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The Effect of 8 Weeks of Tai Chi Exercises on Girls' Static and Dynamic Balance with Intellectual Disability

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ABSTRACT: Individuals with intellectual disability are slower and have less physical activities due to their intellectual and mental condition and the conventional trend of the society. As a consequence of this slowness, they have somatic-motor weaknesses. The objective of this study is to examine the effect if 8-week Tai Chi exercises on the balance of girls with intellectual disability. This is a quasi-empirical research. Based on its essence, it is a field study. Research design was in form of pretest-posttest including two test and control groups. The test group did Tai Chi exercises three 60min sessions a week under direct supervision of the researcher. Exercises gradually got harder. The control group did not do these exercises. After 8 weeks, both groups took posttest. Results showed that hypotheses are significantly higher in test group as compared to control group ($p<0.05$). Generally, results of hypothesis testing showed that 8-week Tai Chi exercises can affect participants' balance. Based on the results of the present study, it can be said that selected Tai Chi exercises have a significant effect on the balance of girls with intellectual disability. Dynamic balance all people have in form of walking in their daily physical activities plays a key role in humans' life. This significance is barely considered in the life of people with intellectual disability.

Keywords: Dynamic Balance, Intellectually Disable, Static Balance, Tai Chi

INTRODUCTION

In contemporaneous life, sport and physical exercises and activities are the best way to achieve living. In all physical and mental diseases and when treatment and medication no longer work, it is sport and physical movement that work (Agrawal *et al.*, 2009, Gauchard *et al.*, 2003).

Intellectual and mental disability is an ordinary extensive disorder and a chronic illness during life. The factors of this mental disease affect the structure and/or expansive function of brain and/or both with a range of mild to severe signs. These people tend to seat and reluctant to attend exercise schedules which itself exposes them to many chronic diseases. There are over 400 factors in the creation of Down Syndrome: nutritional disorders, injuries in childhood or at birth, infectious diseases and poisonings like Fetal Alcohol Syndrome, mother's drug use during pregnancy, ingestion of leaded substances, poverty, malnutrition, and lack of knowledge supports (which enhance intellectual development and adaptability skill learning) (Horak, 2006). Most studies regarding the effect of physical activities on physical strength factors and motor abilities are done on normal people rather than abnormal people. Apparently, it is required to carry out further studies in this regard. Then, we can use the results to implement timely sport schedules and endow these people a healthy body to do their routine activities via reinforcing their physical power and enhancing their motor abilities. Doing so, it is possible to acquire somatic-perceptual-motor capabilities and desirable social effects (Gauchard *et al.*, 1992). Mentally retarded individuals are a group of disable people. Based on epidemiologic information, the amount of mental retardedness is estimated 170 millions of people around the world. Annually, 200 thousands of people across the world are added to this group. It includes about 3% of total population of the world (Contestabile *et al.*, 2010). By an intellectual disable, we mean limitations appearing in the individual's performance and manifesting in the following forms. The extent of disability is affected by a variety of factors. As a result, mental disabilities are considerably different regarding type and intensity ranging from slowly learning to the need for intensive care.

Usually, to determine the intensity of intellectual disability, various IQ tests are used. Results of these tests are exploited to classify intellectually disable people. Based on Stanford IQ tests, most intellectually disable people are classified in mild group. They usually have good movement, skill, and independence (Rigoldi *et al.,* 2011).

In the contemporaneous world, the importance of sport and its direct effect on mental and physical health is evident to all people. There are a wide variety of sport fields. Each can be useful for human based on the type of movement and activity. Regarding the differences existing in various sports, all of them emphasize the use of muscles force. Only few sports do not follow this general rule. Tai chi is among these exceptions. This art is a complete and, at the same time, joyful sport. It can be executed for all people including the old and young, weak and strong, poor and rich, and man and woman. Atmospheric condition will not inhibit the exercise. It can be done in a limited space with the least facilities and at the least cost (B?aszczyk, 2005).

Balance is necessary for daily and sport activities. It is almost used as the measurement of lower limb function. Balance is defined as the process of maintaining center of gravity on support (Hertel and Denegar 2002). In previous studies, the effect of Tai chi on balance is proved. Hine et al (1999) have concluded that Tai chi exercises improve balance. Studies done in the last two decades have shown that those suffering from Down syndrome been under the instruction of exercise, sport, and rehabilitative plans have considerable occupational and social status (Wayne *et al.,* 2004). The attendance of people with Down syndrome in sport activities has infinite physiological and mental advantages (Sanyer, 2006).

METHODOLOGY

The present study is a quasi-empirical research. Based on its essence, it is a field study. Research design was in form of pretest-posttest including two test and control groups. The test group did Tai Chi exercises three 60min sessions a week under direct supervision of the researcher. Exercises gradually got harder. The control group did not do these exercises. After 8 weeks, both groups took posttest. This study was carried out on Alborz Province girl students with intellectual disability. The study sample consisted of 200 intellectually disable students. Hence, tests were conducted on 30 students (test group = 15, control group =15) with mean age 15.7, mean weight 45.4, and man high 147.7. They were randomly selected. Here, participants having problems like disability and epilepsy, cardiac diseases, lower limb disorders and multiple disabilities were removed from this study. Tests included static balance (stork test) and dynamic balance (sit-and-stand test).

Based on the objectives of the study and information obtained from participants, exercise schedule included 8 weeks of Tai chi exercises formulated and executed as follows.

-Participants were required to attend in the exercise schedule three 60min sessions a week.

-Each session took 60min (first, 10min and reached 40min at the end)

After the last day of exercise, posttest was conducted. The time and method were similar for both pretest and posttest. That is, pretest and posttest were carried out at the same hour.

Statistical Analysis: To describe the information obtained from descriptive statistics methods including tables, diagrams, frequencies, mean, and SD and also to examine the effect of variables and analyze the results, Kolmogorov-Smirnov test and t-independent statistic were applied. Research hypotheses were tested at p-value<0.05. All calculations were done using computer and SPSS20. Diagrams were drawn by EXCEL.

RESULTS

This study was carried out on 30 trainable intellectually disable girl students in two test and control groups (test group =15 students and control group =15 students) with mean age 15.7, mean weight 45.4, and man high 147.7. They were randomly selected. Tests consisted of static and dynamic balance. To compare data, static balance variables and dynamic balance were tested using Mann-Whitney test. Results showed that all hypotheses in test group are significantly higher as compared to control group ($p<0.05$). In general, results from hypothesis testing showed that 8 weeks of Tai chi exercises can affect participants' balance. In this section, first, participants are described based on age, high, and weight. Then, dependent variable including static balance and dynamic balance are described in two pretest-posttest stages based on pretest-posttest scores difference, table, and diagram. Table 1 shows participants' age (year), high (cm), and weight (kg) status. In this table, mean, SD, Min, and Max scores are described.

Table 1: Descriptive characteristics of some anthropometrical markers.

Variable	Mean ± SD	Range
Age (year)	15.7 ± 2.2	12 - 19
Height (cm)	147.7 ± 10.6	123 – 163
Weight (kg)	45.4 ± 11.4	26 - 68

Table 2: Mean and standard deviation of independent variables at two groups.

variable	Exercise group			Control group		
	Pre test	post test	Difference	Pre test	post test	Difference
Static balance	16.7 ± 14.7	25.6 ± 17.1	28.9 ± 28.7	18.1 ± 16.6	12.3 ± 12.6	-2.37 ± 4.04
Dynamic balance	12 ± 2.1	10.6 ± 0.64	-0.96 ± 0.5	12.7 ± 1.7	13.8 ± 2.2	1.17 ± 1.6

DISCUSSION AND CONCLUSION

Intellectually disable people are those with weaker mental activities as compared to their peers. As a result, they cannot meet family and society expectations and demands. They are deprived of learning ability, adaptability with environment, exploiting experiences, understanding concepts, and proper inference in various degrees. This disability exists from the very first stages of childhood. Intellectually disable people are among individuals who have less physical activity and slower as compared to normal people due to special intellectual and mental condition and the trend existing in the society. As a consequence of this slowness, they have somatic-motor weaknesses (Timothy *et al.,* 1999). Since Tai chi is a kind of Chinese martial art done for improving health, increasing life, and gaining mental peace; this sport is classified as mild martial sports. It leads muscles to get smooth, simple, flexible, and strong due reinforcement, flexibility, and softening happening after doing Tai chi exercises. In studies done, it is shown that Tai chi is able to cure acute, chronic, and even genetic diseases. Respiratory exercises of this sport can also contribute to the health of lungs and improvement of blood circulation in body. Tai chi exercises can strengthen bones, muscles, and joints. Among the main advantages of Tai chi, strengthening muscles, flexibility and softness of muscles, and tendons and instructing self-defense can be pointed out.

Tai chi improves body balance. It enhances body strength to stand by improving the function of sensory neurons in inner ear and the stretch of receptors in muscles and ligaments (Timothy *et al.*, 1999). As one of the oldest branches of sport science, special physical education studies designing and executing motor activities and sport schedules for intellectual, physical, mental, and social disable individuals. Enhancing the quality of life through motor activities by instructors, teachers, and parents and also accelerating and

facilitating the socialization trend of these special people are among the main objectives of special physical education. The preset study was carried out to examine the effect of Tai chi exercises on the balance of trainable girls with mental disability. Results showed that test group participants have a significant progress regarding dynamic and static balance. Tai chi exercises improved balance. In approving the results of the present study, Nejadsahebi examined the effect and durability of eight weeks of rebound therapy exercises on the static and dynamic balance of high school girls with Down syndrome. Results showed that eight weeks of rebound therapy affect static and dynamic balance in girls with Down syndrome. Yet, the effect is not durable. Daneshmandi *et al* conducted a study as "the effect of central stability exercises on intellectual disable people's balance". Regarding the fact that these children's motor growth is limited and since it gets them deprived of many situations in life activities, and also due to posture control, it is considered to be a prerequisite for the development of motor skills. Any deficiency in balance will probably be resulted in motor development delay. Concerning the balance weakness in people with intellectual disability and the significance of balance in daily activities as well as the effect of central stability exercises on balance, it was shown that these exercises improve balance in these people. Jancoviz *et al* carried out a study as "the effect of physical exercises on static balance in young people with intellectual disability. Result of this study showed that exercises using instable levels improve proprioception in individuals with mild intellectual disability. The final objective of this study is: whether sensory exercises can improve prorioceptive quality in mentally retarded people? And, whether it can be useful for executing them in general plan and increasing these people's yield?

This study shows that instruction at instable levels improves static balance in people with Down syndrome. Klaro *et al* examined balance and walking regarding the fall of people with intellectual disability. This study demonstrates that balance and walking are trainable in these people. These results show that it is possible to prevent from these people's fall by special sports interventions. Concerning the matter that balance control acts like a feedback circuit between brain and muscular-skeletal system, their information is provided via visual, atrial, and proprioceptive systems. The probable reason for the significance can be attributed to the fact that Tai chi improves proprioception. This is because it is performed in two positions (i.e. standing and sitting). It probably affects muscles flexibility and creates permanent changes in neural-muscular coordination in body. In a general summation, it can be said that selective Tai chi exercises have a significant effect on girls with intellectual disability. Dynamic balance manifested in people's routine in form of walking plays an important role in humans' life. This importance is of more significance in people suffering from intellectual disability. Based on results, it can be concluded that Tai chi exercises enhance balance among girls with intellectual disability.

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