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THE IMPACT OF THERAPEUTIC RECREATIONAL EXERCISES ON DEVELOPMENT IN BASIC SKILLS OF MALE AND FEMALE STUDENTS WITH DOWN SYNDROME

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Abstract:
The aim of this study is to examine developmental gender differences of the special movement training programme applied to male and female students with Down syndrome. 12 male and 10 female students with Down syndrome were chosen for the study. The students were chosen from 6-9 age groups. Permission was granted for the study by the families of the children, and the movement training programme was applied. The movement training programme for the study was designed by the academics at the Department of Special Education and Department of Physical Education and Sports. The special movement training programme consist of basic motor skills (walking, running, jumping, hopping, standing long jump, juggling the soccer ball, throwing the ball, catching the thrown ball, hitting the thrown ball with a racket and kicking the ball). The trainings were performed for 40-50 minutes four times a week for 4 months and 8 weeks. Before starting the training, pre-test was applied to the children. At the end of the research period, post-test was applied and then both tests were compared. Furthermore, an observation form was prepared. It consisted of 8 questions. The first data related to the observation form were collected at the beginning of the study. The observation data were recollected at the end of the study. These two observation results were interpreted, analysed and reported. The obtained data were analysed using SSPS.16 programme. The male and female students were compared and interpreted according to Mann-Whitney U, Wilcoxon W and Z values. As a result of the present study, while a development at the level of $p<0,001$ was observed in the basic skills of the male students, there was a development at the level of $p<0,05$ in the basic skills of the female students. Basing on this data, it was concluded that the development of the male students was more than of the female students in the special movement training programme.

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Keywords: Down syndrome, movement training, basic skills, observation, interview

1. Introduction

Down syndrome is considered as the most notable genetic condition related to intellectual disabilities. It has been reported that one in 733 children is born with Down syndrome (National Down Syndrome Society, 2010a). In the United States, about 5000 such children are born each year. Even though the fact that men are genetically responsible for the abnormality in about 25 percent of all cases, women who are over the age of 35 are at the highest risk (1 in 300) of having a child with Down syndrome. This risk goes up to 1 in 110 births at age of 40, and 1 in 35 births syndrome at age of 45, (National Down Syndrome Society, 2010a).

1.1. Causes

Down syndrome is caused by three chromosomal abnormalities. Trisomy 21 is the most common cause, which is so called due to the fact that there is an extra number 21 chromosome. Therefore, there is a total of 47 chromosomes instead of the normal 46 (23 chromosomes received from each parent). Another known cause of Down syndrome is non-disjunction, dividing during meiotic cell division, and results in 24 chromosomes in one haploid cell and 22 in the other. Translocation can be listed as a third cause of Down syndrome. As a rare cause, translocation is seen when two chromosomes grow together; although they seem to be one chromosome they include the genetic material of two chromosomes (Winnick, 2011).

1.2. What are common symptoms of Down syndrome?

There are a number of symptoms of Down syndrome, which vary from person to person. Individuals with Down syndrome may face different problems in different periods of their lives.

1.3. Physical Symptoms

Common physical symptoms of Down syndrome can be listed as: (Bull, 2011).

- Decreased or poor muscle tone;
- Short neck, with excess skin at the back of the neck;
- Flattened facial profile and nose;
- Small head, ears, and mouth;
- Upward slanting eyes, often with a skin fold that comes out from the upper eyelid and covers the inner corner of the eye;
- White spots on the coloured part of the eye (called Brushfield spots);
- Wide, short hands with short fingers;
- A single, deep, crease across the palm of the hand;
- A deep groove between the first and second toes.

Physical development in children with Down syndrome is often slower than those of children without Down syndrome. For instance, a child with Down syndrome can be slower to learn to turn over, sit, stand, and walk due to weak muscle tone. In spite of these delays, children with Down syndrome may learn to perform physical exercises just as other children. To reach developmental milestones may take children with Down syndrome longer; however, they will meet many of these milestones in the end (Bull, 2011).

1.4. Intellectual and Developmental Symptoms

Individuals with Down syndrome mostly face cognitive impairment, which is a thinking and learning disorder, and generally extend from mild to moderate down syndrome with severe cognitive impairment is rarely seen. Individuals with Down syndrome may face some other cognitive and behavioural problems such as short attention span, poor judgement, impulsive behaviour, slow learning and delayed language and speech development (Ulrich, 2011). Most children with Down syndrome can develop the necessary communication skills even if this process takes them longer when compared with other children. Martin et al. (2009) found early, continuous speech and language interference especially helpful to enhance speech and to encourage expressive language.

1.5. Physical Education Programming

Children with Down syndrome need medical approval to participate in activities and also need a planned physical education programme because of their medical problems. Aerobic activities and some other activities that require maximum muscular contraction are to be modified and monitored carefully. Muscle hypertonia, low muscle tone, and hypermobility, above-normal mobility, of the joints often result in postural and orthopaedic impairments, such as kyphosis, lordosis, dislocated hips, ptosis, atlantoaxial instability, flat pronated feet and forward head. For the reason that they put excessive stress on the body which can cause hernias, dislocations, strain or sprains, exercises and activities causing hyperflexion are contraindicated. Instead of these exercises and activities, those which strengthen and stabilize muscles around the joints must be encouraged. Children with Down syndrome, who have sensory impairment such as poor eyesight and hearing, need instructors to use adapted equipment and teaching strategies special for those with sensory impairment ((Winnick, 2011).

1.6. Activity Modifications

Children with intellectual disabilities can be successful at participating in physical education and sport together with their peers without disabilities when the demanding skills are necessarily modified. This case is especially true for children with intellectual disabilities whose health or physical impairments are associated, or who require extensive or pervasive supports. Activities for these children with intellectual disabilities can be modified by:

a) Substituting fundamental motor skills and pattern for more highly developed sport skills;
b) Allowing students to sit, hold on to a bar or hold a peer's hand for support;
c) Substituting softer, lighter or slower balls for striking and catching;
d) Substituting larger balls for kicking and striking;
e) Substituting shorter, lighter or broader striking implements;
f) Substituting stationary or suspended balls for moving balls;
g) Enlarging the target or goal area;
h) Reducing the number of player;
i) Narrowing and shortening the field of play;
j) Creating safety zones or special zones within the field of play;
k) Reducing the speed of skill execution or the force required to execute a skill;
l) Reducing the distance required for skills execution or lengthening the distance for other students (Block, 2007. Akt. Winnick, 2011).

In the current study, the development of physiological and psychomotor characteristics of the children with Down syndrome was aimed rather than anatomic, physiological, sociological, and psychological inabilities. For this reason, the research programme was prepared and put into practice.

2. Material and Method

12 male and 10 female students with Down syndrome was chosen for the study. The students were chosen from 6-9 age groups. Permission was granted for the study by the families of the children, and the movement training programme was applied. The movement training programme for the study was designed by the academics at the Department of Special Education and Department of Recreation, Faculty of Sport Sciences. The special movement training programme included basic motor skills (walking, running, jumping, hopping, standing long jump, juggling the soccer ball, throwing the ball, catching the thrown ball, hitting the thrown ball with a racket and kicking the ball). The trainings were performed for 40-50 minutes four times a week for 4 months and 8 weeks.

Before starting the training, pre-test was applied to the children. At the end of the research period, post-test was applied and then both tests were compared. Furthermore, an observation form was prepared. It consisted of 8 questions. The fist data related to the observation form were collected at the beginning of the study. The observation data were recollected at the end of the study. These two observation results were analysed and reported.

3. Analysis

The data obtained from the male and female students were analysed using SSPS.16 programme. The male and female students were compared and interpreted according to Mann-Whitney U, Wilcoxon W and Z values.

4. Findings

Table 1: Height, weight, age and gender of the participants

Male Students					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Age	12	10,00	12,00	11,0000	,85280
Height	12	125,00	135,00	129,0833	3,52803
Weight	12	25,00	55,00	35,2500	10,48050
Female Students					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Age	10	10,00	12,00	11,1000	,87560
Height	10	125,00	135,00	129,7000	3,52924
Weight	10	26,00	55,00	43,5000	10,49074

Table 2: Pre-test and Post-test Scores of Male Students

	N	**Mean**	**Std. Deviation**	**Minimum**	**Maximum**
Walking pre-test	12	7,8458	,48310	7,10	8,55
Running pre-test	12	4,8583	,46163	4,15	5,50
Jumping pre-test	12	30,0000	4,76731	25,00	35,00
Hopping pre-test	12	5,5000	,90453	4,00	7,00
Long jump pre-test	12	65,4167	14,05482	40,00	85,00
Juggling the soccer ball pre-test	12	4,1667	,71774	3,00	5,00
Throwing the ball pre-test	12	17,4167	2,31432	15,00	22,00
Catching the ball pre-test	12	2,9167	,66856	2,00	4,00
Hitting with a racket pre-test	12	3,9167	,66856	3,00	5,00
Kicking pre-test	12	3,7500	,75378	3,00	5,00
Walking post-test	12	6,6333	,35569	6,05	7,10
Running post-test	12	4,3292	,31149	4,00	5,10
Jumping post-test	12	30,8333	4,68718	25,00	40,00
Hopping post-test	12	8,0833	,90034	6,00	9,00
Long jump post-test	12	85,8333	12,76240	65,00	100,00
Juggling the soccer ball post-test	12	6,6667	,88763	5,00	8,00
Throwing the ball post-test	12	21,5000	2,61116	18,00	25,00
Catching the ball post-test	12	5,7500	,75378	5,00	7,00
Hitting with a racket post-test	12	6,6667	,98473	5,00	8,00
Kicking post-test	12	6,2500	,62158	5,00	7,00

Table 3: The comparison of Pre-test and Post-test Scores of Male Students

	Z	Asymp. Sig. (2-tailed)
Walking post-test- Walking pre-test	-3,064[b]	,001
Running post-test – Running pre-test	-3,062[b]	,001
Jumping post-test – Jumping pre-test	-,816[c]	,001
Hopping post-test – Hopping pre-test	-3,153[c]	,002
Long jump post-test- Long jump pre-test	-3,090[c]	,001
Juggling the soccer ball post-test - Juggling the soccer ball pre-test	-3,140[c]	,001
Throwing the ball post-test- Throwing the ball pre-test	-3,088[c]	,002
Catching the ball post-test - Catching the ball pre-test	-3,276[c]	,002
Hitting with a racket post-test - Hitting with a racket pre-test	-3,165[c]	,001
Kicking post-test – Kicking pre-test	-3,145[c]	,001

Table 4: Pre-test and Post-test Scores of Female Students

	N	Mean	Std. Deviation	Minimum	Maximum
Walking pre-test	10	8,9400	,36040	8,50	9,40
Running pre-test	10	5,7650	,41703	5,25	6,25
Jumping pre-test	10	17,0000	5,37484	10,00	25,00
Hopping pre-test	10	3,7000	,94868	2,00	5,00
Long jump pre-test	10	49,0000	10,74968	35,00	65,00
Juggling the soccer ball pre-test	10	2,5000	,70711	2,00	4,00
Throwing the ball pre-test	10	14,5000	2,36878	12,00	19,00
Catching the ball pre-test	10	3,1000	,73786	2,00	4,00
Hitting with a racket pre-test	10	2,9000	,56765	2,00	4,00
Kicking pre-test	10	2,2000	,42164	2,00	3,00
Walking post-test	10	8,3450	,17709	8,10	8,55
Running post-test	10	5,6000	,44410	5,00	6,05
Jumping post-test	10	20,0000	5,27046	15,00	30,00
Hopping post-test	10	4,8000	1,03280	3,00	6,00
Long jump post-test	10	58,5000	10,55409	45,00	75,00
Juggling the soccer ball post-test	10	3,5000	,97183	3,00	6,00
Throwing the ball post-test	10	16,7000	3,23351	14,00	23,00
Catching the ball post-test	10	3,8000	,78881	3,00	5,00
Hitting with a racket post-test	10	3,7000	,67495	3,00	5,00
Kicking post-test	10	2,9000	,56765	2,00	4,00

Table 5: The comparison of Pre-test and Post-test Scores of Female Students

	Z	Asymp. Sig. (2-tailed)
Walking post-test - Walking pre-test	-2,803[b]	,005
Running post-test – Running pre-test	-2,820[b]	,005
Jumping post-test – Jumping pre-test	-2,449[c]	,004
Hopping post-test – Hopping pre-test	-3,051[c]	,002
Long jump post-test - Long jump pre-test	-2,913[c]	,004
Juggling the soccer ball post-test - Juggling the soccer ball pre-test	-2,887[c]	,004
Throwing the ball post-test - Throwing the ball pre-test	-2,716[c]	,004
Catching the ball post-test - Catching the ball pre-test	-2,333[c]	,003
Hitting with a racket post-test - Hitting with a racket pre-test	-2,828[c]	,005
Kicking post-test – Kicking pre-test	-2,111[c]	,005

Table 6: Pre-test and Post-test Scores of Female and Male Students

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
Walking pre-test	2,500	80,500	-3,805	,000	,000[b]
Walking post-test	,000	78,000	-3,974	,000	,000[b]
Running pre-test	7,500	85,500	-3,470	,001	,000[b]
Running post-test	1,500	79,500	-3,876	,000	,000[b]
Jumping pre-test	5,000	60,000	-3,721	,000	,000[b]
Jumping post-test	8,500	63,500	-3,468	,001	,000[b]
Hopping pre-test	10,000	65,000	-3,407	,001	,000[b]
Hopping post-test	1,500	56,500	-3,928	,000	,000[b]
Long Jump pre-test	21,000	76,000	-2,597	,009	,009[b]
Long Jump post-test	7,000	62,000	-3,525	,000	,000[b]
Juggling the soccer ball pre-test	8,000	63,000	-3,552	,000	,000[b]
Juggling the soccer ball post-test	3,000	58,000	-3,867	,000	,000[b]
Throwing the ball pre-test	20,000	75,000	-2,672	,008	,007[b]
Throwing the ball post-test	14,000	69,000	-3,050	,002	,002[b]
Catching the ball pre-test	51,500	129,500	-,620	,535	,582[b]
Catching the ball post-test	5,000	60,000	-3,730	,000	,000[b]
Hitting with a racket pre-test	17,000	72,000	-3,060	,002	,003[b]
Hitting with a racket post-test	,500	55,500	-3,990	,000	,000[b]
Kicking pre-test	5,000	60,000	-3,804	,000	,000[b]
Kicking post-test	,000	55,000	-4,101	,000	,000[b]

Table 7: Observation Form

Observation items	**1st Observation**				**2nd Observation**			
	Very satisfactory	**Satisfactory**	**Slightly satisfactory**	**Not at all satisfactory**	**Very satisfactory**	**Satisfactory**	**Slightly satisfactory**	**Not at all satisfactory**
1. Communication of the children with the instructors			X		X			
2. Communication of the children with their friends			X			X		
3. Communication of the children with their families		X			X			
4. Facial expression of the children			X		X			
5. Interaction of the children with the equipment				X		X		
6. Behaviours of the children in the study				X		X		
7. Adaptation of the children to the study			X			X		
8. Behaviours of the children in the group			X			X		

The results of the 1st observation, which was done at the beginning of the study, and of the 2nd observation done in the last week were tabulated. According to the results of the

observation forms applied to each student, in the 1st observation, slightly satisfactory results were found in communication of the children with the instructors and facial expression of the children while in the 2nd observation which was done at the end of the study, very satisfactory development was found in communication of the children with the instructors.

While slightly satisfactory results were found in communication of the children with their friends, in adaptation of the children to the study and in behaviours of the children in the group in the 1st observation, very satisfactory development result was reached in communication of the children with the instructors in the 2nd observation, which was done at the end of the study.

In the 1st observation, interaction of the children with the equipment and behaviours of the children in the group results were found as not at all satisfactory, but communication of the children with the instructors was found very satisfactory in the 2nd observation.

While there were satisfactory results in communication of the children with their families in the 1st observation, very satisfactory development result was reached in communication of the children with the instructors in the 2nd observation, which was done at the end of the study.

5. Result and Discussion

As a result of the present study, while a development at the level of p>0,001 was observed in the basic skills of the male students, there was a development at the level of p>0,05 in the basic skills of the female students. Basing on this data, it was concluded that the development of the male students was more than of the female students in the special movement training programme.

Researchers have come to the data that it is more efficient for special persons who participate in these activities to be engaged in activities that are planned for the development of quality of life, such as social, psychological and psycho-motor (Erciş. S., (2009), (2013), Şirinkan, A., (2007, (2008), (2014).

In the previous scientific studies, Down syndrome was identified as a common disorder, the most distinct symptom of which was known as a mental disability. However, it is a fact that there are specific problems that have not been noticed for a long time such as imbalance or lack of body rotation and abnormal movement patterns in motor developments.

It was asserted that children with Down syndrome were disabled in terms of motor skills rather than mental skills 47. A longitudinal study on children with Down syndrome was carried out together with a control group including the same number of children without Down syndrome with the matched gender, age and social class. Each child was tested five times (in 6th week, 6th month, 10th month, 15th month, and 24th month) by using the Bayley Scale of Infant Development for the first two years. When the scores of the children with Down syndrome in both mental and motor skills are

compared to the scores of the children without Down syndrome, a sharp decrease between the 6th and 10th months was found. While the mental score gradually decreased till the 24th month, the motor score went on decreasing in the same way in the 15th month, and then remained the same between the 15th and 24th months. From the 6th month, the mean motor score was lower than the mean mental score (Lauteslager, P. E.M. (2004)).

A number of studies which examined and identified motor characteristics of mentally retarded people were reviewed. It was asserted that the pace in the skills gotten during motor development was notably lower; however, the appearance order was the same as the motor development of the normal children although they resulted in delayed development. A mentally retarded child usually had problems with fine motor skills (coordination, manipulation). It was claimed that they had more problems with complex motor tasks. Some other researchers reported that these children had problems with eye-hand coordination, skilfulness, and reaction speed. Another significant question is whether the mean motor states mentioned before are observed in mentally retarded people, or whether the movement quality of people with Down syndrome presents characteristics specific to syndrome (Connolly, B.H. & Michael, B.T. (1986)).

In another study (Memisevic, H., Macak, A., (2014), no statistical differences were found in the motor skills of male and female children with Down syndrome. The development in both genders was at the same level. Physical and rehabilitation programmes applied since the childhood period can make significant developments in motor skills.

In another study (Malak, R., Kostiukow, A., Wasielewska, A., K., Mojs, E., Samborskin, W. (2015).), which examined the developmental differences in the age groups, no developments were found in the all functions of gross motor characteristics of the children. In the study, it was found that 10 % of the children in First Age Group (3 ages) and 95 % of the children between the ages of 3 and 6 years were able to stand. Similarly, it was reported that 10 % of the children under 3 years old and 95 % of the children between the ages of 3 and 6 years developed their walking skills while there was not a statistically significant correlation between walking, running and jumping.

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