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The Effect of Movement Education Program on Static Balance Skills of Pre-School Children

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Abstract: This study aimed at evaluating the effect of movement education program on static balance skills of preschool children (5-7 years). 80 preschool children in total – 40 in experimental group (20 males and 20 females) and 40 (20 males and 20 females) in control group – were included in this project. While children in the experimental group were administered the movement education program for one hour and three days per a week during 3 months, control group received the regular curriculum. The movement education program was composed of fundamental motor skills, posture exercises and games. Static balance platform was used to assess the static balance ability. SPSS package program was utilized for the statistical analyses. Independent T Test was conducted to compare the results of experimental and control groups. Paired Samples T Test was used for differences between pre- and post-tests in both groups. Significance level was taken as ($p<0.05$). According to the results of the statistical analysis; the static balance values of the experiment group in the pre- and post-tests were found significant ($p<0.001$) while the static balance values of the control group in the pre- and post-tests were not found significant ($p<0.05$). The final static balance test values were found significant for the experiment group ($p<0.001$). The results tell us that movement education program which was implemented positively affected static balance of preschool children.

Key words: Preschool Children · Movement Education Program · Static Balance

INTRODUCTION

Balance as a component of motor function is ensured through the connections among sight, deep sensory organs and motor system. Balance can change according to the musculoskeletal system, age, visual and vestibular stimulations and the unity of these components.

Balance and other physical features play an important role in displaying sport skills successfully. Balance is defined as a senso-motoric ability which tries to protect it while standing and in motion. As for the sense of balance, it is the ability to balance the body and to maintain the balance [1].

Balance is necessary for many motor skills to occur. Balance increases with the age and girls have a better balance during their childhood [2].

Balance begins to improve at very early ages. As the age rises, the skill of balance increases.

Balance is the base for all the movements and effected by various factors. This ability is useful for solving motor problems emerging in such conditions in which there are tight side fields and balance can easily be lost due to the change in gravity center of the body [3].

The delay which is seen in the activities that require the ability of balance such as standing on one foot is considered to be arising from the late occurrence of the reactions of head coordination and body position (e.g. Landau and parachute reflection) and the reactions of balance against leaning back. Vestibular, throat deep senses and asymmetric touching stimulation are deemed to have a role in the reactions peculiar to posture [4].

Perception of visual stimulations and any disorder in the mechanism involving the supply of balance result in lack of coordination in the movements. Vestibular system is a special system which ensures balance with the help of visual stimulations depending upon the position of the head.

Balancing occurs by means of muscular tonus and neuromuscular reflections under the control of this system [5- 7].

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MATERIALS AND METHODS

Instruments and the methods of the research carried out in order to search for the effect of the movement education program on static balance skills of the preschool children have been presented below.

Subjects: At the beginning of the research, 60 girls and 59 boys (n= 119) whose ages are between 5 and 7 attending the same kindergarten composed the experiment and control groups. During the working time (3 months), those who were absent in two successive lessons or who haven't participated into totally three working sessions during the research were removed from research group and 80 students, 40 of whom composed the experiment group (20 girls-20 boys) and 40 of whom composed the control group (20 girls-20 boys) were taken into consideration in total. Children were included in the working group on condition that they had not been attending any sportive activity regularly and it was not posing any medical risk for children to participate into movement education. So as to enable this condition, as experiment and control groups, the whole group underwent a check-up with the help of their parents, the children who have especially asthma, bronchitis and blood and cardiac problems haven't been included in the research and their parents were informed through seminars and private meetings of the fact that these children would not be included in the study due to their medical situations.

Parents have been briefed about the program by meeting them twice before the studies. Approvals of parents have been taken by having them sign the letter of permission prepared before the study. Attention has been paid to the selection of the students who have attended the school and whose parents have given permission while composing experiment and control groups.

Legal permissions necessary for the research were all taken. All the measurements were carried out during the school time. Before starting the study, the approval of the Ethic Board was taken. Measurements related to the subjects were carried out by the experts of each field.

Research Design: In this part, design of the experiment, data collection tools, methods and techniques that were used in the analysis of procedure and data were explained.

In the research, design of the pre-test and post-test was used with the control group. Research was carried out through 2 groups as an experiment group and a control group. One of the groups, appointed with equal chance, was defined as control group. While a program including basic movements, different children games and posture studies was applied to the experiment group, control group continued their daily lives.

Fig. 1: Static Balance Test

Methods: Movement education program used in the research was handled as an independent variable while the static balance of students was dealt with as a dependent variable. Static balance tests were applied to all the groups as pre- and post-measurements [8,9].

Data Collection Instrument

Static Balance (Flamingo) Test

Active: Full body balance Definition of the test: One foot balance on a beam of particular dimensions.

Material: Body stuck to a very good coating material (a maximum thickness of 5 mm) covered with 50 cm to 3 cm in length and width of 4 in height does not move the metal beam width of 2 cm to 15 cm in length rest on two legs.

Purpose of Test: To determine how many seconds in a minute that the static equilibrium keeps on.

Preparation of Test Environment: Balance tool was placed on the ground, in front of a stool to sit on the researcher. A person who facilitated the child to ensure his/her balance and to determine the static balance duration stood next to the balance instrument.

Used of Tools in Test: Balance beam, an irreversible stopwatch per each instrument.

Implementation of Test: Instruction for the subject: Children are explained how they will stand on the balance bar. They are asked to observe the model carefully and the movement is described. Further instruction is given as the child stands on the balance bar on one foot with the other foot directed in parallel to the bar: "As you stand with your arms opened to two sides, someone holds one of your hands and helps you ensure your balance. After you ensure your balance, s/he leaves your hand and you will try to keep your balance on the bar on your own. The device which I am holding will tell me for how many seconds you stay in balance per a minute." After the child ensures his/her balance, the chronometer starts. It is measured how many seconds s/he stays in balance per a minute. Chronometer stops as his/her foot that is hanging on air touches the floor or s/he loses his/her balance and falls down. Chronometer restarts after s/he ensures his/her balance back.

Instruction for the Administrator: Stand in front of the subject. Provide the subject with an opportunity for a rehearsal to ensure that s/he understands the instructions and gets accustomed to the experiment properly. After the rehearsal, proceed with the test. Start the chronometer as s/he leaves your hand that helps him/her ensure balance. Stop the chronometer if his/her foot that is hanging on air touches the floor or s/he loses his/her balance and falls down. After each break, help the subject restore his/her proper starting position.

Recording the Test Result: Out of the two practices implemented, the best practice is recorded. If the child makes more than fifteen errors within the 30 seconds after s/he ensures his/her balance, zero point is graded [10,11].

Movement Education Program: Movement education lasted for 12 weeks. It was composed of basic motor movements, posture exercises and the games suitable for the age group. According to daily class plan, first 5 minutes of the class were spent with a game for warming-up, 25 minutes of the class were composed of posture exercises and the following 25 minutes were allocated to basic movements and the exercises about these basic movements; and in the last 5 minutes, games related to the learned skills or circuit trainings related to the skills studied before have been applied. Resources that were used while comprising the program have been presented in bracket with their sequence numbers in the list [1,12-26].

Statistical Analysis: In this study, in order to see the difference between the values of the pre- and post-tests of the experiment and control groups, Dependent T Test has been used. So as to look at the difference between the groups, Independent T Test has been applied. At the beginning of the experiment procedure, ANCOVA (covariance) analysis was applied in the last measurements as a result of the difference in the values of the static balance between the groups at a significant level. If it is $p < 0.05$, it is considered to be significant [8,9].

RESULTS

According to the results of definitive statistical works; average values of pre- and post-tests for body height, body weight and sitting height in experiment and control groups are (pre-test average value of body height for the experiment group = 115,4- post-test =118,4cm; pre-test value for control group =116,3cm-post-test=119,1cm; pre-test average value of body weight =22,2kg, post-test=23,5kg; pre-test average value of body weight in control group =23,3kg- post-test=25,4kg; pre-test average sitting-height value for the experiment group =61,8cm-post-test=63,4cm; pre-test value for control group=62,6cm- post-test value =63,8cm) respectively (Table 1).

At the beginning of the experiment procedure, ANCOVA (Covariance) was applied in the last measurements as a result of the fact that there is a significant difference in static balance values between the two groups [8].

In Table 3, corrected dynamic balance mean values of the experiment group seem to be higher than those of control group.

Table 1: Descriptive Statistics of height-weight and sitting height value of Experiment and Control Groups

Variables	Groups	Tests	N	Min.	Max.	Mean
Height	Experiment	Pre	40	107	125	115,4
		Post	40	108	129	118,4
	Control	Pre	40	108,5	127	116,3
		Post	40	110	131	119,1
Weight	Experiment	Pre	40	16,9	28,5	22,2
		Post	40	18	32	23,5
	Control	Pre	40	18,2	35,5	23,3
		Post	40	18	38	25,4
Sitting height	Experiment	Pre	40	57	68	61,8
		Post	40	59	70	63,4
	Control	Pre	40	56	71	62,6
		Post	40	58	71	63,8

Table 2: Pre-Test Results of Static Balance Values of Experiment and Control Groups

Measurement	N	$\bar{x}$	S	sd	T	P
E.S.B.	40	18,624	17,092	78	,081	,936
C.S.B.	40	18,317	16,772			

E.S.B.: Experiment Static Balance

C.S.B.: Control Static Balance

Table 3: The Post-Test Results of Static Balance Values of Experiment and Control Groups

Group	N	$\bar{x}$	Corrected $\bar{x}$
E.S.B.	40	30,100	29,995
C.S:B.	40	17,188	17,227

Table 4: Post-Test Values' ANCOVA Results-Adjusted Pre-Test Flamingo Values

Source of Variance	Total of Squares	Sd	Squares$\bar{x}$	F	P
Static Balance	4916,686	1	4916,686	55,399	,000
Group	1069,522	1	1069,522	12,051	,001
Error	6745,063	76	88,751		
Total	60879,681	80			

Table 5: T Test Results of Pre-Post Test Static Balance Mean Points According to the Groups

Measurement	N	$\bar{x}$	S	sd	T	p
E.S.B.Pre	40	18,624	17,092	39	-6,982	,000
E.S:B.Post	40	30,100	14,754	39		
C.S.B.Pre	40	18,317	16,772	39	,450	,655
C.S:B.Post	40	17,188	10,536	39		

An analysis of post-test static balance values reveals a statistically significant difference in favor of the experiment group ($F_{(1-12,051)}$, $p<0,05$).

According to findings obtained from the data; a significant difference was found between pre- and post-test values (pre test $\bar{x}$=18,624, post- test $\bar{x}$=30,100) of the static balance of the experiment group ($p<0.01$). A significant difference was not found between pre-and post-test values (pre test $\bar{x}$=18,317, post-test $\bar{x}$=17,188) of the static balance of control group ($p>0.05$) (Table 5).

DISCUSSION

According to the findings obtained through the study aiming at evaluating the effect of movement education program applied on the static balance values of the preschool children; a significant difference was found between pre- and post-test values (pre test $\bar{x}$=18,624, post-test $\bar{x}$=30,100) of the static balance of the experiment group ($p<0.01$). A significant difference between pre- and post-test values (pre test $\bar{x}$=18,317, post-test $\bar{x}$=17,188) of the static balance of control group was not found ($p>0.05$).

In his study Bayraktar who compared in order to engaged in sport of gymnastics flamingo balance test values than athletes engages in sports, athletics and swimming flamingo balance test values, Bayraktar stated that she have found gymnastics' flamingo balance test values significantly difference ($p<0.001$) according to athletics and swimmers[27].

In his research which he carried out in order to examine the effect of perceptual motor improvement programs on the balance and agility skills of 4-6-year-old children, Tüfekçioğlu stated that he did not find any significant difference; even though there was a rise in the values of static balance values and that it would be possible if studies started to be applied beginning from the age of 4 by spreading them on a plan [28].

In his study, Altınkök (2007) examined the effect of 4-week physical education program design on the children's improvement of the static balance skills by applying it to the 5-6 years-old children in preschool term and statistically found a significant difference at the level of $p<0.001$. Control group's pre-test and post test values of static balance were stated as 28.03 sec. and 23.79 sec. whereas static balance pre-test and post-test values of experiment group were recorded as 28.09 sec. and 41.55 sec. The values obtained in the study are quite close to those available in the literature, the difference sometimes seen in the post-test values is considered to result from the content of the program [29].

In his study to determine the factors affecting some of motor characteristics (standing long jump and running and static and dynamic balance), Müniroğlu (1995) found 14.89±0.99 sec. in 4 ages and 24.40±1.39 sec. in 5 ages static balance mean values of (160 public, 160 private) 320 preschool children. In development of motor skills, children with favorable body images at early ages were observed to display significant differences in their motor skills in following ages. It was stated that children at later stages of perceptional development had more new experiences, by which they improved their skill levels [30].

Kiomourtzouglou *et. al.* stated that static balance of the sportive group that did rhythmic gymnastics was better than the balance of the control group when they compared the static balance values of the 9-15 year-old children doing rhythmic gymnastics in a model with experiment and control groups. They confirmed that, as the age rises, static balance values get better [31].

Haslofça *et al.* stated that the values of the average number of flamingo balance error reported as 16.65 of a total of 80 male children (7 years old (n=29) and 8years (n=51) [32].

Nurdoğan *et al.* stated that the values of the average time of flamingo balance of male tenis players between 9-12 ages reported as 18,27±5,16 sec. and sedantar male' 11,93±3,93 sec. [33].

Haslofça *et al.* stated that the values of the average number of flamingo balance error reported as 15.34 of a total of 69 female children (7 years old (n=23) and 8years (n=46) [34].

In his study, Yıldırım searched for the static balance improvement of the children between the ages of 5-10 who took 2-hour gymnastic education in a week during 8 weeks. Static balance values of the experiment group were found to rise significantly at the level of $p<0.001$ among the values of pre- and post-test. The static balance duration of the experiment group was claimed to be 2.69 sec. at the pre-test and to be 4.18 sec. at the post-test [35].

In his research which he carried out examine the effect of basic motor skill programs of 8 weeks on the physical and cognitive developments of first class students. The result of; Kruger stated that improved in experimental group' all motor skills according to control group. [36].

Singer did not define a crucial relation between the static and dynamic balance degrees of the preschool children. He stated that the children with higher body weight had lower balance degrees, whereas they were better than those who were tall [37].

The balance values collected are normal values considering the age group and seem to be parallel to those with the same age group in the literature.

Considering the control group, experiment group's balancing duration ($p<0.05$) seems in statistical terms to increase significantly while the values of control group seem to decrease. These findings show that movement education program applied has a positive effect on improved balance, but resulted in recession in the values of control group who did not attend the study of the same age group and display that similar studies are necessary to be carried out in this age group. In this case, we can suggest that improvement of these study programs and making them available for children will affect their static balance improvement positively.

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