Special Issue: Psychology: Challenges and Current Research

Available online at **www.ijmrhs.com**

International Journal of Medical Research & Health Sciences, 2016, 5, 5(S):349-353

ISSN No: 2319-5886

Investigating the Effects of 8 Weeks of Rope Skipping on Static and Dynamic Balance of Educable Mentally Retarded Boys

Saied Ilbeigi[1], Mahin Khirkhah[2], Mahdi Mahjur[3], Hossein Soltani[4*] and Jafarkhoshbakhti[1]

[1]*Assistant Professor School of Physical Education and Sport Sciences, University of Birjand*
[2]*Department of Physical Education and Sport Sciences, Boroujerd Branch, Islamic Azad University, Boroujerd, Iran*
[3]*Young Researchers and Elite Club, Torbat-e Heydarieh Branch, Islamic Azad University, Torbat-e Heydarieh, Iran*
[4]*Department of Physical Education and Sport Sciences, Torbat-e Heydarieh Branch, Islamic Azad University, Torbat-e Heydarieh, Iran*
Corresponding Email: soltani_hn@yahoo.com

ABSTRACT

The effects of 8 weeks of rope skipping on static and dynamic balance of educable mentally retarded boys were studied. The results showed a significant difference in static balance (P =0.019) and dynamic balance in the surfaces of anterior (P =0.03), posterior-interior (P =0.008), posterior-external (P =0.017) at the experimental group compared with control group after the exercises. The rope skipping exercises used in this study improved the static and dynamic balance in mentally retarded students aged between 11 and 17 years.

Keywords: mentally retardation, static balance, dynamic balance, rope skipping exercises

---

INTRODUCTION

Mental retardation is a specific performance condition that starts in childhood characterized with restriction in cognitive and adaptive skills. The causes of these diseases can be genetic- congenital disorders, chromosomal disorders, congenital intrauterine infection, impaired blood supply of the placenta to fetus and metabolic or endocrine disorders [1]. Mentally retarded children are typically weaker than normal healthy children about 2 - 3 years. These children are divided into three groups: dependent children with IQ less than 29, trainable children with IQs between 30 to 49 and educable children with IQs between 50 to 75 [2]. Educable are low in learning and compared with their peers are not identical, but they can learn some academic skills. The majority of these children can engage in similar motor activities like children who have normal intelligence, however, motor skill learning is slow [3]. According to previous studies, children with mental retardation and physical fitness group are weaker in a variety of factors such as strength, muscular and cardio respiratory endurance, agility, speed and balance compared with peers and healthy. One of the reasons behind this can be the life style and low mobility of these people [3]. One of the fundamental problems of mentally retarded children is inconsistencies in doing rhythmic actions and flaws in the timing of the subsequent actions, coordination between hands and feet, hands and eyes, and balance [4]. Balance is defined as the body control in the space for stability, orientation and base of support, .The results of the researches aimed to study the balance performance of educable mentally retarded people have shown that static and dynamic balance points are significantly lower than the average persons and their response to stature disunities is associated with more delay in comparison with the average person's [5].

The effects of various exercise methods on the balance level of these people have been studied by lots of researches. Kubilay, yildirim, bilge & alder (2011) studied the effects of balance and posture exercises on performance level of the mentally retarded children. The research was done on 28 mentally retarded children with IQ range 50-70. Their results indicated that exercising with Swiss ball has positive effect on strength, endurance and balance of mentally retarded children [6]. Also, Daneshmandi, Ahmadi & Barati (2013) in a study on 31 children with intellectual disability studied the impact of 6 weeks of core stabilization exercises on the balance of mentally retarded students. The results showed that there has been a significant relationship between the posterior component of the internal bio-posterior life .Also the balance exercise and the core stability exercises can improve the balance of the mentally disable people[7].

As mentioned before, one of the fundamental problems of mentally retarded children is in perfect harmony and rhythmic actions [4]. Rope skipping is one of the rhythmic and mentally retarded children's favorite exercises. These actions are inheritably coordinated and their correct implementation requires regular movements with specific sequences. In addition to being an effective tool for training and exercising basic motor skills, rope skipping, can affect cognitive processes, attention, perception, concentration, strength and muscle stamina, speed of reaction and mostly important improvement in the balance. Chen Chao assessed positive effects of 12 weeks of rope skipping on factors related to the health of 9 children with intellectual disability aged 13 to 15 years, and showed that exercise increases the cardiopulmonary endurance and muscular flexibility of such children [8]. However, this study did not examine balance factor.

Kim, Jee Aee, Kim KC, Park, Suh, Kang & Kim SH (2007) in a research on fat children studied 6 weeks of rope skipping effect on insulin and *adiponectin* sensitivity levels and stated that 6 weeks of rope skipping exercise improved insulin sensitivity and increased *adiponectin* levels in Korean fat children[9]. As it comes from the literature of the research, up to now there have been conducted few researches on the rope skipping exercises effects on the balance level of mentally retarded children, and most of the researches conducted in this field studied the effects of such exercise methods on other factors related to physical fitness of children with mental retardation. Since one of the main problems of people with such disease is imbalance, the main objective of this study was to compare the effects of the trial rope skipping method on the static and dynamic balance of mentally retarded children aged 10 to 17 years.

MATERIALS AND METHODS

Participants

This study was semi-experimental with two groups and pre- test and-post- test. The statistical population consisted of all the educable mentally disable students of mental retarded Children school of Saravan city aged between 10 to 17 years old from which 20 educable mentally disable children were selected randomly and divided into two groups, experimental rope skipping group (N=10) and control group(N=10). All samples voluntarily and with the consent letter from parents and teachers participated in the study. Statistical samples were homogeneous in terms of age, weight, dose and the type of drug use, nutrition and IQ: (50 to 75). Also the preferred leg was determined by the desire to shoot a soccer ball to measure the balance tests [7].

Materials and Procedure

The balance Modified test of star (Y) was used to assess the dynamic balance of the subjects. The test is consisted of three anterior, internal posterior and external posterior dimensions that are also drawn at an angle of 135 degrees. In the prior investigations to this study, the validity of 91 percent has been declared [10]. The Subject performed each of the directions three times and the average of three attempts was considered as the dynamic equilibrium. Stork test was used to measure the static balance. In the Stork test the subject stood without shoes on a flat surface, laid hands on hips, then fixed the non- support leg (preferable leg) in the adjacent of the knee of the support leg (not-preferable leg) and the subject tried to remain in this state. The score of this test was equal to the maximum time (in seconds) since when he stood on a foot until losing his balance. Each subject performed this three times and the average time for the individual's balance score was recorded by stopwatch. If the subject leg moved or rotated, the other leg was removed from knee, the hands were unfolded, or the subject jumped, the experimenter stopped the stopwatch[12]. Nelson and Johnson reported the reliability of 87% for this test [10].

Rope skipping exercises

The rope skipping plan was carried out on experimental group for 8 weeks, 3 sessions per week, each session lasted 45 minutes. That is , at each session 5 minutes was allocated to warm up , 35 minutes for practicing skills that was trained previously by the rope skipping coach and movie ,and at last 5 minutes for free and cool-down activities. Two descriptive and inferential statistical methods were used to analyze the data. Descriptive Statistics was used for the mean and standard deviation and the independent t was used in order to analyze the data of the two groups and identify the differences between the groups and the correlated t-test was used to determine inter-group differences. Data analysis was used with SPSS software, version 21, at a significant level of P<0.5.

RESULTS

Demographic and anthropometric characteristics of each group, as well as dependent and independent t-test results are shown in Tables 1 and 2.

Table 1: Demographic characteristics of the study samples into separate groups

Group variable	Rope skipping (10)	Control (10)
Age	12.2±1.10	13.6±3.66
Height (centimeter)	117±9.72	125±6.23
Weight (kg)	40.1±4.87	41.2±1.89

Table 2: Test results within groups and between groups in static and dynamic balance

Variable		level group	Pre-test	Post-test	intragroup		Intergroup	
					t	sig	t	sig
Static balance		experimental	2.2±2.19	5±2.44	-4.79	0.00	-2.57	0.01
		control	1.2±0.78	1.5±0.52	-1.15	0.27		
Dynamic balance	anterior	experimental	110.8±4.94	133.25±6.93	-3.30	0.00	-2.23	0.03
		control	115.02±5.07	118.40±3.17	-0.67	0.51		
	Internal posterior	experimental	114.4±5.81	139.4±8.6	-3.55	0.00	-2.98	0.00
		control	124.7±3.48	124.3±4.28	0.08	0.93		
	Postero lateral	experimental	95.8±4.64	122.6±6.16	-5.72	0.00	2.57	0.01
		control	103.7±3.37	112.5±3.64	-1.69	0.12		

The results of independent t-test showed that in the static balance (p= 0.019) after exercises and rope skipping plan there were statistically significant differences between the two experimental and control groups and that the exercises improved the static balance . There was significant difference between groups ($p \leq 0.05$) for the index of dynamic equilibrium in all directions anterior (p =0.03), posterior-internal (p = 0.008), posterior-external (p = 0.019). The results of the dependent t-test also showed that there was significant difference into the experimental group ($p \leq 0.05$), between the pretest and posttest of static balance (p= 0.001) and dynamic balance in all directions anterior (p= 0.009), posterior - interior (p= 0.006), posterior- external (p = 0.001). But in the control group, this difference was not statistically significant.

DISCUSSION

This study aimed to investigate the effects of rope skipping on static and dynamic balance of educable mentally retarded children. The results showed that participants in the experimental group, compared to the control group had a significant improvement in the balance and 8 weeks of rope skipping exercises improved the static and dynamic balance of the mentally retarded children in three directions anterior, posterior interior and, posterior eternal. Partavi (2013) assessed the effects of 7 weeks rope skipping on cardiorespiratory endurance, speed and agility of pre-high school boys and resulted that rope skipping exercises can be an effective method to increase the performance of their body which is consistent with the results of this research[11].

Tsimaras, Giamouridou, Kokaridas, Sidiropoulou & Patsiaouras (2012) on a study examined the effect of a sport exercise based on rhythmic and harmonious movements at 17 educable mentally retarded students. Their findings showed that sport exercise increases the balance indices of these persons which are in agreement with the results of this study [12]. Yılmaz, Ergu, Konukman, Agbu, Zorba & Cimen, (2009) in a research entitled" the effect of water-and-swimming exercises on physical fitness of children with intellectual disability" realized that such exercises have

significant effect on cardiovascular endurance, muscular strength, static balance and agility and generally water sports can increase the physical fitness [3]. These results are also consistent with this study in terms of the impact on the static balance.

Salari A, Zarezadeh, Amirikhorasani (2014) in a study titled the effect of 12 weeks of Perceptual – motor exercises on the dynamic balance of the mentally retarded boys aged 11 to 14 years showed that the exercises improve the anterior-posterior balance indices of such people but there is no significant effect at internal – external surface. The results of this study is inconsistent with the present research in the terms of having no positive effects of exercise on the internal - external surface [13]. The possible reasons for this inconsistency can be difference in the type of exercise. Ghilich Poor (2011) after a 10-week training program of rope skipping showed that the rope skipping plan has a significant impact on the eye-hand coordination and two-handed coordination and static and dynamic balance which is consistent with the results of this study[14].

Chen (2010) in a study examined the effects of rope skipping on physical fitness of the visually impaired students. In this study, the physical flexibility, physical factors, aerobic capacity and balance before and after ten weeks of exercise were measured [15]. The results of this study indicated a positive effect on the dependent variables under study suggesting that the results of the present study is consistent with the present study [15].

The rope skipping exercises with the involvement mechanism of the upper and lower organs increase cardiovascular endurance and metabolism. In addition, it helps developing coordination, balance, agility, speed and physical fitness factors in general. It seems that the effect of this practice is quite reasonable considering the rope skipping patterns [16]. Rope skipping plan uses a reasonable skeletal-muscular model during which the antigravity muscles (muscles that play an important role in balance) are engaged in maintaining body posture [15]. Children with intellectual disability like normal children cannot do the high level of muscle activity and are slow at the onset of muscle activity [17]. Since in these children the cerebral cortex that has a motor task is of an abnormal growth, compensatory mechanisms will be used to handle these abnormalities [18]. According to this mechanism the rope skipping exercise improves the function of the cerebral cortex, and thus it can improve balance.

Two strategies by which individuals can maintain their standing are ankle and thigh equilibrium strategies [19]. Studies have shown that, compared with balance control in the anterior - posterior direction, the body strategy in order to control balance in interior-external direction, occurs often in the hip and trunk joint and ankle involvement strategy is less [20]. Deep-sense receptors get activated by repeated use of wrist movements, in addition, the head balance and ability to use vision for posture balance are affected by the accuracy of sensory messages of ankle [21]. The ankle strategy is mainly used when the disruptive forces of balance is low, if the disruptive force of balance is great, the strategy of the pelvis (hip strategy) is used. Stimulation of sensory, nerve and motor systems and repetitious activity of ankle of the children participating in this study along with the use of rope skipping exercises may cause noro-muscular coordination and increase and stimulate ankle deep sensory receptors and increase the balance. Since rope skipping is one of the sport exercises that activate various muscular groups during exercise and all three strategies of postural control at such exercises are used for long, it indicates that these exercises have been able well to have favorable effects on three strategies and increase the static and dynamic balance of the persons.

CONCLUSION

The results of this study showed that 8 weeks of rope skipping had positive impact on the balance of the educable mentally retarded students aged 11 to 17 years. Since the students like rope skipping exercises, it is recommended that teachers and trainers of mentally retarded students schools use such exercises to improve balance, which is a common problem in these persons.

REFERENCES

[1] Frey GC, Chow B. Relationship between BMI, physical fitness, and motor skills in youth with mild intellectual disabilities. Int J Obes. 2006; 30(5): 861-7.
[2] Helm Seresht P, Delpisheh E. [Rehabilitation and Health Disability (Persian)]. Tehran: Chehrpublication.1992; pp: 95-98.
[3] Yılmaz I, Ergu N, Konukman F, Agbu\uga B, Zorba E, Cimen Z. The effects of water exercises and swimming on physical fitness of children with mental retardation. Journal of Human Kinetics.2009; 21(1):105–11.

[4] Chiba Y, Shimada A, Yoshida F, Keino H, Hasegawa M, Ikari H. Risk of fall for individuals with intellectual disability. Am J Intellect Dev Disabil.2009; 114: 225 – 236.
[5] BlomqvistS, Olsson J, WallinL, WesterA, Rehn B.Adolescents with intellectual disability have reduced postural balance and muscle performance in trunk and lower limbs compared to peers without intellectual disability. Res Dev Disabil.2013; 34:198–206.
[6] Kubilay ns, yildirim y, bilge k, akdurhhEffect of balance training and posture exercises on functional level in mental retardation.2011; 22 (2):55-64.
[7] Daneshmandi H, Ahmadi R, Barati AM. The Effect of Core Stabilization Training Program on the Balance of Mentally Retarded Educable Students. Sport medicine.2013; (3): 58-64.
[8] Chao C, Yi-Chun L. Jumping Rope Intervention on Health-Related Physical Fitness in Students with Intellectual Impairment. The Journal of Human Resource and Adult Learning.2012; 8(1), 56-62.
[9] Kim E.S, JeeAee IM, Kim KC, Park J.H, Suh SH, Kang ES, Kim SH. Improved insulin sensitivity and adiponectin level after exercise training in obese Korean youth. Obesity.2007; 15, 3023-3030.
[10] Reiman MP, Manske RC.Functional testing in human performance. J Sports Sci Med.2010; 9(1): 161.
[11] Partavi S. Effects of 7 weeks of rope-jump training on cardiovascular endurance, speed and agility in middle school student boys Sport Science. Sport science.2013; 2: 40-43.
[12] Tsimaras VK, Giamouridou GA, Kokaridas DG, Sidiropoulou MP, Patsiaouras AI.The Effect of a Traditional Dance Training Program on Dynamic Balance of Individuals With mental Retardation. The Journal of Strength & Conditioning Research.2012;26(1):192-8 10.1519/JSC.0b013e31821c2494.
[13] Salari-Askar M, Zarezadeh M, Amiri-Khorasani M. Effect of Perceptual-motor Trainingon Dynamic Balance in Boyes Aged 11-14 Years with Mental Retarded. J Res Rehabil Sci.2014; 10(1): 139-150
[14] Ghilich poor, B. Effects of exercise on balance and coordination rope-jump training Fourth Grade Students Primary. Master Thesis. Tehran University.2011.
[15] Chen H. M. The Effects of rope skipping on health-related physical fitness in student with mild intellectual disability: A case study. Unpublished Master's Thesis. Taipei: National Taiwan Normal University; 2010.
[16] Brancazio, P. J. Sport science: Physical laws and optimum performance. New York: Simon and Schuster; 1984.
[17] Davis WE. Evidence for muscle activation deficiency in mentally handicapping conditions. In M. E. Berridge&G.r. Ward (Eds), International perspectives on adapted physical activity.1987; 53-64.
[18] Hollis FF.Physical education and recreation for individuals with disabilities. Iran: Behnashr; Trans. MonshiTusi MT. Mashhad; 1987.
[19] Horak F, Nashner L. Central programming of postural movements: Adaptation to altered support surface configurations. J Neurophysiol.1986; 55: 1369-1381.
[20] Kapteyn TS. After thought about the physics and mechanics of postural sway. Agrostology.1973; 14: 27- 35.
[21] Rajabi R. Samadi H. Corrective Exercise Laboratory Book for Post Graduated Student. 1st Ed. Tehran: Tehran University;2009