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Balance improvement in basketball players after neuromuscular training

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Abstract: This study focused on comparing the effects of plyometric training and regular training in secondary school basket ball players. The results show that both plyometric training and regular training showed greater influence in improving balance in secondary school basket ball players as assessed by BESS and SBST. But in comparision between both groups, plyometric training group shows more significant results thann regular training group.

Key words: Stork balance, neuromuscular, basketball players

Introduction: Balance is the ability to neutralize forces that would disturb equilibrium. One can retain one's balance while experiencing factors that disturb balance. The basketball post player things have changed in the past two decades. Players are subject to important principles when attempting to enhance stability in order to deter a bigger, stronger player.

Aim of the study: To determine the effects of balance improvements in secondary school basketball players by using neuromuscular training.

Methodology: In this experimental comparative study, 40 samples are randomly divided into 2 groups control Group (1)- 20), experimental Group(2)-20 and trained for 8 weeks.

Outcome measures: Balance error scoring scale (BESS), Stork balance stand test (SBST)

Results: In the present study, balance improvement in basketball players in experimental group has improved and this improvement was significant by both the outcome measures.

Conclusion: The study concluded that there was a significant difference in balancing task in BESS and SBST after neuromuscular training. This study states that neuromuscular training was effective in balancing task in basketball players; BESS ad SBST was effective assessment tool.

INTRODUCTION

Balance training is an interesting and controversial method of training for coaches because of the transversal effect that it may have on athletic performance in various sports and at different ages. From the literature, an evidence-based relationship between balance ability and the risk of injury is clear. In fact, studies have demonstrated that systematic training in a balance training program would be effective in reducing the risk of injuries(1, 2). It was observed that when balance training was implemented during competitive season, the occurrence of injury rate was reduced by 38 % (3).

However, the link between balance ability and athletic performance is not fully clear and required further evidence. There are, in fact, very few studies that specifically investigated balance training as approach to improving performance (4,5).

Because of growing scientific knowledge, the role of neuromuscular training has become better known (6). Moreover, it has been used in combination with balance training in different sports, such as basketball, soccer and gymnastics (4).

Balance can be defined as the ability to maintain the body's centre of gravity over the base of support and results from neuromuscular actions in response to continuous visual, vestibular and somato-sensory feedback.

In recent years, balance training has become a very popular addition to more standard athletic training programme in many sports. Basketball, for example, requires the players to habitually address physical contact and various situations involving balance instability, such as basketball-specific accelerations and decelerations, changes in direction, penetrations into the defensive perimeter, boxing out, dribbling and defence position recovery. These actions are often performed in a very limited

space and require very fast movement, high coordination ability and appropriate strength.

Disequilibrium can be found in every specific movement of basketball, such as in the twisting movement of feet (particularly the pivot foot), jump shots as well as offensive and defensive rebounds. Hence, further investigation of the most suitable balance training protocols for basketball is warranted.

Balance is the ability to neutralize forces that would disturb equilibrium. Balance can be seen is variety of movements from someone simply standing on one leg, to an intricate, dynamic most during execution(7) of a specific sport skill.

Body balance is the 1st physical ability we need to teach Young Basket Ball players. All successful individual maneuvers are easier and more effective when made with good body balance.

The COG should be low & knees well bent in a wide stance, but not wide enough to be uncomfortable. Flex the arms naturally & use them to maintain balance & quick starts.

The only difference between offensive balance & defensive balance is the use of the arms. On offense the arms are used for balance & quick starting on defense, they are used the same way as well as blocking shots (8) & deflecting or intercepting passes (8).

The balance of the Basketball point guard as he weaves around players on his way to the basket. Balance comes in all levels of difficulty. One can retain one's balance while experiencing factors that disturb balance.

The Basketball post player things have changed in the past two decades. A position for massive, slow footed player playing 5-10 ft. from the basket is now more commonly given to player, who although still very tall & long have lesser mass in exchange for better foot speed & more perimeter oriented skills.

Basketball post players are subject to important principles when attempting to enhance stability in order to deter a bigger, stronger player.

These are the players own mass, which should be taken advantage of athletes automatically have greater stability when they have greater mass, The more mass one has the harder it is to get going & the harder it is to stop or change direction, The value of wide base when posting up or blocking out, The value lowering the COG. Players must learn to play wide base & bent knees. The need to extend the Base of Support in the direction of an oncoming force.

Therefore, the purpose of this study to find out the effects of balance improvements by using neuromuscular training in secondary school basketball players.

METHODS AND METHODOLOGY

26 boys and 14 girls of ages between 13 -15were recruited for this study. Players who are included in the study don't have previous history of injuries at least 6 months along with pain-free functional ROM, normal strength and endurance. Players with any recent fractures, recent dislocations, sprain, ligament injuries, structural deformities, neuromuscular disease are excluded from this study. This study was conducted at Zilla sports authority stadium, Kakinada with

consultation of concerned authority. All methods and procedures were approved by Institutional Review Boards of Sandhya institute of physiotherapy and Rehabilitation, Kakinada and NTR University.

MATERIALS UESD

Medicine ball, plyo Box, Table and Stop watch.

PROCEDURE

Forty basketball players were selected depending on the inclusion and exclusion criteria and randomly divided into two groups twenty in each group. Informed consent was obtained before starting the intervention. Baseline measurements had been taken before starting the intervention by Balance error scoring scale (B E S S), Stork balance stand test (S B S T).

To initiate the 8 week exercise programmme, the subjects underwent a supervised orientation, after which they exercised on their own. Posttest was taken at the end of week 8. All measurements were conducted during the morning hours. Three readings were taken at 2 minutes interval, and best of three was used in statistical analysis.

GROUPS:

Two Groups:

Group 1: Control group

Group 2: Neuromuscular training

CONTROL GROUP

In this group subjects are continued with their regular exercise (Mention about the regular exercises) for 8weeks.

NEUROMUSCULAR TRAINING

In this group subjects underwent neuromuscular training programme which incorporates 45 minutes session per day for 8 weeks. Neuromuscular training programme includes Lower body plyometric and Stability ball exercises

LOWER BODY PLYOMETRIC EXERCISE

The plyometric training can be given in three forms of intensities such as,

- ✓ Low intensity
- ✓ Moderate intensity
- ✓ High intensity

LOW INTENSITY PLYOMETRICS

- ✓ Squat jump
- ✓ Jump to Box

MODERATE INTENSITY

- ✓ Box drill with rings.
- ✓ Lateral hurdle jump.

HIGH INTENSITY PLYOMETRICS

- ✓ zig zag hops
- ✓ single leg lateral hops

DATA ANALYSIS

The collected data were recorded and tabulated. The data was analyzed using statistical package for social science (SPSS) to present the finding of the study.

Table-1 presents the range, mean, SD of pre and posttest number of errors based on Balance Error Scoring Scale(BESS) on double leg stance, single leg stance, tandem stance and Stork balance stand test(SBST) in seconds among the basket players administered with neuromuscular training. The pre and posttest number of errors based on BESS in all three conditions were compared for significance through non parametric test for paired outcomes, the Wilcoxon test was carried out and it was found to be statistically significant. It

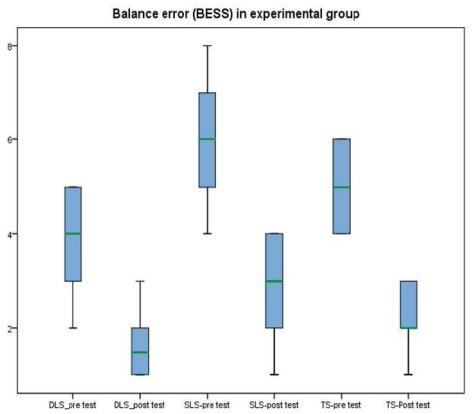
evidenced there was significant decrease in number of errors among basket players after neuromuscular training.

Similarly, the pre and posttest SBST scores in seconds compared for significance, the paired t-test was worked out and it was found to be statistically significant. It evidenced that there was significant increase on balance among basketball players after neuromuscular training.

Table-1: Range, mean and SD of balance scores of basket players in experimental group.

SNo	Balance parameters		Pre test		Post test		Wilcoxon test/ Paired t-test	p-value
			Range	Mean ± SD	Range	Mean ± SD		
1	Number of errors(BESS)	Double leg stance	2-5	3.80±1.06(4)	1-3	1.60 ±0.68 (2)	Z=3.957*	P<0.001
2		Single leg stance	4-8	5.90 ±1.25(6)	1-4	2.70 ±1.29 (3)	Z=3.982*	P<0.001
3		Tandem stance	4-6	5.00 ±0.79(5)	1-3	2.10 ±0.71 (2)	Z=3.979*	P<0.001
4	SBST(seconds)	Stork balance	25-42	33.45 ±4.94	45-60	53.85 ±4.76	t=26.76*	P<0.001

Note: Value within parentheses median number of errors,
*- denotes significant.



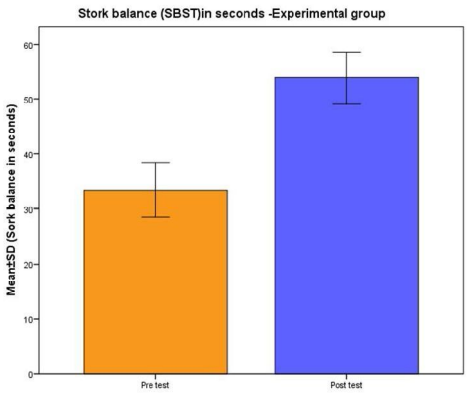
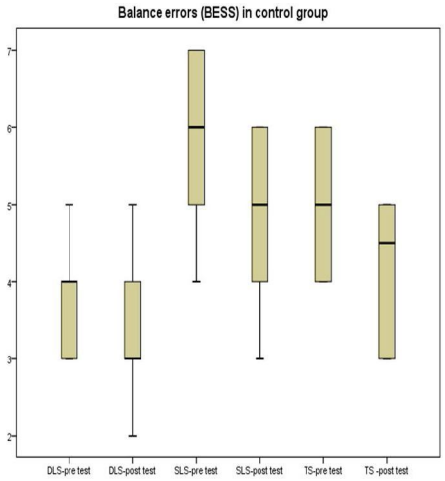


Table-2: Range, mean and SD of balance scores of basket players in control group.

SNo	Balance parameters		Pre test		Post test		Wilcoxon test/ Paired t-test	p-value
			Range	Mean ± SD	Range	Mean ± SD		
1	Number of errors(BESS)	Double leg stance	3-5	3.90±0.71(4)	2-5	3.20±0.89(3)	Z=2.734*	P<0.001
2		Single leg stance	4-7	5.80±1.00(6)	3-6	5.00±1.02(5)	Z=2.864*	P<0.001
3		Tandem stance	4-6	5.00±0.91(5)	3-5	4.20±0.89(4)	Z=2.832*	P<0.001
4	SBST(seconds)	Stork balance	25-43	33.60±5.88	36-52	43.40±4.95	t=11.20*	P<0.001

Note: Value within parentheses median number of errors.

*- denotes significant.



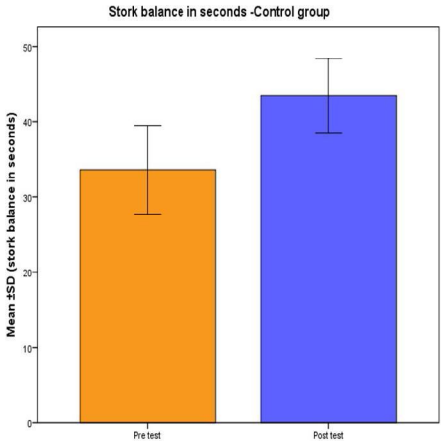
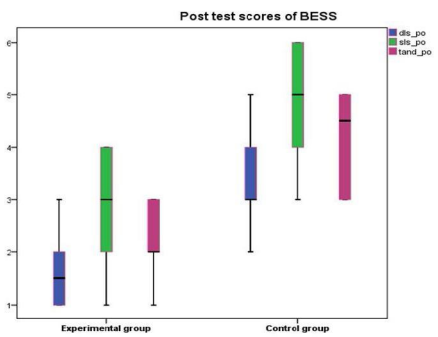
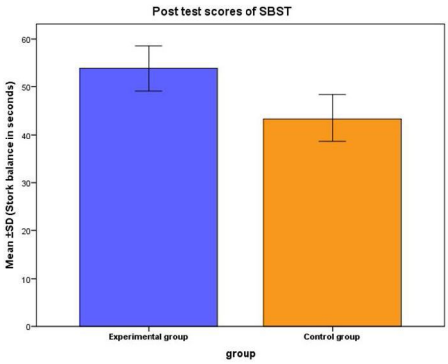


Table-2 presents the range, mean, SD of pre and post test number of errors based on Balance Error Scoring Scale(BESS) on double leg stance, single leg stance, tandem stance and Stork balance stand test(SBST) in seconds among the basket players control group. The pre and post test number of errors based on BESS in all three conditions were compared for significance through non parametric test for paired outcomes, the Wilcoxon test was carried out and it was found to be statistically significant. It evidenced there was significant decrease in number of errors among basket players in control group.Similarly, the pre and post test SBST scores in seconds compared for significance , the paired t-test was worked out and it was found to be statistically significant. It evidenced that there was significant increase on balance among basket ball players in control group.

Table-3: Range, mean and SD of post test balance scores of basket players in between groups.

SNo	Balance parameters		Experimental	Control	Mann Whitney U test/ Unpaired t-test	p-value
			Mean ± SD	Mean ± SD		
1	Number of errors(BESS)	Double leg stance	1.60 ±0.68 (2)	3.20±0.89(3)	Z=4.657*	P<0.001
2		Single leg stance	2.70 ±1.29 (3)	5.00±1.02(5)	Z=4.665*	P<0.001
3		Tandem stance	2.10 ±0.71 (2)	4.20±0.89(4)	Z=5.077*	P<0.001
4	SBST(seconds)	Stork balance	53.85 ±4.76	43.40±4.95	t=6.785*	P<0.001





The above table-3 presents the comparison of post test balance in between experimental and control groups. The post test balance scores of BESS in experimental group in all three conditions were comparably less than the post test number of errors in control group. The Mann-Whitney U test resulted to be significant. It evidenced that number of errors in balance according to BESS was significantly less than the control group.

The post test balance scores of SBST in experimental group were comparably more than the post test balance in seconds in control group. The unpaired t-test was carried out to compare the post test balance score in between experimental and control group and it was found to be statistically significant. It the balance was better improved in experimental group.

DISCUSSION

This study focused on comparing the effects of plyometric training and regular training in secondary school basket ball players. The results show that both plyometric training and regular training showed greater influence in improving balance in secondary school basket ball players as assessed by BESS and SBST. But in comparision between both groups, plyometric training group shows more significant results thann regular training group. These results shows that the regular practice of plyometric exercise has positive impact on improving balance in secondary school basket ball players.

The results of Frank A.O(2007), Mark V.pateno(2005), Hudswell.S(2004), Timothy E.Hewett(2006) were recommended to take neuromuscular training and control group for treatment program and supported the present study in which the group A athletes has got more improvement in response to neuromuscular training.

REASONS FOR IMPROVING BALANCING TASK IN RESPONSE TO NEUROMUSCULAR TRAINING

- The neuromuscular training greatly influences the strength of stretch reflex within the loop time (30-50m sec).
- The neuromuscular training strongly alters the function of muscle spindle via motor neurons for better recruitment of additional motor units.
- The plyometrics and stability training increases the stiffness of muscle spring and neuromuscular coordination in basketball players.
- This sport specific activity developed the general and specific flexibility including both static and short

dynamic in nature in related to neuromuscular coordination.

- The physiologic over flow to antagonistic muscles of the trained muscle superiorly works in neuromuscular training.

REASONS FOR IMPROVING BALANCING TASK IN RESPONSE TO REGULAR EXERCISE

- The general in program facilitates through monosynaptic pathway of firing motor neurons.
- The firing activities of motor units strengthen the trained muscle in related to loading response.

CONCLUSION: The study concluded that there was significant difference in balancing task in BESS and SBST after neuromuscular training.

Based on the results of the study concluded that neuromuscular training was effective in increasing balancing task in basketball players; BESS and SBST was the effective assessment tool.

RECOMMENDATION

- The similar study can be conducted with star excursion balance test and flamingo balance test to find out the improvement of balance in basketball players.
- The similar study can be conducted with BESS and SBST to find out the improvement of balance in football players.
- The similar study can be conducted with BESS and SBST to find out the effectiveness of eccentric exercises.
- The similar study can be conducted with the neuromuscular training and regular exercises on football players.

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