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INVESTIGATION OF THE EFFECT OF THE PILATES MOVEMENT EDUCATION PROGRAM ON DEVELOPMENT OF FLEXIBILITY AND BALANCE OF THE CHILDREN AT SPECIAL EDUCATION AND REHABILITATION CENTER

Ahmet Şirinkan
Department of Recreation, Faculty of Sport Science,
Atatürk Üniversity, Erzurum, Turkey

Abstract:
The aim of this study is to investigate the effect of the pilates movement education program on development of flexibility and balance of the children at special education and rehabilitation centre. 28 Students (18 male + 10 female) participated to this study. The age of the students was between 8 and 16 years. Two groups were created for the research. The first group was the experimental group and consisted of 14 (9 male + 5 female) students. Second group was control group and consisted of 14 (9 male + 5 female) students. It was considered the age, gender, and physical appearance and IQ levels of the students when creating the groups. The research data analysed by SPSS 16.0 software. Pre–test and Post–test comparisons, minimum and maximum values were tabulated. According to survey results, there is no significant improvement the flexibility of the control group and a significant improvement seen the flexibility ($p<0,05$) of the experimental group. There is also seen a significant improvement the balance ($p<0,01$) of both groups. As a result, it has been observed that pilates movement education program contributes to the physical characteristics and balance skills of the children with learning difficulties.

Keywords: educable, pilates, flexibility, balance

1. Introduction

Intellectual disabilities are multidimensional in that they affect all aspects of a person's life. Following are characteristics typically manifested in people with intellectual

disabilities. The area in which people with intellectual disabilities differ most from others is in cognitive behaviour. The greater the degree of intellectual disability, the lower the cognitive level at which the person functions. Another characteristics affecting learning are a limited ability to generalize information, short attention span, and inability to understand abstract concepts (Winnick, J. P. 2011).

Even though intellectual disabled children have the same progress in the development stage with normally developing children, they follow them behind and cannot develop exactly as normal children. (Siedendop and friends, 1986)

Krebs (1995) defined that the mild intellectual disabled children and children in borderline can race with peers with normal intelligence in terms of physical fitness and motor performans and also Krebs defined that the children in teachable level are about 4 years behind.

Generally, the greater the intellectual disability, the greater the delay in attaining major development milestones. As a group, children with intellectual disabilities walk and talk later, are slightly shorter, and usually are more susceptible to physical problems and illnesses compared with other children. In comparative studies, children with intellectual disabilities consistently score lower than children without intellectual disabilities on measures of strength, endurance, agility, balance, running speed, flexibility, and reaction time (Winnick, J. P. 2011).

Some researchers connect the loss of motor development of intellectual disabled children to insufficient physical activities. The physical fitness and motor development of intellectual disabled children caused by mostly insufficient training and not to give an opportunity to participate to the games has been claimed. It is expressed that the children who do not participate to the activities or are not accepted to the games by friends drop behind in terms of physical and motor fitness components and greatly have loos of skills. (Clark and Clark, 1978)

Playing games over and over will help students learn specific steps that will increase their ability to motor plan and developed certain skills. For example, the students who are having difficulty releasing the ball when attempting to throw at a target or an opponent can practice the skill of throwing during the game and can be given individualized help if needed (Rouse, P. 2010).

Materıal and Methods

28 Students (18 male + 10 female) participated to this study. The age of the students is between 8–16 years. Two groups were created for the research. The first group is

experimental group and consist of 14 (9 male + 5 female) students. Second group is control group and consist of 14 (9 male + 5 female) students. It was considered the age, gender, and physical appearance and IQ levels of the students when creating the groups.

The special movement training program which comprise with pilates materials was prepared for research. The materials which are used in research have been created with the kind of:

1. Pilates mats
2. Foam roll
3. Peanut shape ball (90 cmx145 cm)
4. Pilates ball (40cm, 50 cm, 60 cm)
5. Balance ball (8 cmx16 cm)
6. Weight ball (250 gr., 500 gr., 750 gr., 1000 gr.)
7. Circle (40cm, 50 cm, 60 cm)
8. Dumbbells (250 gr., 500 gr., 750 gr., 1000 gr.)
9. Resistanca bands
10. Pilates rollers
11. Pilates ball with resistance
12. Pilates mini balls
13. Pilates soft balls.

While preparing the special movement training program, the study program was created with taking views of the special education department lecturers and the lecturer of coaching education department of sport science faculty. The research planned 12 weeks and two days per week. While prepared special movement training program was applied to experimental group, any program was not applied to control group.

Two groups were created according to IQ status from the children of 14 people in experimental group. First group of 8 people (5 boys+3 girls) was created from the intellectual disabled children with medium grade IQ (IQ=35-40 to 50-55). Second group of 6 people (4 boys+ 2 girls) was created from the intellectual disabled children with low-grade IQ (IQ=50-55 to 70-75). The same movement program was applied to both groups.

Pre-test (sit-reach, dynamic balance, static balance) was performed to experimental group before starting to the studies. After the 12 weeks study, same tests (sit-reach, dynamic balance, static balance) were performed as a post-test and compared with pre-test.

Fındıngs

According to survey results, there is no significant improvement in the flexibility of the control group and a significant improvement seen in the flexibility ($p<0,05$) of the

experimental group. There is also seen a significant improvement in the balance ($p<0,01$) of both groups.

As a result, it has been observed that pilates movement education program contributes to the physical characteristics and balance skills of the children with learning difficulties.

Mental retardation level	Intelligence test score
Mild Mental Retardation	IQ 50-55 to 70-75
Moderate Mental Retardation	IQ 35-40 to 50-55
Severe Mental Retardation	IQ 20-25 to 35-40
Profound Mental Retardation	IQ below 20-25

Table 1: The age, gender, height, weight status of children who participated to the training program

Groups	Status	M	%
Age experimental group	8-10 aged	4	25
Age control group	8-10 aged	4	25
Age experimental group	11-13 aged	6	37,5
Age control group	11-13 aged	6	37,5
Age experimental group	14-16 aged	6	37,5
Age control group	14-16 aged	6	37,5
Gender experimental group	Male	9	56
Gender control group	Male	9	56
Gender experimental group	Female	7	44
Gender control group	Female	7	44
Height experimental group	120-130 cm	5	31,25
Height control group	120-130 cm	5	31,25
Height experimental group	131-140cm	5	31,25
Height control group	131-140cm	5	31,25
Height experimental group	141-150cm	3	12.5
Height control group	141-150cm	3	12,5
Height experimental group	151cm and above	3	12.5
Height control group	151cm and above	3	12,5
Weight experimental group	30-40 kg	6	37,5
Weight control group	30-40 kg	6	37,5
Weight experimental group	41-50 kg	5	31,25
Weight control group	41-50 kg	5	31,25
Weight experimental group	51 kg and above	5	31,25
Weight control group	51 kg and above	5	31,25

Table 2: The Pilates special movement training program for students who participated to the training

Weeks	Basic movements	Special movements	Gains	Used materials
Week1. (2 exercises)	General warming, opening and stretching	Educational games	Muscles and joints of the body to be ready to exercise	Pilates mats, Foam roll, Resistanca bands, Pilates rollers
Week2. (2 exercises)	General warming, opening and stretching	Educational games with ball	Muscles and joints of the body to be ready to use materials	Peanut shape ball (90 cmx145 cm), Pilates ball (40cm, 50 cm, 60 cm), Pilates mini balls, Pilates soft balls
Week3. (2exercises)	General warming, opening and stretching	Educational games with ball and weights	Muscles and joints of the body to be ready to use materials	Balance ball (8 cmx16 cm), Weight ball (250 gr., 500 gr., 750 gr., 1000 gr.)
Week4. (2exercises)	General warming, opening and stretching	Educational games with different sport materials	Muscles and joints of the body to be ready to use different materials	Circle (40cm, 50 cm, 60 cm), Dumbbells (250 gr., 500 gr., 750 gr., 1000 gr.), Circle (40cm, 50 cm, 60 cm), Dumbbells (250 gr., 500 gr., 750 gr., 1000 gr.)
Week5. (2 exercises)	General warming, opening and stretching	Educational games made on gym mat	Ability to do ground exercises individual and pairs	Pilates mats, Foam roll, Resistanca bands, Pilates rollers, Resistanca bands, Pilates rollers
Week6. (2 exercises)	General warming, opening and stretching	Educational games made with weight balls on the gym mat	Ability to do ground exercises with weight balls individual and pairs	Pilates ball with resistance, Pilates mini balls, Pilates soft balls
Week7. (2 exercises)	General warming, opening and	Educational games related to sport branches	Ability to do flexibility and balance	Pilates mats, Foam roll, Resistanca bands, Pilates rollers and various sport

	stretching		exercises individual and pairs	balls
Week8. (2 exercises)	General warming, opening and stretching	Competition with educational games made on gym mat	Ability to do ground exercises with racing individual and pairs	Penanut shape ball (90 cmx145 cm), Pilates ball (40cm, 50 cm, 60 cm), Pilates mini balls, Pilates soft balls and various sport balls
Week9. (2 exercises)	General warming, opening and stretching	Educational games related to sport branches	Ability to do flexibility and balance exercises individual and pairs	Balance ball (8 cmx16 cm), Weight ball (250 gr., 500 gr., 750 gr., 1000 gr.) and various sport balls
Week10. (2 exercises)	General warming, opening and stretching	Educational games related to sport branches	Ability to do flexibility and balance exercises individual and pairs	Circle (40cm, 50 cm, 60 cm), Dambıl (250 gr., 500 gr., 750 gr., 1000 gr.), Circle (40cm, 50 cm, 60 cm), Dumbbells (250 gr., 500 gr., 750 gr., 1000 gr.) and various sport balls
Week11. (2 exercises)	General warming, opening and stretching	Competition with educational games made on gym mat	Ability to do ground exercises with racing individual and pairs	Pilates mats, Foam roll, Resistanca bands, Pilates rollers, Resistanca bands, Pilates rollers and various sport balls
Week12. (2 exercises)	General warming, opening and stretching	Shows with educational games made on gym mat	Ability to do shows with ground exercises individual and pairs	Pilates ball with resistance, Pilates mini balls, Pilates soft balls and various sport balls

Analysis

The research data analysed by SPSS 16.0 software. Pre–test, Post–test comparisons, minimum and maximum values were tabulated.

Table 3: The results of pre-test and post-test of experimental and control groups who participated to research

Tests	Pre and Post Tests	n	Min.	Max.	Z
Flexibility tests of girls in experimental group	Pre-test	5	6.07	8.15	**,000**
	Post-test	5	8.45	17.05	
Flexibility tests of girls in control group	Pre-test	5	5,25	8,60	**,765**
	Post-test	5	5,00	8,45	
Flexibility tests of boys in experimental group	Pre-test	9	8	15	**,000**
	Post-test	9	12	18	
Flexibility tests of boys in control group	Pre-test	9	7	16	**,275**
	Post-test	9	7	15	
Flamingo balance tests of girls in experimental group	Pre-test	5	18	40	**,000**
	Post-test	5	29	60	
Flamingo balance tests of girls in control group	Pre-test	5	16	26	**,398**
	Post-test	5	15	28	
Flamingo balance tests of boys in experimental group	Pre-test	9	25	45	**,000**
	Post-test	9	35	60	
Flamingo balance tests of boys in control group	Pre-test	9	22	43	**,523**
	Post-test	9	24	45	

Conclusıon and Evaluation

According to research results, the special movement training program which is applied to children in experimental group contributed significant development to children's basic motor skills of balance and flexibility development ($p< 0.01$).

Children in control group who were tested with the same age, gender, physical property and IQ degree and do not participate to any kind of exercise program did not have this development.

It is expressed that ıntellectual disabled boys are more flexible and balanced than girls and moderate intellectual disabled children are more flexible than mild intellectual disable children. (Özer, D. 2010)

Rarick and Dobbins (1972) have been expressed that in most intellectual disabled children have many problems of body mechanics and balance because of having loose musculature. In Kreb's research it is emphasized that intellectual disabled children have problem with walking and sitting skills because of their body proportions and

looseness in musculature. It is seen that in most children who participated to our research have irregularities in body structure (overweight, excessive weakness, arm and leg structure etc.). The results of positive contribution in made Pilate's program to the body development (walk, run, balance, coordination, flexibility etc.) have been reached.

In research (Egan, C. 2006) ''Pilates for Children With Neuromuscular Disorders 'which is done to related to our research, pilates for children with neuromuscular disorders—such as cerebral palsy or hypertonia—differs from pilates for general rehab. Therapists working with this unique group must understand the social, emotional, behavioural and developmental implications of neurological damage, and how to harness Pilate's principles to counteract these effects.

Children with neuromuscular challenges have difficulty modulating an appropriate balance of flexion and extension. While a healthy motor control system acts like a dimmer switch your body automatically knows what percentage to flex or extend an affected neuromuscular system is more like an on-off switch. For example, the knee is either straight or bent.

In other research (Foley, M., K. 2009), it is common for people with MS to experience a decrease in flexibility and decline in motor control. You can improve your flexibility and range of motion, while strengthening your legs, by using the foot straps on the reformer to perform leg circles. You can also flex and extend your knees or ankles by pushing against the foot-bar or foot-board in a closed-chain exercise. The movements can be small in order to strengthen isolated leg muscles and improve motor control.

Part of pilates's (Endelman, K. Pilates.com. 2016) success which is done for a result of injury rehabilitation is based on the approach to the principles of pilates - core strength, an even musculature, etc. But another reason is that it provides a greater degree of flexibility than most conventional forms of physical therapy. This is true because pilates exercises can be modified for each person and still be extremely effective. You can go from basic movements to very advanced, depending on how a patient needs to progress or how badly they are injured.

The pilates exercises (Burke, D. Pilates.com, 2016) which are done as a result of knee injuries for treatment shows that at the end of week 8, John demonstrated increased tolerance to all exercises with minimal complaint of knee pain. He was able to climb and descend stairs without discomfort and only experienced L knee pain with passive knee flexion to end range. Objective measures were improved as well. Bilateral quad strength was equal at 5/5 and visually, the L vastus medialis showed increased activity with isometric, closed chain and open chain activities. Additionally, increased

awareness of hip stability was demonstrated with all exercises. After two months of pilates exercises focused on strengthening the muscles around the knee and stabilizing the hip, John was back to full function without limitations.

In another research (Wintroub, B., Pilates.com. 2016), in a gym or other fitness facility, Aerobic Pilates fits perfectly. Begin the pilates class with jumpboard activities. First, teach the foot patterns with a red and a blue spring. This will warm up the feet, knees and hips while holding the neutral pelvic zone. Next, teach the proper hand patterns without weights, and then add 2 lb. weights once the patterns are coordinated with the footwork. Finally, add disco music to the foot patterns. From there the instructor can call out the patterns. To make the workout more difficult, simulate running up a hill by changing the springs to two red springs or more. Or, use a single blue spring to simulate running on the moon, which requires a huge amount of pelvic stability that will challenge anyone. Finish the workout by leaving the jumpboard up and doing stretching exercises like elephant, mermaid, knee stretch, Eve's stretch, etc.

In pilates exercises which are done to Parkinson patients (Royer, L., Waldmann, K. Pilates.com. 2016), the ability to bring a client from a foreign to a familiar environment/gravity relationship, and to simulate functional, biomechanically correct movement with increased proprioceptive challenge can best be achieved with access to multiple pilates apparatus. One example: doing Footwork on the Reformer, progressing to a single-leg version, then eventually to the Standing/Single Leg Pump on the Chair.

The addition of pilates mat repertoire and use of props such as foam rollers, balls, balance discs, etc, can be used (when successfully following this model of progression) to develop an individualized program specific to the patient's activities and functional requirements. This also allows for a home exercise program to compliment the studio program, especially for clients who are unable to commit to a studio appointment more than once a week.

As a result it is said that pilates exercises contributes positively to the indispensable muscle and joint development for basic motor control, motor skills and life if it is done to normal people, patients or disabled people.

References

1. Burke, D. (2016). "Pilates and Knee Injuries". It is taken on 4.3.2016 from www.pilates.com

2. Clarke, H. H., & Clarke, H. D., (1978). "Development and Adapted Physical Education". Second Edition., Prentice Hall INC. Englewoodb Cliffs, New Jersey.
3. Egan, K. (2006.) "Pilates for Children with Neuromuscular Disorders". It is taken on 15.02.2016 from pilates com.
4. Endelman, K. (2016). "Pilates: Effective for Injury Rehabilitation". It is taken on 04.03.2016 from www.pilates.com
5. Foley, M., K., (2009). "Improving Mobility with Pilates". Disabled World.
6. Krebs, P.L. (1995). "Mental Retardation. Adapted Physical Education and Sport" (Ed:J.P. Winnick). Human Kintics Books Champaigne, 459 p, İllinois.
7. Özer, D. S. (2010). "Physical Education and Sports for the Disabled", Nobel Release Distribution, Ankara.
8. Rarick, G., L., & Dobbins, D., A., (1972)." Basic Component in the Motor Performance of Educable Mentally Retarded Children: Implications for Corriculum Development". U.S. Office of Education., Washington.
9. Rouse, P. (2010). "Inclusion in Physical Education. Fitness, motor, and social skills for students of all abilities". Human Kinetics, Printed in the United States of America.
10. Royer, L., Waldmann, K. (2016). "Pilates for People with Parkinson Disease". It is taken on 4.3.2016 from www.pilates.com
11. Siedentop, D., Mond, C. & Toggort, A. (1986). "Students with special needs. Physical Education Teaching and Curriculum Strategies for Grades 5-12".May, Field Publishing Company Mountain View, 113-127 p., California.
12. Winnick, J. P. (2011). "Adapted Physical Education and Sport". Fifth Edition, Human Kinetics, Printed in the United States of America.
13. Wintroub, B. (2016). "Aerobic Pilates and to Jumpboard". It is taken on 4.3.2016 from www.pilates.com