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EFFECTS OF SPECIFIC GYMNASTIC EXERCISES ON BALANCE AND FLEXIBILITY OF ADOLESCENT STUDENTS

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Abstract

Purpose: The study was to clarify the influence of eight (8) weeks of specific gymnastic exercises on the balance and flexibility of adolescent students. **Materials and Methods:** Thirty boys students (aged = 14 to 16 years) were randomly assigned to the experimental group (n=30) and control group (n=30). All student was selected from The Jain International School, Bilaspur, Chhattisgarh, India. Various gymnastic exercises were included in the experimental group training session 5 times (each session 60 minutes) per week over eight (8) weeks as part of their usual weekly training regime. Both groups of gymnasts were tested on balance and flexibility parameters before and after training. Students' performance was tested and measured through the standard procedure with the help of an expert and under the direct supervision of the experimenter. Standard deviation and 't'-test were used to analyse data statistical mean. The level of significance was set at 0.05 ($p \leq 0.05$). **Conclusion:** There were significant effects of specific gymnastic exercises on the balance and flexibility parameters of the experimental group.

Keywords: Gymnastic exercise, Flexibility, Balance. Adolescent

1. Introduction

Gymnastics is a sports branch that requires extensive locomotor movement, balance, flexibility, and body control movements. Initial levels of flexibility and CMJ performance do not alter the responses of elite gymnasts to warm-up protocols differing in stretching and potentiating exercise volumes. Furthermore, 3 sets of 5 tuck jumps result in a relatively large increase in CMJ performance despite an increase in flexibility in these highly trained athletes [1]. Trampoline training increased bipedal static balance, dynamic balance and vertical jump values in boys who do not exercise regularly. Trampoline training is an effective intervention to

improve multifunctional motor features in 9 years old boys [2]. The smallest loss of balance will negatively affect the score the athlete will receive, balance in gymnastics is an important factor and one of the most important features that need to be developed [3]. Stretching exercises to increase flexibility are routinely included in both the training program and warm-up activities of many athletes. As stated at the basic level, the whole body should be considered as a whole in flexibility studies and should be developed on the basis of general mobility, especially in the specific mobility required for gymnasts. When gymnasts perform acrobatic movements, they must constantly move their bodies from one position to the other. Therefore, they have to maintain their dynamic and static balance best [4]. Six weeks of various gymnastic exercise training significantly improved on selected motor fitness components (muscular strength, agility and cardio-vascular endurance) of school students. The muscular strength, agility and cardiovascular endurance of the students in the experimental group have improved significantly in comparison with the control group due to the effect of six weeks of gymnastic exercise training [5]. Gymnastics is a sport that requires a high level of physical fitness factors such as strength, flexibility, agility, coordination, balance, and grace. It is a well-known exercise and sport in the world. An elite gymnast is supposed to be equipped with a combination of these motor features [6,7]. Without a doubt, balance is one of the major effective aspects of appropriate sport skill performance (especially in gymnastics) [8]. Good gymnasts must maintain balance in order to successfully perform the dynamic and static acrobatic moves at different levels. Thus, during the special training period, posture control exercises should be particularly emphasized [9]. Gymnastic branch-specific stretching exercises increase the balance and flexibility parameters in a positive way; it is thought that the longer duration of training programs will have a positive effect on the athlete's performance [10].

1.1 Objective of the study

To find out the effects of selected gymnastic exercises on the balance and flexibility of adolescent school students.

1.2 Hypothesis

It is hypothesized that no significant change will occur after training for Eight (8) weeks.

2. Methodology

2.1 Population and Sampling Technique

The subjects were selected from The Jain International School, Bilaspur, Chhattisgarh, India for this study. A total of sixty (60) subjects were randomly selected out of which thirty (30) were the experimental group and the other thirty (30) were the control group. The age range of subjects was 14 to 16 years.

2.2 Selection of Variables & Criterion measuring tools

For the present study, the researcher used to measure balance and flexibility motor fitness variables through the Bass Stick test and Sit and Reach test.

2.3 Administration of the test

After selecting these subjects from Jain International School, Bilaspur, Chhattisgarh, India the researcher conducted a motor fitness test (balance and flexibility) to measure motor fitness components before and after

an eight (8) week gymnastic exercise training program. The balance and flexibility motor fitness components were tested with the help of an expert and measured by the base stick test and the sit and reach test under the direct supervision of the examiner. Research scholars have conducted the following tests given below.

A) Bass Stick Tests

Purpose: To measure the static body balance.

Equipment: A stopwatch, one inch wide, one inch high and 12 inches long stick and adhesive tape.

Procedure: The tester gives a practical demonstration either himself/ herself or through a trained helper to a group of 10 to 15 subjects by showing how to stand crosswise on the stick upon a given signal. After the demonstration, the subject is asked to place the ball of the right foot crosswise on the stick which is tightly secured to the floor with the help of adhesive tape. The tester then announces Ready, Steady, and 'Start'! On the signal 'Start', the performer lifts the foot from the floor and raises the heel of the right foot from the ground so as to balance his/her body on the ball of the foot placed crosswise on the stick for as long as possible up to a maximum of 60 seconds, on the signal 'Start' the timer starts the stopwatch which is stopped when one of the following events happens -

- The subject touches the floor either with his/her right heel or toes.
- The subject loose balance and happens to touch the floor with the free foot (left foot in the trial).
- 60 seconds are over when the test is officially announced as completed. Each subject is required to perform the above test for six times, three times on the right foot and three times on the left foot alternating each trial with the left foot after the right foot.

Scoring: The scores are given by the sum of the times in seconds recorded during all six (6) trials.

A) Sit and Reach Test

Purpose: To measure body flexibility.

Equipment: A testing box or flex measure and yardstick.

Procedure: The subject is asked to remove shoes and place his/her feet against the testing box while sitting on the floor with straight knees. Now the subject is asked to place one hand on top of the other so that both hands' middle fingers are together at the same length. The subject is instructed to lean forwards and place his/her hands over the measuring scale lying on the top of the box with its 10-inch mark coinciding with the front edge of the testing box. Then, the subject is asked to slide his/her hands along the measuring scale as far as possible without bouncing and to hold the farthest position for at least one second.

Scoring: Each subject is given three trials and the highest score nearest to an inch is recorded and 10 inches are subtracted from the recorded reading to obtain the flexibility score [11].

2.4 Design of the Study

For the present study, sixty (60) male subjects were selected randomly from The Jain International School, Bilaspur, Chhattisgarh, India. Their age ranged from 14 to 16 years. The subject was divided into two equal groups of 30 (thirty) subjects in each. One is treated as an experimental (practice gymnastic exercise) group, the second one is a Control (without practice) group. The experimental group will practice gymnastics exercises,

for five (5) days a week for 60 minutes each day, for the period of eight (8) weeks under direct supervision of the experimenter. The control group did not practice any special training during the period of eight (8) weeks.

2.5 Training Protocol

Table:1 Eight weeks gymnastic exercise Training protocol

Sr. No.	Gymnastic-Exercises	Week (1-2)	Week (3-4)	Week (5-6)	Week (7-8)
1	Front Rolling	4 repetitions 2 set	5 repetitions 3 set	6 repetitions 4 set	5repetitions 3 set
2	Back Rolling	4 repetitions 2 set	5 repetitions 3 set	6 repetitions 4 set	5 repetitions 3 set
3	Handstand	4 repetitions 2 set	5 repetitions 3 set	6 repetitions 4 set	5 repetitions 3 set
4	Cartwheel	4 repetitions 2 set	5 repetitions 3 set	6 repetitions 4 set	5 repetitions 3 set
5	Leg Split	5 repetitions 2 set	6 repetitions 3 set	7 repetitions 4 set	5 repetitions 3 set
6	Leaps and jumps	4 repetitions 2 set	5 repetitions 3 set	6 repetitions 4 set	5 repetitions 3 set
7	Arch	4 repetitions 2 set	5 repetitions 3 set	5 repetitions 3 set	5 repetitions 3 set
8	'T' balance	4 repetitions 2 set	5 repetitions 3 set	5 repetitions 3 set	5 repetitions 3 set
9	Walking on the balancing wood	4 repetitions 2 set	6 repetitions 3 set	8 repetitions 4 set	5 repetitions 3 set

Note: Relaxation 10 To 15 seconds after each exercise

2.6 Collection of the Data

To find out the effects of gymnastic exercises on balance and flexibility selected components of adolescent school students, the data were collected through the administration of the "Bass Stick Test" & "Sit and Reach Test" before and after the gymnastic exercises program of eight (8) weeks. To see any significant different 't' test was used for further statistical analysis.

3. Result and Discussion

All the data pertaining to the present study were examined by employing 't' test to find out whether any significant difference between the means of motor fitness component of school students. The following notations were used for all the subsequent tables for elaborations.

E.G.- Experimental group, C.G.- Control group, N- Number of subjects in group, M- Mean score of the group, S.D.- Standard deviation of 't' – 't' value,

3.1Results

Table- 2: Mean differences between the pre and post-test of experimental and control groups on balance (bass stick test in seconds)

Sl.no.	Group	Test	N	M	SD	MD	't' value	P- value
1	E.G	Pre-test	15	15.44	1.31	0.17	0.49	.312991.
2	C.G	Pre-test	15	15.27	1.35			
1	E.G	Post-test	15	17.63	1.75	2.32	4.07	.000072.
2	C.G	Post-test	15	15.31	1.34			

Level of Significance was at .05 (2,58) =2.00

Table-2 shows that the pretest mean of experimental and control groups on balance is 15.44 and 15.27 and their calculated 't' value is 0.49 which is lesser than that of the tabulated value of 2.04 at 0.05(28) level of confidence. There is no significant difference found between the experimental and control groups of the pre test on balance. Whereas the mean of the post-test experimental and control groups is 17.63 and 15.31 and their calculated 't' value is 4.07 which is greater than that of the tabulated value 2.04 at 0.05(28) level of confidence. This indicates that there is a significant difference between the experimental and control groups of post-tests on balance. It can be said that six weeks of gymnastic exercise training affects the balance of experimental groups. Hence, the null hypothesis is rejected.

Fig-1: Graphical presentation of the mean difference between the experimental and control groups on balance

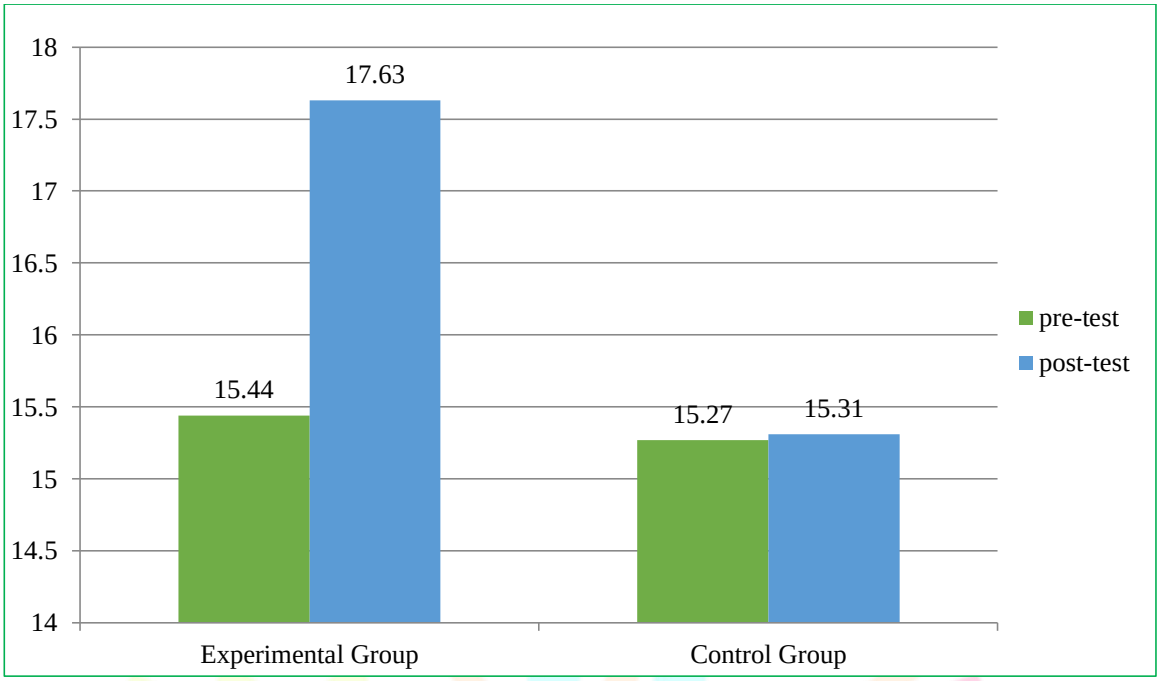


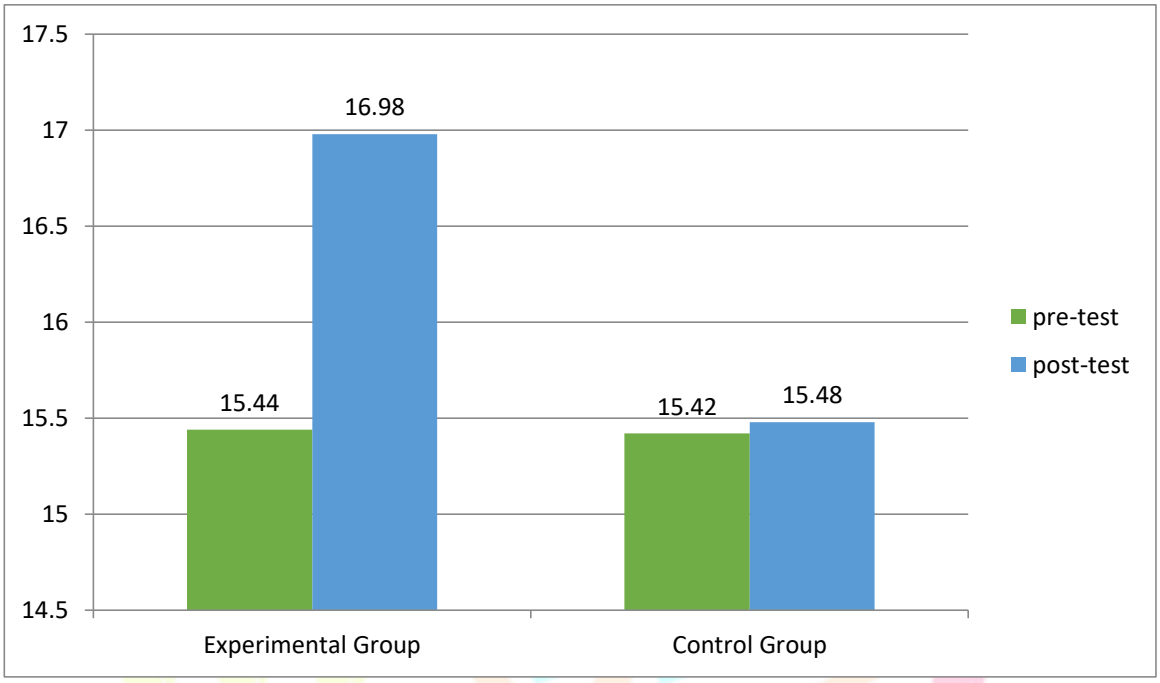
Table- 3: Mean differences between the pre and post-test of experimental and control groups on Flexibility (Sit and Reach Test)

Sr.no.	Group	Test	N	M	SD	MD	't' value	P- value
1	E.G	Pre-test	15	15.44	1.31	0.02	0.04	.484115
2	C.G	Pre-test	15	15.42	1.29			
1	E.G	Post-test	15	16.98	0.70	1.5	3.95	.000214
2	C.G	Post-test	15	15.48	1.28			

Level of Significance was at .05 (2,58) =2.00

Table-3 shows that the pre-test mean of experimental and control groups on flexibility is 15.44 and 15.42 and their calculated 't' value is 0.04 which is lesser than that of the tabulated value 2.00 at 0.05(28) level of confidence. There is no significant difference found between the experimental and control groups of the pre-test on flexibility. Whereas the mean of the post-test experimental and control groups is 16.98 and 15.48 and their calculated 't' value is 3.95 which is greater than that of the tabulated value of 2.00 at 0.05(28) level of confidence. It is indicated that there is a significant difference between the experimental and control groups of post-tests on flexibility. It can be said that six weeks of gymnastic exercise training have an effect on the flexibility of experimental groups. Hence, the null hypothesis is rejected.

Fig-2: Graphical presentation of the mean difference between the experimental and control groups on Flexibility



3.2 Discussion and Findings

Based on the results it can be concluded that there are significant differences in balance and flexibility variables between the experimental and control groups. It was found that the experimental group is more balanced and flexible than the control group. This could be attributed to the fact that eight weeks of gymnastic exercise training could improve the balance and flexibility of the experimental group. Thus, we can say that this eight-week gymnastic exercise training protocol can be generalized because, in this current research study, a statistically significant difference was found between the pre-test and post-test between the experimental groups.

3.2.1. Major Findings

- The mean of post-test experimental and control groups is 17.63 and 15.31 and their calculated 't' value is 4.07 which is higher than the tabulated value of 2.04 at 0.05(28) confidence level. Here a significant difference was found between the experimental and control groups in the post-test on balance.
- The mean of the post-test experimental and control groups is 16.98 and 15.48 and their calculated 't' value is 3.95 which is more than the table value of 2.00 at 0.05(28) confidence level. This indicates that there is a significant difference between the experimental and control groups in the post-test on flexibility. It can be said that six weeks of gymnastic exercise training affects the flexibility of the experimental group.

4. Conclusions

- Eight weeks of specific gymnastic exercise training significantly increase on balance and flexibility of adolescent students.
- Balance and flexibility parameters of the students in the experimental group have a positive effect in comparison with the control group due to the effect of eight weeks of gymnastic exercise training. It is thought that the longer duration of training programs will have a positive effect on the athlete's performance.
- It was also experienced during the conduction of this research that the longer duration, as well as well-programmed training protocol and well-selected exercise, will increase the performance of athletes.

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