



Effect of Training on the Balance and Coordination of the Mentally Retarded Children

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Abstract

Background: The present research aims to consider the effects of training on the static and dynamic balance and coordination of the educable mentally retarded children.

Method: In this semi-experimental study, 24 individuals were selected from amongst educable mentally retarded boy students with the calendar age of 6-9 years old who did not have any special illness and motion restriction. The participants were randomly divided into two identical control (n: 12) and experiment (n: 12) groups. The selected exercise program was performed for 8 weeks including three 60-minute sessions for each week. The subscales of the balance and coordination of the Lincoln-Oseretsky test were used to evaluate the participants' balance and coordination in the pretest and posttest.

Results: The results showed that there was no significant difference between the two groups of control and experiment in pretest; whereas, a significant difference was observed in the static balance, dynamic balance and coordination between the pretest and posttest scores in the experiment group. The effect of Brailletonik training on balance and coordination was confirmed.

Conclusion: According to the findings, it seems that Brailletonik training can be a suitable intervention to improve the motor elements in retarded children.

Introduction

Taking part in the daily activities of life needs the minimum level of balance and coordination skills for the children, in particular. Although most of the healthy grown children are capable of well-performing motor skills, some are delayed and are deficient in the elements of balance and coordination (Giagazoglou et al, 2015). Motor problems are common among the mentally retarded children since mental retardation causes the motor and cognitive factors to get weak (Vuij et al, 2010).

Many definitions have been provided for mental retardation so far; however, the most comprehensive one has been proposed by the

American Diagnostic and Statistical Psychiatric Association: intellectual quotient significantly below the average level which includes the intellectual quotient of 70 or less (about two standard deviations less than the average). A mentally retarded child has a significant restriction in the adaptive actions in at least two cases of the following skills learning: communicating with another one, self-care, family life, social and interpersonal skills, how to use the public facilities, self-management, educational action skills and health and safety which begin before age 18 (Carulla, 2011). Mentally retarded children suffer from physical inactivity due to their mental

disorder which causes weakness in the body in some cases and makes them lazy and self-indulgent, so the energy existed in the body opens its way and appears differently (Kishore, 2019).

Motor development is a branch of motor behavior referring to the progressive changes of motor behavior during lifetime which results from the interaction among task needs, biological features of an individual and environmental conditions. Childhood is the most important period for motor development in life and the effective development of basic motor skills is the most crucial stage of motor development in early childhood (Wouters, 2019). Proficiency in the performance of basic motor skills is the fundamental factor in the individuals' success in performing daily activities, playing and doing sport skills (Giagazoglou, 2013). So, not only the sports activities and skills require the right and accurate performance of the basic motor skills such as balance and coordination, but also, they are necessary for performing daily life activities. Besides, continuous failure in performing the daily activities considered as the activities of the cultural norms leads to secondary excitement and behavioral problems (Kerati, 1967). Therefore, retarded development or lack of balance and coordination not only affect on an individual's ability to perform the specialized and sport skills and even the daily activities negatively and directly but also they indirectly influence learning (Cairney, Hay, Faugh, Carna, Flouris, 2006), visual perception (Leitschuh, Dunnn, 2001), spatial orientation (Wrotniak, Epstein, Dorn, Janses,

Kondilis, 2006), self-esteem (Hicks, Wiggins, Crist and Mood, 2001) and physical activity motivation (Venkadeson, Finita, 2010). The necessity of the early interventions seems clear and significant regarding the importance of motor skills as well as the problems due to the retarded motor development. This idea is supported by various studies. The question is what interventions are effective and which one is more effective.

Various interventions have been performed in various areas. Occupational therapy interventions, cognitive-behavioral interventions for the cognitive function disorders, sport interventions, and perceptual-motor interventions are some of the interventional programs to improve the mentally retarded children's physical, cognitive and behavioral functions. Yet, there are a few studies about the development of motor skills in the mentally retarded children; most of which are about the development of subtle motor skills and motor-perceptual skills. For example, Giagazoglou et al (2013) analyzed the effect of 12 weeks of trampoline training on the balance and coordination abilities of the mentally retarded children. These researchers found that trampoline training positively affects the mentally retarded children's balance. They proposed to use trampoline training to improve motor functions in these children because of its pleasant effects. Giagazoglou et al (2015) analyzed the effects of trampoline training on balance and coordination in the DCD children in another study. It was shown that 12 weeks of trampoline training could improve the balance and coordination of the children

suffering from coordination development disorder. However, it has not been analyzed for mentally retarded children. So, the limitation of the previous researches on the mentally retarded children requires analyzing the effect of the intervention on their balance and coordination. Since each intervention changes a specific aspect of the mentally retarded children's abilities and functions, it is necessary to consider the effect of the new intervention programs to cause motivation and broaden the effect of the intervention. One of the common motor programs is the Brailletonik motor program.

It is a modern sport played individually or in a team. It is a public activity for performing simultaneous exercises for any gender of any age and with any physical conditions. Brailletonik is a collection of sport, playing, creativity, thinking, competition, pleasure, culture, art and improvement movements which leads an individual toward being healthy and happy. This method is a phenomenon to increase individuals' motivation for creativity and positive initiatives. There are limited researches in this area; although Brailletonik training programs are new. Aghajani (2015) and Tavanapour (2015) analyzed the effects of Brailletonik training on the motor-perceptual abilities in the girls and boys of the elementary schools. The sample included 24 subjects. To evaluate the whole situation in the pretest and posttest, the test of Lincoln- Osertesky's motor-perceptual abilities were used. Finally, the results showed that Brailletonik training positively affected all the factors of the motor- perceptual

abilities including static balance, dynamic balance, power, speed, accuracy, and coordination. Dehghanizadeh et al (2018) analyzed the effect of Brailletonik training on the mentally retarded children's motor skills. An 8-week intervention was carried out and Ulrich test was employed to analyze the coarse motor skills. The results showed that Brailletonik training positively affected the coarse motor skills including object control and movement. But the components of coordination and balance were not analyzed in these children. Therefore, the effect of Brailletonik training on the mentally retarded children's coordination and balance is ambiguous. So, the effect of the Brailletonik training on the mentally retarded children's static balance, dynamic balance and coordination was evaluated in the present research because of the importance of the two components of balance and coordination in the development of the other motor skills, the limitation of the intervention programs for the mentally retarded children, the newness of the Brailletonik trainings and its effect on the motor and perceptual skills.

Method

The present research is in a practical, semi-experimental design. 24 mentally retarded educable boy students who were 6 to 9 years old (with the IQ of 50- 70) were determined in the exceptional elementary school of Aran-Bidgol with an average year of 7.23 ± 1.34 . The entry criteria included being right-hand, the subjects' unfamiliarity with the criterion skill, having no physical problems and hyperactivity, no auditory

and visual disturbances, no speech disorders, not taking special drugs and no history of brain surgery. Moreover, children's mental retardation was not the result of the clinical symptoms as hydrocephaly, microcephaly, and macrocephaly. The parents completed the testimonial of voluntary participation in the research. Then, they were organized in two identical groups (12 ones in the control and 12 ones in the experiment group) based on the age, intelligent quotient and pretest. The subjects having been selected and grouped; the experiment group performed Brailletonik training. The experiment group performed Brailletonik training for 8 weeks; each week included 3 sixty-minute sessions. The control group carried out daily activities.

The performed Brailletonik training included 11 trains which are explained in brief: 1. Throwing small plastic balls toward Brailletonik baskets, 2. Placing handball balls in the Brailletonik baskets, 3. Making paper balls and throwing them toward Brailletonik baskets, 4. Placing colorful cards in the Brailletonik baskets, 5. Jumping and touching the Brailletonik table, 6. Catching the ball and throwing it toward the Brailletonik table, 7. Hoping on the Brailletonik table, 8. Hoping by one foot to another foot on Brailletonik table, 9. Tuck jumping on the Brailletonik table while the eyes are open, 10. Tuck jumping on the Brailletonik table while the eyes are closed, and 11. Throwing the ball toward the box while crossing the circular bar.

Measuring tools

Lincoln-Oseretsky motor- perceptual abilities test was used to measure balance and coordination in the subjects. The modified version of this scale included 6 subscales and 36 subtests which evaluate each motor-perceptual aspect of the 5.5-14.5 years old children (Wuang, 2009). Out of 36 items of this test, 8 items evaluated static balance, 2 items evaluated dynamic balance and 13 items evaluated coordination (13, 14). The subtests of this scale are scored from zero to three (Wuang, 2009). The total reliability coefficient of this test is 96% for the boys and 97% for the girls in all age range (Brown, 2019). This test is the most common measurement test in motor development resources.

Data Analyzing Method

Shapiro-Wilk test was used to evaluate the naturalness of the data distribution. Independent t-test and covariance analyzing tests were employed to compare the scores in the pretest and the posttest, respectively. These stages were carried out by SPSS software, version 22 in the significance level of 0.05.

Results

Table 1 shows the descriptive findings of the age, intelligent quotient, height and weight of the participants in each group. Table 2 shows the mean and standard deviation of the research variables in each group in the pretest and posttest.

Table 1. Descriptive statistics of the mean±SD for the two groups.

Groups	Age	Intelligent Quotient	Height	Weight
Control	7.19±1.28	60±3.2	132.47±4.21	28.87±3.91
Experiment	7.27±1.22	61±3.1	132.2±4.14	29.53±3.36

The descriptive findings reported in table 1 show that there are almost the same means for the control and experiment groups in the variables of age, intelligent quotient, height, and weight. So, it is confirmed that the groups are homogenous based on the analyzed variables. As it was mentioned, the Shapiro-Wilk test was used to analyze the naturalness of the data distribution according to the number of the samples (n=24). Based on this test, the data distribution is natural when the

significance value is more than the critical number in level 0.05. The results showed that data distribution is natural in the scores of balance and coordination in the pretest (p>0.05). Therefore, independent t-test and covariance analysis were used to analyze the data. T-test was employed for the independent groups to consider whether the groups were homogenous in the pretest. The results are shown in Table 3.

Table 2. Mean (standard deviation) of the motor development scores for each group in the pretest and posttest.

Test course	Control		Experiment	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Static balance	3.5±4.12	3.33±3.67	5.42±3.20	29.83±5.22
Dynamic balance	0.33±0.78	0.67±0.98	0.5±0.91	3.58±1.83
Coordination	13.00±3.67	15.5±4.58	11.83±5.37	35.08±3.82

Table 3. Independent T-test to compare the mean of the scores on two groups in the pretest.

Variety	Experiment Group (n=12)	Control Group (n=12)	d	F	Sig.
Static balance	5.42±3.20	3.5±4.12	22	-1.27	0.22
Dynamic balance	0.5±0.91	0.33±0.78	22	-0.48	0.63
Coordination	11.83±5.37	13.00±3.67	22	-0.62	0.54

The results in table 3 show that there is no significant difference between the control and experiment groups in the pretest scores in the research variables (p>0.05), therefore two groups

are homogenous. So, the effect of Brailletonik training was evaluated using a covariance analyzing test and the results are reported in Table 4.

Table 4. The results of covariance analyzing for the effect of group membership on the scores of balance and coordination in the pretest stage.

Variety	Factor	d	Mean square	F	P	Effect size
Static balance	Group	1	3637.38	186.29	0.001	0.91
	Error	19	19.53	-	-	-
Dynamic balance	Group	1	39.89	17.43	0.001	0.48
	Error	19	2.29	-	-	-
Coordination	Group	1	2224.84	139.48	0.001	0.86
	Error	19	15.95	-	-	-

Dependent variable: Post-Test Scores.

The results mentioned in the above table show that group membership (intervention and control group) was effective on increasing the static balance ($p=0.001$, $F(1,19)= 186.29$), dynamic balance ($p=0.001$, $F(1,19)= 17.34$) and coordination ($p=0.001$, $F(1,19)= 139.48$) in the post-test stage. Comparing the means show that the scores of the variables of balance and coordination

in the posttest for the intervention group to that of the children in the control group have increased after Brailletonik training. However, according to the obtained effects, Brailletonik had the most effect on static balance ($91/0=£$), coordination ($/0=£88$) and dynamic balance ($£=0.48$), respectively (Fig.1).

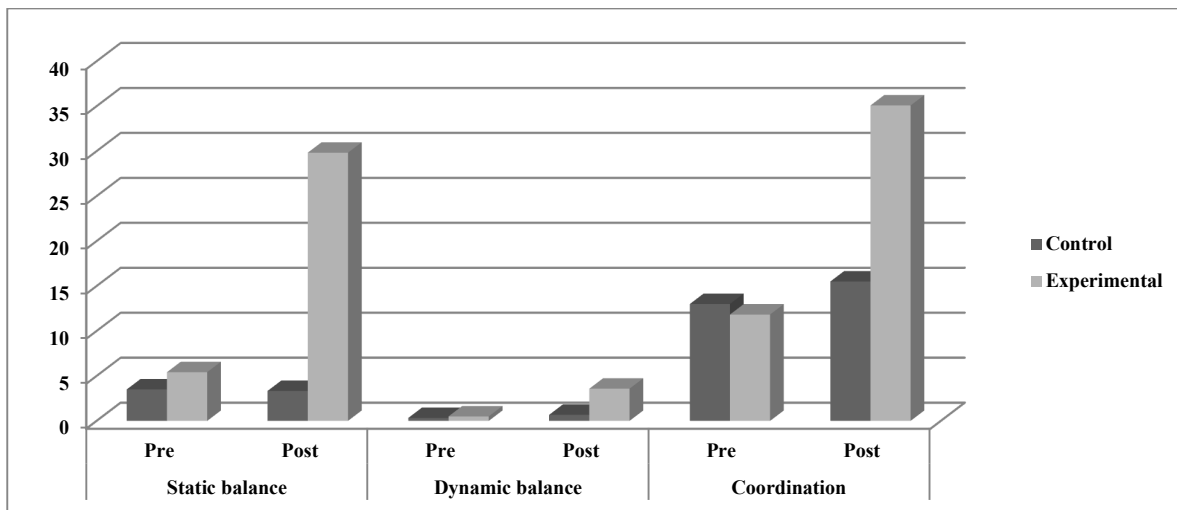


Fig. 1. Comparing the means of the research variables for each group in the pretest and posttest.

Discussion and Conclusion

Today, lifestyle has caused motor poverty in all of the people in the society. The children tolerate the most damages to the motor poverty resulted from the lifestyle because of the sensibility of the development period. In the children population, motor poverty and developmental retardation in the mentally retarded children are more manifest due

to being ignored by the peers in the team games, followed by a decrease of the self -esteem and intervention in self-concept as well as lacking the motivation of physical activity. In this regard, balance and coordination are more important because they are the bases for performing motor and daily activities of life. So, it is very important to design motor physical programs and enriching

the environment for the physical activity of these children. The results of the research showed that a course of Brailletonik training positively affected the static balance, dynamic balance and coordination in the mentally retarded educable children. These results are in agreement with the findings of Salary Scar et al (2014), Dehghanizadeh et al (2018), Giagazoglou et al (2013) and Giagazoglou et al (2015). Although there are some differences between the present research and the mentioned ones, the effect of motor programs on the improvement of the motor elements in the mentally retarded children is confirmed in all of these researches. Salary Scar et al (2014) analyzed and confirmed the effect of the motor perceptual training on the dynamic balance in the mentally retarded boy children. The effect of Brailletonik training on the development of the coarse motor skills in the mentally retarded children was analyzed in research by Dehghanizadeh et al (2018). Giagazoglou et al (2013, 2015) showed the effect of trampoline training on the balance and coordination of the DCD and mentally retarded children. The findings in the present research showed that Brailletonik training had a significant effect on static and dynamic balance. The child practiced hoping and jumping with one foot on another foot in exercise 7 and 8 according to the exercising protocol of Brailletonik. Exercises 5, 8, 9 and 10 involving jumping skills stimulated the proprioception system in the ankle. Difabio et al (1992) showed that the recipients of the proprioception got active by repeated use of the ankle movement and head

balance and visual usage ability in the posture balance were affected by the accuracy of the sensory signals in the ankle. Probably, stimulating the sensory, nervous and motor system of the subjects in this research by movement and dynamic balance in the training protocol has caused muscular- nervous coordination, increased stimulation of the proprioception recipients in the muscles of the ankle and improved the usual balance of the people. The significant improvement of these basic balance skills is due to the various jumping training in the Brailletonik training programs.

Giagazoglou et al (2015, 2013) believe that the improvement of balance after the training is related to the vestibular system. The training protocols in which there are jumping movements stimulate the vestibular system which improves the balance. There are various training requiring tuck and single-leg jump in the Brailletonik training protocol. Hopping can also positively affect the stimulation of the vestibular system during training. The findings show that Brailletonik training had a significant effect on the improvement of coordination. In the coordination, the findings show that the training used in this research has caused significant changes in the coordination in the empirical group. The results of this research are in agreement with those of Dawson (2010) and Giagazoglou et al (2015). Dawson concluded that playing as a very useful external factor had an important effect on decreasing the coordination disorders in the children suffering from the nervous- psychiatric

problems because the sport has a powerful curing benefit for improvement and cure of the muscular-nervous coordination disorders in these children. However, in their research on the DCD children, Giagazoglou et al (2015) believe that the effect of training on coordination is related to the kind of training. They believe that training strengthening self-efficiency in children can be effective in their cognitive and physical functions. Performing pleasing and, at the same time, available and effective training improve the child's self – efficiency which causes motivation for continuing participation in the activity. Continuing the participation strengthens the child's physical and cognitive functions. There is a significant improvement in the child's coordination level in Brailletonik training since each training needs the coordination of eyes- hands, eyes-feet and hands-feet and this improvement is related to the Brailletonik training due to controlling the conditions. As it was mentioned, 8 weeks of Brailletonik training similar to that of the present research can increase the level of the static and dynamic balance as well as the level of coordination in the mentally retarded educable children. So, it is suggested that the Brittonic training program can be used to enhance the level of balance and coordination as a basis for performing motor skills and the activities of daily life.

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