojeni, 2011). Descriptive statistics were used to classify the data and to calculate the central tendency (mean) and dispersion indicators (standard deviation) and inferential statistics were used to test the hypotheses and Mixed ANOVA test was used to investigate differences within the group. All calculations were performed using SPSS V.18 software. Significance level was considered $p<5\%$.

Table1. The proposed training program for the experimental group

Week	Movement	Time(min)	Session
1st week	Sun salutation crocodile pose cat pose spinal twist santolanasana balancing post	75	1st
	Correct standing Crescent Moon Pose butterfly pose cattle pose cobra pose corpse pose	75	2nd
	Tree pose mountain pose camel pose tiger pose head-to-knee pose locust pose	75	3rd
2nd week	Simple triangle forward bend full boat pose leg to side yoga pose simple twist pose	75	4th
	Palm tree pose correct sitting prostration pose bridge pose leg reclining lunge meditation	75	5th
	Hero pose cattle pose abdominal exercises fish pose standing stretch pose relaxation	75	6th
3rd week	Leg to side yoga pose cattle pose divine pose Based pose swastika pose Full yoga pose	80	7th

	Hero pose supine pose garland pose contraction pose stealth pose fish pose	80	8th
	Tree pose turtle pose eagle pose locust pose alligator pose Buddha pose	80	9th
4th week	Revolved side angle pose supine pose full boat pose lotus pose Hand-claws pose sacred fig pose	85	10th
	Standing stretch pose plough pose shoulder stand forward bend yoga pose	90	11th
	Simple triangle pose stand spread leg forward fold full boat pose leg to side yoga pose simple twist pose	90	12th
5th week	Hero pose cattle pose abdominal exercise spinal stretch relaxation	90	13th
	Tree pose turtle pose eagle pose locust pose fish pose Buddha pose	90	14th
	Palm tree pose correct sitting prostration pose bridge pose leg reclining pose meditation	90	15th
6th week	Angle pose supine pose full boat pose lotus pose hand claws pose sacred fig pose	90	16th
	Standing stretch pose plough pose standing on shoulder forward bend yoga pose	90	17th
	Leg stretching pose plough pose divine pose based pose Swastika pose full yoga pose	90	18th
7th week	Sun salutation crocodile pose cat pose spinal twist corpse pose	90	19th
	Palm tree pose correct sitting standing on shoulders full boat pose lotus pose corpse pose	90	20th
	Palm tree pose correct sitting prostration pose bridge pose leg reclining pose meditation	85	21th
8th week	Leg stretching pose plough pose divine pose cobra pose corpse pose yoga pose	90	22th
	Palm tree pose correct sitting prostration pose bridge pose leg reclining pose meditation	90	23th
	Tree pose turtle pose eagle pose locust pose crocodile pose Buddha pose	90	24th

RESULTS

The results of Kolmogorov-Smirnov test showed that significance level of all the variable was greater than 5%. This shows the normal distribution of data (P>5%). Table2 shows demographic characteristics of the participants.

Table2. Demographic characteristics

Variable	Group	SD±mean	Median	Min-max	T	P
Age(year)	Experimental	15.59±1.84	16	15-17	0.95	0.29
	Control	14.66±1.71	16	15-17		
Tall (cm)	Experimental	151.643±5.5128	152.000	142.0-160.0	0.98	0.33
	Control	153.133±7.8637	153.000	141.0-169.0		
Weight(kg)	Experimental	48.46±6.173	48.000	38-63	1.5	0.11
	Control	49.53±6.234	49.00	39-63		
Level of hearing loss (db)	Experimental	50±16.5204	52.500	30-80	0.30	0.976
	Control	45±13.60147	40.000	30-70		

Table3. The results of static balance test

Variable	Group	Pre-test mean±SD	Post test mean±SD	Within group Df(1,26)	Between group Df(1,26)	Group interaction Df(1,26)
Static balance (second)	Experimental	7.86±5.157	26.57±13.142	P=0.004	P=0.000	P=0.000
	Control	8.18±7.705	2.64±0.674	F=10.520	F=71.742	F=35.701

Table4. The results of dynamic balance test

Variable	Group	Pre-test mean±SD	Post test mean±SD	Within group Df(1,26)	Between group Df(1,26)	Group interaction Df(1,26)
Dynamic balance (anterior)	Experimental	83.79±19.94	93.79±21.662	P=0.000	P=0.000	P=0.000
	Control	58.82±18.302	57.73±19.283	F=25.051	F=238.300	F=38.832
Dynamic balance (internal)	Experimental	100.43±15.103	109.57±16.147	P=0.000	P=0.000	P=0.000

	Control	74.00±15.748	73.00±15.843	F=22.817	F=810.529	F=35.402
Dynamic balance (external)	Experimental	97.64±12.506	106.86±14.379	P=0.000	P=0.000	P=0.000
	Control	84.45±15.443	83.36±13.786	F=24.914	F=1113.548	F=40.094

Table 5. The results of hearing-impaired adolescents' quality of life test

Variable	Group	Pre-test mean±SD	Post test mean±SD	Within group Df(1,26)	Between group Df(1,26)	Group interaction Df(1,26)
Quality of life (total)	Experimental	55.85±12.636	66.07±12.054	P=0.000	P=0.000	P=0.000
	Control	52.99±14.428	51.31±16.747	F=18.126	F=423.227	F=35.097
Quality of life (physical aspect)	Experimental	62.05±17.756	78.57±14.234	P=0.001	P=0.000	P=0.001
	Control	53.41±15.379	53.41±12.919	F=13.232	F=452.376	F=17.431
Quality of life (emotional aspect)	Experimental	56.30±14.992	70.37±10.911	P=0.002	P=0.000	P=0.000
	Control	56.95±16.069	56.95±16.069	P=0.002	P=0.000	P=0.000
Quality of life (social aspect)	Experimental	46.70±23.749	65.31±27.011	P=0.012	P=0.000	P=0.001
	Control	51.04±16.773	49.64±18.157	F=7.517	F=131.866	F=13.505

DISCUSSION

The aim of this study was to evaluate the effect of Hatha Yoga exercises on static and dynamic balance and quality of life in hearing impaired adolescents. The results showed that yoga exercises significantly increase static and dynamic balance and quality of life. This result is consistent with the results of the study by Fernandez (2015), Majlesi (2014), Schmid (2015), Hoot (2011), Schmid (2010), Jannati (1388) on the impact of yoga on static balance but it is inconsistent with the study by Silver (2005) (18,9, 21, 22,23). This consistency may be due to the age mean of participants because in Silver's study, the participants were between 26-28 years old and exercises were performed for 6 weeks.

Static balance is associated with muscle strength, on the other hand, the studies on animal models where there is the possibility of analysis of muscle fibers showed that doing stretching exercises in reduced muscles for a time a week is enough to reduce the muscle atrophy. Other researchers have reported that in normal muscles, doing stretching exercises for three times a week leads to the increase in the chain of some Sacromere and in the muscle fiber cross-sectional area. Since yoga is based on the stretch of muscles, it seems that doing yoga exercises can increase the muscle strength in general and specially, the muscles involved in maintaining the balance. It is also possible that doing meditation exercises in yoga improves the attention and focusing.

This result is consistent with the results of the studies by Fernandez (2015), Majlesi (2014), Schmid (2015), Johnson (2006), Zetergen (2011), Jannati (1388), Korila New (2012) (26,31,32,37,27,30,29). When the muscle loses its flexibility, length-tension relationship has changed and the change prevents the muscle to reach the peak of enough tension and is associated with weakness and loss of muscle contractions. Shortening of muscle can be caused by several factors such as lack of muscle stimulation, muscle weakness and aging. Lack of muscle stimulation causes changes in contractile proteins and mitochondria metabolism; thereby reducing the number of sarcomere and increasing deposition of connective tissue. All of these factors together cause muscle shortening and limit the muscle and joint stimulation. Some studies showed that stretching the muscle fiber increases the number of sarcomere. So, increasing muscle strength with stretching exercises may be attributed to the better interaction between actin and myosin filaments which increase the performance of muscle function (24).

Hatha Yoga exercises are effective in maintaining and improving the proper functioning of the musculoskeletal system, including joint motion, spinal flexibility, muscular strength and endurance, focus, muscle characteristics and bio-mechanical communication between the muscles, joints, glands, tissues and critical organs. On the other hand, Hatha yoga exercises deal with muscle weakness caused by the aging process and improve the ability to perform physical activities and to resist fatigue. Doing Hatha yoga exercises regularly with increased motion range of joints and developing the movement of spine, help the individual to maintain a stable body (25).

Also, the results of this study showed that after 8 weeks of yoga exercises, the quality of life in hearing-impaired adolescents was improved significantly. According to the data obtained from the hearing-impaired adolescent-related quality of life inventory, the yoga increased the quality of related to physical, emotional and social health. This result is consistent with the result of the study by Sing (2006) in terms of the effects of yoga on hearing-impaired adolescents' quality of life related to physical and mental health. In terms of the effects of yoga on quality of life related to physical and mental health, it is consistent with the results of the studies by Ranjbar (2014), Frank (2015), Patil (2015), Schmid (2015), Schmid (2012), Thompson (2008), Gayle (2002) (41,44, 15, 27, 28, 45). Improved physical and physical ability factors can be noted as this increase. This would boost morale, increase self-confidence and self-esteem and so, individual can do more daily activities and observing the progress of physical ability leads to increase the efforts and this increases quality of life related to physical aspect. According to WHO, health is the state of perfect health in terms of physical, mental and social aspects, so public health owes to the improvement of those aspects. Sing et al. (2006) have studied on the effects of yoga exercises on physical fitness and psychological variables of deaf and dumb children. The results showed that yoga had positive impact on physical fitness factors of experimental group (46). In present study, yoga exercises increase the quality of life related to emotional health. Hearing-impaired adolescents were motivated more to study and to do daily tasks of life and also, they prevent discomfort and loss of self-confidence. In other words, yoga exercises improved their spirit and distracted their minds from their limitation and inabilities with mental exercises focusing the mind on positive events, in addition to increasing physical ability. Most studies showed that teamwork is an effective aid to social development and improved quality of life. According to the study by Ghavamin (2016), exercise therapy has positive effects on the hearing-impaired children's quality of life (43) and according to the study by Enayati (2013), corrective exercises have positive effects on social aspect of deaf adolescents' quality of life (42).

LIMITATION

Controllable limits: Demographic characteristics such as age, weight, and physiological abilities. None of the participants had a history of doing sport exercises. Number and duration of training sessions were under control. The same environment was used to do exercises and tests. Uncontrollable limitations: the intrinsic motivation of participants to do exercises completely and carefully, controlling the mood conditions of participants during or after training sessions.

SUGGESTIONS

It is suggested to perform a study on the effects of proposed exercise program on the rehabilitation of other disabled groups, deaf and hearing-impaired males in the older age groups, in the rehabilitation and sport centers for deaf disabled, especially people with balance problems.

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