

The Impact of Pilates Training on Lower Extremity Function of Mentally Retarded Students

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ABSTRACT— The aim of this study was to investigate the effects of Pilates training on lower extremity function of educable mentally retarded boy students. This study was a kind of semi-experimental and quasi-experimental design of pre-test and post-test with a control group. The cases of the study were 30, 10 to 15 year-old teenager educable mentally retarded boys students who were randomly selected among the students of Pars Abad special school. In addition, they were randomly assigned in two groups of control (15 people with average age of $01/1 \pm 20/12$, $49/3 \pm 26/151$ centimeters height, $94/2 \pm 46/44$ kilograms weight, $68/3 \pm 60/59$ of IQ) and experimental (15 people with the average age of $68/3 \pm 60/59$ years, $68/2 \pm 73/150$ centimeters height, $73/2 \pm 73/43$ kilograms weight, $68/3 \pm 60/59$ IQ). One collection of test were utilized in order to evaluate function of lower extremity .Practice program of the experimental group included Pilates selected exercise. Cases did the exercises in 8 weeks (3 times a week). To analyze the data, both independent and dependent t-tests were used together. The results of the study, represented a significant difference in star-like movement in direction of abduction, vertical jump, one foot triple jump, reciprocating running and leap running on the stairway, in experimental group after the exercises ($05 \geq P$). But any significant difference was not seen in star-like movement in direction of flexion and one leap with one foot. This study, in accordance with weak functionality of lower extremity in mentally retarded and the effect of Pilates on them, showed that the exercises improve balance and performance of lower extremity in these people.

KEYWORDS: Plates, mental retardation, balance, lower extremity function.

Introduction

Physical health and having desirable body condition have an utmost importance in human life, besides, its negative and positive changes can effect on all dimensions of human life. The consequences due to bad physical condition are so wide that its mental, physical, economic and social dimensions are considerable. (1). in today's world, despite the progress, retardation is a lifelong condition and status. About 3 percent of people throughout the world have IQ of lower than 68 and Performance of 80 to 90 percent of them is in the range of mild or educable mental idleness. (2). the quality and condition of human body is of particular importance in the human life body; because negative and positive changes and variation in the mentioned issue have an effect on all other situations of human. Chronic situation of people with intellectual disability creates limitations for them and also, effects on their families' financial , social, emotional , behavioral and cognitive abilities(3). Physical condition of mentally retarded children is generally poor, accompanied by pain and postural abnormalities and do not have much physical vitality (4). It seems that there is no way to prevent this situation. Although, this type of retardation is of a kind that has capability of being reduced to the least limitation by education and suitable conditions and the disabled person can be placed in the normal course of life. Here the important role of education to restore Exceptional Children to normal life is featured.as we know , physical education is one the main elements of education ,especially in children. Majority of mentally retarded children suffer from physical-motional weaknesses because of inactivity or sometimes immobility. The evidence suggests that, contrary to what the coaches thought in the past, during the children maturity, their skills base will not development itself and environment is another effective factor on growth of this skills .in addition, And exceptional children because of the type of approach that, unfortunately, is in our society about him, has more poverty of mobility(5). For, mentally retarded people, maintaining muscle strength and endurance and balance are important to ensure the quality of life and functional independence. Physiological deterioration with age usually follows sedentary lifestyle or reduced mobility and physical activity, resulting in increased dependence on others. Ability to keep independent lifestyle is very prominent for mentally retarded people(6).therefore, a proper plan of physical activity for teenagers prepares this opportunity for them to be trained physically and therefore, have an active and healthy life when entering to adulthood and this is the urgency of physical activity and physical education among people(7). Mentally retarded people have both mental problems and physical problems such as pain, malfunctions in cardio - vascular System, neurological disorders,

decreased mobility of the spine, early fatigue and etc. there are various solutions for the problems of these people (8, 9). One of the solutions is Pilates. This sport is known, by doctors, as a unique approach to fitness that a combination of strengthening, stretching and breathing muscles to develop trunk muscles and restore muscle balance is used in it (10, 11). Unlike traditional resistance exercises in which muscles are exercised, Pilates with a holistic approach requires balancing and coordination of several muscle groups at a time (12). Nezakat Alhosseini et al (1391), who investigated the effect of eight weeks of training Pilates on motor function and in patients with multiple sclerosis, reached to this result that Pilate's exercises lead depression to be decreased and motor function to be improved in cases. In another study, Raj Kumar (2012) examined the effect of eight weeks of training Pilates on speed, the result of the study showed that the exercises improved the speed. Strength / endurance, in all fields significantly increased, which implies that the exercises based on Pilates can the daily activities can be developed through the strength and endurance (14).Airs et al (2011) ,also, in their study tried to determine the effect of 12 weeks of training Pilates on women over 65 years. . Participants in the exercise group exercised for 12 weeks, three sessions per week .the result showed that 12 weeks Pilates can be effective to prevent falls, increase muscle strength, dynamic balance, reaction time and reduce depression and improve the quality of life in elderly women over 65 (15). There is numerous evidence for the desirable effect of sports and physical activities on mentally healthy people (without mental retardation). Regular physical activity in young people not only promotes bone health and muscle, but also reduces depression and anxiety and also improves mental health. On the other hand, many people enter to child adolescence (and later adults) from childhood, they will become inactive and sedentary (7). While there is a little information about mentally retarded children and teenagers. In spite of the preset studies about sports and Fitness corrective exercises of normal students, a few studies have been done in our country about body condition, its function and its relation to physical training at students with exceptional intellectual disability, especially mentally retarded. in this regard, this study will be done according to the a protocol of Pilates exercises ,which is a kind of new and practical activity that in addition to concentrating on stretching and strengthening muscles ,develops breath and increases quality of health and happiness.in regard to importance and practicality of Pilates trainings, the present study tries to improve and increase the quality of balance and function of lower extremity of these people , that following the improvement of these abilities , other motor and physiologically functions in these people will be effected. According to mentioned issues, researcher is to find out whether by having regular physical exercise and Pilates ,mentally retarded people can benefit from these activities like mentally healthy people or not ? Therefore, the purpose of the present study is to investigate the effect of twelve weeks of Pilates training on lower extremity function of mentally retarded teenagers.

Methodology

This study was a kind of semi-experimental and quasi-experimental design of pre-test and post-test with a control group. The cases of the study were 30, 10 to 15 year-old teenager educable mentally retarded boy's students who were randomly selected among the students of Pars Abad special school. . In addition, they were randomly assigned in two groups of control (15 people with average age of $01/1 \pm 20/12$, $49/3 \pm 26/151$ centimeters height, $94/2 \pm 46/44$ kilograms weight, $68/3 \pm 60/59$ of IQ) and experimental (15 people with the average age of $68/3 \pm 60/59$ years, $68/2 \pm 73/150$ centimeters height, $73/2 \pm 73/43$ kilograms weight, $68/3 \pm 60/59$ IQ). All the cases were volunteers and took part in the study under the consent of their parents and with cooperation of principles and coaches .besides , all of them had IQ of under 70 , meaning that they were educable . Before conducting the survey, cases were at a same level in terms of age and physical activity. Thus, on the basis of student records, records information such as cardiovascular diseases and disorders, disabilities, orthopedic, surgery and medication were collected, and according to them, cases with the above-mentioned issues were deleted from the survey, then, among the remaining the needed cases were selected .before start, a total explanation was given to every individual about how tests will be done. Then , they were tested as pre-test of lower extremity All the tests were done in one session .there was a 5 -minute break between tests in order to prevent tiredness. After pre-test, experimental group practiced Pilates for 8 weeks and 3 sessions per week for 45 minutes. During this time, control group did not take part in any exercise. At the end, both experimental and control groups were taken the pre- test of lower extremity. The data from pre-test and post-test were analyzed using independent t test ($05/ \geq P$). And statistical analysis was performed with software SPSS version 20.

Tests for lower extremity function

To investigate Star Excursion Balance move in the direction of flexion, athlete stood on one foot behind the line of intersection of the lines and in the direction perpendicular to the frontal plane. Tester requested him to stretch his foot forward as far as his balance does not go away. The distance from toes of motive foot to intersection line were measured and its average was calculated. (figure1). To investigate to study the stellar balance in the direction of extension, athlete stood on one foot behind the line of intersection of the lines and in the direction perpendicular to the frontal plane. Tester requested him to stretch his foot backward as far as his balance does not go away. The distance of moving foot toes and intersection line was measured with a meter. This test was done for both lower extremity and their average was taken (figure 1).

To study the star equilibrium move in abduction, the athlete stood on one foot so that the inner edge of his foot the line is perpendicular to the frontal plane. The examiner asked him to stretch his leg out as far as his balance does not go away. The

distance from the moving leg toes to intersection line was measured, the test was performed for both lower extremity and their average was taken out (figure 1).

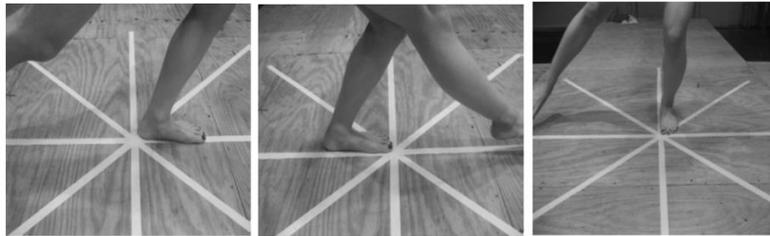


Fig1: Star Excursion Balance Test in three directions

To check on vertical jump, the athlete stand on a flat surface, in front of a wall with reflective strips at intervals of 10 cm from 150 to 200 cm height, reflective strips were graded for one cm intervals. He takes his upper extremity to 180-degree abduction .the fingertips height were marked .then , with once oscillating motion of the upper limb, He maximum jumped with both feet and he left a mark on graded line with his toe tips. The difference between the fingertips height in a standing position and maximum jump is calculated .the test was done 2 times for familiarity and 3 times for recording the maximum jump and there was a 5-minute break between different repetitions. To check the distance of one foot single mutation, the athlete stood on dominant leg and his toes were behind the zero line.in order to prevent the effect of upper limb motion, he kept his hand on his back. He was asked to jump and passes as long as he can .then, distance was measured until back of his foot. This move was done 2 times for familiarity and 3 times for recording the maximum jump and there was a 60-second break between different repetitions. To check the distance of one foot 3 mutations, the athlete stood on dominant leg and his toes were behind the zero line.in order to prevent the effect of upper limb motion, he kept his hand on his back. He was asked to have 3 successive jumps, So that he lands on one side of the longitudinal strips to a width of 15 cm for each mutation. He was asked to jump as long as he can, then, after the third jump, the distance to back of his foot was measured. . This move was done 2 times for familiarity and 3 times for recording the maximum jump and there was a 60-second break between different repetitions. To check time of leap running on the stairway, Athlete stood in a distinct distance from a wall of the staircase, leaning and, by the start of time, he ran to the stairs, he claimed two steps in each move. Since the separation point of the wall until he put his foot on the last step was measured. To check time of sweep running, athletes stood in point of 5 meters in middle of a10-meter path .he ran to the end of 10-meter path, then, he returned and ran to the other head of 10-meter path, and finally, he ran from there to the start point (totally 20 meters). 2 chronometers measured from the athlete’s start time to his final pass from the middle line. At last, their average was calculated to a hundredth of a second. This test was performed just once .unless it was not done correctly, in this case, there was a break of 3 to 5 minutes before the test was preformed again.

Findings

The survey was performed about of 30 educable mentally retarded boy students in the experimental and control groups.as it can be seen in the tables, investigating results of before and after research showed that there is significant difference between Pilates exercises and star excursion in direction of extension, Stars moving in the direction of abduction, vertical jump, triple jump one foot, reciprocating running and leap running on the stairway in educable mentally retarded people after the trainings; but, any significant difference was not seen between star movement in the direction of flexion and one leap one foot .

Results of independent coefficient t test to compare pre-test and post-test of groups in lower extremity function tests

	Group	Pre-Test, M±SD	Post-Test, M±SD	T	P-Value
Star Movement In Direction Of Flexion(Cm)	Experimental	0.94 ±60.80	0.97± 61.33	-1.586	0.135
	Control	1.08 ± 61.20	1.64 ± 60.86	1.046	0.313
Star Movement In Direction Of Extension (Cm)	Experimental	1.17 ±80.66	1.22 ±72.06	-5.137	0.000
	Control	1.29 ±71.00	1.23±71.33	-0.924	0.371
Star Movement In Direction Of Abduction (Cm)	Experimental	1.24 ± 76.06	0.98± 77.60	-3.440	0.004
	Control	1.24± 77.40	0.45 ± 77.93	-1.524	0.150
Vertical Jump(Cm)	Experimental	1.21 ± 15.2	1.37 ± 19.3	-6.839	0.000
	Control	1.08±15.8	1.02 ± 15.6	-0.364	0.713
One Foot One Leap (Cm)	Experimental	0.96 ±92.06	0.83 ± 92.53	-1.388	0.187
	Control	0.86 ± 91.5	1.27 ± 91.0	1.562	0.135
One Foot 3 Leaps(Cm)	Experimental	3.76 ± 241.6	2.26 ± 248.5	-4.973	0.000
	Control	3.08 ± 242.0	2.14 ± 241.3	0.489	0.419
Sweep Running(Second)	Experimental	0.79 ± 9.48	0.75± 8.15	4.314	0.001
	Control	0.88 ± 9.56	0.88 ± 10.43	-1.493	0.166
Leaping Run On Stairs(Second)	Experimental	0.51 ± 8.32	0.65 ± 7.23	3.757	0.003
	Control	0.86 ± 8.35	0.71 ± 8.26	0.290	0.767

Is significant at the level of (05/≥P).

Discussion and conclusion

Pilates (Contrology) means creating coordination between body, mind and spirit; in Pilates, first, the person takes full control of his body by targeted ways through Contrology. Then, by full repetition of the moves through gradual but, progressing ways, earns a natural coordination. (16).the recent surveys have reported that Pilates is suitable for all ages, all physical types, different body fitness and in every place (17,18). In regard to Kibble research (2009), it can be said that exercising and participating in sports can lead to facilitating the muscle release and as a result, it makes function persistence to increase in participants. With learning and repeating these activating muscle patterns, athletes and participants in sport activities can be able to potentially improve posture control condition and also be persistent against damaging forces. Due to these information, we find out that Pilate's activities reinforce muscles, flexibility and etc., that strengthening muscles can have a noticeable effect on balance and walking and lower extremity function of people. The present survey aimed to investigate the effects of Pilate's exercises on lower extremity function of mentally retarded people. The results showed: 1: cases in experimental group had a significant progress totally in their lower extremity. 2-Pilates improved balance extension and abduction directions, and also, vertical jump, one foot three leaps, reciprocating running and leap running ;but ,in direction of flexion and one foot one leap ,the results were not significant. In a study, Panahi(1393) tried to investigate the effect of 8 weeks of training Pilates on balance and kinematics parameters of deaf students 'walking and stated that Pilates training protocol has been able to increase amount of Static balance and dynamic balance, walking speed and stride length of deaf students(19). In another study , Yokslon et al (2008) investigated the effect of exercises on fundamental motor skills of mentally retarded children.in this survey , skills of walking , running , squatting , balance , trampoline , obstacles Jumping were studied(20).results of this study and studies of Ilker Yilmaz et al (2009) , Eric and Johnson (2007) , Eli Karmeli et al (2005) Shahrjerdi et al (1393) , Shanazari et al (1391) and Golpayegani et al (1391) are consistent with finding of the present study , although , they might be different in selecting the cases or some of the variables. But , studies of Gene Bo et al (2006) , Bachner et al (1997) and Savag et al (1992) are different from the finding of the present study that they report that exercises to improve balance , walking and lower extremity function , was not significant .of course , this contradiction is because of ignoring some factors like readiness of cases , level of physical activity , motivation , gender , age , height , weight and leg length ,in addition , the observed difference in researches can be related to methodology and other variables. As the final result, it can be said that mentally retarded people delay in motor growth in comparison with mentally healthy people that seems this delay decreases balance, speed of running, jumping, walking etc. In these people. According to weakness of balance and lower extremity function in mentally retarded people and the significance of this component in daily life activities and the effect of Pilates exercises on them , the present study showed that the mentioned exercises improves balance and some of the lower extremity functions in these people. Coaches and teachers can also ,use Pilates exercises for mentally retarded individuals and other exceptional groups .of course ,it is better to use them when they are in lower ages and their movement patterns are forming.

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