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INFLUENCE OF BILATERAL EXERCISES ON REACTION ABILITY AND BALANCE ABILITY AMONG PRE-ADOLESCENT GIRLS

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Abstract:

The purpose of the study was designed to examine the effect of bilateral exercises on reaction ability and balance ability of pre-adolescent girls. For the purpose of the study, thirty pre-adolescent girls studying in the schools in and around Warangal District, Telangana, India were selected as subjects. They were divided into two equal groups. Each group consisted of the fifteen subjects. Group I underwent bilateral exercises for three days per week for twelve weeks. Group II acted as control who did not undergo any special training programme apart from their regular physical education programme. The following variables namely reaction ability and balance ability were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables by using Visual Reaction Timer and Stork Stand respectively at prior to and immediately after the training programme. The analysis of covariance was used to analyze the significant difference, if any among the groups. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered appropriate. The results of the study showed that there was a significant difference between bilateral exercises group and control group on reaction ability and balance ability. And also it was found that there was a significant improvement on reaction ability and balance ability due to twelve weeks of bilateral exercises.

Key Words: Bilateral Exercises, Reaction Ability, Balance Ability, Pre-Adolescent Girls

Introduction:

Bilateral exercises are physical activities that involve the coordinated use of both sides of the body simultaneously, promoting symmetrical muscle development and neuromuscular efficiency. At the same time, bilateral movements contribute significantly to balance ability by engaging core muscles and stabilizing joints, which helps maintain body control during dynamic and static positions. Activities such as squats, jumping drills, and coordinated arm-leg movements stimulate proprioception and postural control, thereby improving overall coordination, agility, and stability. Hence, bilateral exercises are essential in sports training and rehabilitation for developing quick reactions and maintaining optimal balance.

Bilateral exercises refer to movements that require the simultaneous use of both sides of the body in a coordinated and controlled manner, such as squats, lunges, dead lifts, and push-ups. These exercises are fundamental in developing neuromuscular coordination because they engage both hemispheres of the brain, leading to more efficient motor control and movement symmetry. One of the key benefits of bilateral exercises is their strong influence on reaction ability, which is the capacity to respond rapidly and appropriately to a stimulus. Through repeated bilateral movement patterns, the nervous system becomes more efficient in processing sensory information and executing quick motor responses, thereby improving speed, timing, and accuracy of reactions in sports and daily activities.

In addition, bilateral exercises significantly enhance balance ability, which involves maintaining the body's center of gravity over its base of support, both in static and dynamic conditions. When both limbs are actively engaged, stabilizing muscles especially in the core, hips, and lower extremities are recruited more effectively, leading to improved postural control and equilibrium. This dual engagement also reduces muscular imbalances and asymmetries, which are often responsible for poor balance and increased risk of injury. Furthermore, the integration of reaction ability and balance through bilateral exercises is particularly important in athletic performance, where quick responses must be executed while maintaining stability and control. Therefore, incorporating bilateral exercises into training programs not only enhances physical fitness components but also supports functional movement efficiency, coordination, and injury prevention.

Methodology:

The purpose of the study was designed to examine the influence of bilateral exercises on reaction ability and balance ability of pre-adolescent girls. For the purpose of the study, thirty pre-adolescent girls studying in the schools in and around Warangal District, Telangana, India were selected as subjects. They were divided into two equal groups. Each group consisted of the fifteen subjects. Group I underwent bilateral exercises for three days per week for twelve weeks. Group II acted as control who did not undergo

any special training programme apart from their regular physical education programme. The following variables namely reaction ability and balance ability were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables by using Visual Reaction Timer and Stork Stand respectively at prior to and immediately after the training programme. The analysis of covariance was used to analyze the significant difference, if any among the groups. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered appropriate.

Analysis of the Data:

Reaction Ability:

The analysis of covariance on reaction ability of the pre and post test scores of bilateral exercises group and control group have been analyzed and presented in table 1.

Table 1: Analysis of Covariance of the Data on Reaction Ability of Pre and Post Tests Scores of Bilateral Exercises and Control Groups

Test	Bilateral Exercises Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	205.33	202.00	Between	83.333	1	83.333	1.16
S.D.	6.18	8.06	Within	2013.333	28	71.905	
Post Test							
Mean	245.33	203.33	Between	13230.000	1	13230.000	23.54*
S.D.	9.80	10.11	Within	15736.667	28	562.024	
Adjusted Post Test							
Mean	244.20	204.47	Between	11365.881	1	11365.881	195.48*
			Within	1569.890	27	58.144	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 2 and 28 and 2 and 27 are 3.34 and 3.35 respectively).

The table 1 shows that the adjusted post-test means of bilateral exercises group and control group are 244.20 and 204.47 respectively on reaction ability. The obtained "F" ratio of 195.48 for adjusted post-test means is more than the table value of 3.35 for df 1 and 27 required for significance at .05 level of confidence on reaction ability.

The results of the study indicated that there was a significant difference between the adjusted post-test means of bilateral exercises group and control group on reaction ability.

Balance Ability:

The analysis of covariance on balance ability of the pre and post test scores of bilateral exercises group and control group have been analyzed and presented in table 2.

Table 2: Analysis of Covariance of the Data on Balance Ability of Pre and Post Tests Scores of Bilateral Exercises and Control Groups

Test	Bilateral Exercises Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	20.67	20.40	Between	0.533	1	0.533	0.33
S.D.	1.35	1.15	Within	44.933	28	1.605	
Post Test							
Mean	22.00	20.53	Between	16.133	1	16.133	8.09*
S.D.	1.08	1.15	Within	55.867	28	1.995	
Adjusted Post Test							
Mean	21.90	20.63	Between	11.881	1	11.881	22.42*
			Within	14.308	27	0.530	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 2 and 28 and 2 and 27 are 3.34 and 3.35 respectively).

The table 2 shows that the adjusted post-test means of bilateral exercises group and control group are 21.90 and 20.63 respectively on balance ability. The obtained "F" ratio of 22.42 for adjusted post-test means is more than the table value of 3.35 for df 1 and 27 required for significance at .05 level of confidence on balance ability.

The results of the study indicated that there was a significant difference between the adjusted post-test means of bilateral exercises group and control group on balance ability.

Conclusions:

- There was a significant difference between bilateral exercises group and control group on reaction ability and balance ability.

- And also it was found that there was a significant improvement on selected criterion variables such as reaction ability and balance ability due to bilateral exercises.

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