

## Effect of Standing Pilates on Balance in Basketball Players

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### Abstract

**Background:** Balance is necessary component in sport activities to reduce non-contact injuries specifically in basketball players. Balance training during competitive season reduces occurrence of injury by 38%. Hence in this study we evaluated effect of standing Pilates on balance in basketball players.

**Aim:** To study the effect of standing Pilates on balance in basketball players.

**Objectives** To find out balance using star excursion test and Activity Specific Balance Confidence Scale in basketball players.

**Method & Material:** In Pre-Post Experimental study design, 30 Basketball players between age group 18-35 years were included. By taking prior consent individuals balance and confidence was assessed using SEBT and ASBC, data was collected and analysed. Beginners Pilate's exercises were taught in 1<sup>st</sup> week and intermittent and advanced were introduced in 3<sup>rd</sup> and 4<sup>th</sup> week. Post intervention assessment was done and data was analysed.

**Result:** Mean age was 22 + 0.7 in which 13 males and 13 females were included. 4 subjects dropped out from study. Data was analysed and students paired t test was used. Mean of pre SEBT(R) and mean of post SEBT(R) 2.51+0.58 was compared with paired t test with p value (0.000) was statistically significant. Mean of pre SEBT(L) and mean of post SEBT(L) 2.25+0.86 was compared with paired t test with p value (0.000) was statistically significant. Mean of pre ASBC and mean of post ASBC 13.7 +3.52 was compared with paired t test with p value (0.000) was statistically significant.

**Conclusion:** There is significant effect of standing Pilates on balance in basketball players.

**Keywords:** Pilates, balance, basketball players, SEBT, ASBCS

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### I. Introduction

Balance is considered to be an important aspect of performance of all individuals whilst undertaking various daily activities, which is achieved by a complex process involving the function of musculoskeletal and neurological systems. Balance has the ability of maintaining the position of the centre of gravity (COG) and it vertically over the base of support and it related on rapid, continuous feedback from visual, vestibular and somatosensory. It has been seen that balance trainings have reduced the risk of some musculoskeletal system injuries like ankle sprain and after both static and dynamic balance trainings, it has been observed that training groups have lower risk of injury.<sup>(1)</sup>

Balance make athletes prevent from injuries during playing basketball e.g. fracture, musculoskeletal disorder, and falls during playing. Balance training was demonstrated to reduce muscular strength, imbalance between the legs and to effective for gaining muscular strength<sup>(2)</sup> In basketball, the standard strength takes a leading role in training; strength training allows players to improve their physical abilities and athletic performance and, therefore, their outcomes during games and to prevent injuries. Basketball players have dynamic balance performance higher than the performance of volleyball and football players.<sup>(1-5)</sup>

Basketball players address physical contact and various situations involving balance instability, such as basketball-specific accelerations and decelerations, changes in direction, penetrations into the defensive perimeter, and 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. In basketball, the standard strength takes a leading role in training; strength training allows players to improve their physical abilities and athletic performance and, therefore, their outcomes during games and to prevent injuries.<sup>(5)</sup>

The process of keeping balance in the standing position may be disrupted by effects of physical activity occurring during the game. Any possible disorders in keeping balance expressed by deteriorating the variables describing the basketball player's balance in the standing position shall be negatively manifested in the control of body positioning in game situations and in this way the activity of scoring points shall be hindered. The upright position of the human body is subject to constant balance disruptions. This is caused by, e.g., the action of the heart or breathing. The body remains in balance if the disruptions do not exceed critical values and displacements of the centre of gravity oscillate within a safe, constant range. Basketball training improves the level of balance, especially referring to standing on one lower limb and as the player spends the majority of the time on one of the limbs. The decrease in the ability to maintain balance may also result from fatigue, thus a coach should wisely use the abilities of his players since a loss of balance may lead to injuries and can also influence the final score. Significant balance disturbances may consequently hinder the performance of the particular tasks on the court by a basketball player.<sup>(15)</sup> Pilates is known, by doctors, as a unique approach to fitness that a combination of strengthening, stretching and breathing muscles to develop trunk muscles and restore muscle balance is used in it.<sup>(4)</sup>

Pilates training can significantly improve muscular strength being a promising tool to be used as complementary strength training.<sup>(12)</sup> Pilate's techniques focus on postural symmetry and controlled movement. Particular emphasis, however, was placed on specific muscle activation strategies thought to stabilize the lumbar-pelvic region.<sup>(10)</sup> Specific Pilates exercises, originally introduced by Joseph Hubertus Pilates have also been exploited for increasing the muscular mass in the body. Pilates designed an exercise protocol which was meant to enhance muscular strength, flexibility, and endurance while it also improved bodily concentration and balance. The exercises aimed at increasing strength and endurance in the innermost muscles by gradually repeating complete sets of movements which simultaneously created natural coordination among muscles and body organs.<sup>(10)</sup>

Pilates training intends to improve the general muscular strength and balance. Pilates exercises, is probably the main cause for the greatest improvements on muscular strength in this technical skills.<sup>(12)</sup> Joseph Pilates believed that mobilizing early in rehabilitation decreased the convalescence period after a musculoskeletal injury. The Pilates Method starts by strengthening the core, which is achieved by Coordinating breathing with movement, Scapular, pelvic, and rib cage stabilization during abdominal movements, Head and cervical spine placement to avoid neck strain. Pilates starts a client exercising with a wide base of support in prone, side-lying, and supine positions. The client is progressed as they develop strength and correct technique. This is done by decreasing the base of support to retrain proprioceptive mechanisms and at the same time developing more efficient movement patterns. This system is similar to the dynamic stabilization exercises, used by therapists to treat and prevent musculoskeletal injuries.<sup>(9)</sup>

It is presumed that balance training has the most profound effect on the somatosensory and proprioceptive control systems however its relation and effect on agility has not been studied in athletic population. Found that 4 weeks of balance training improved performance of sports related activities in recreationally active individuals.<sup>(16)</sup> Pilates is therefore effective in improving balance in basketball players.

## **II. Need Of Study**

Poor balance has been associated with increased injury risk among athletes. Basketball is a contact sport which requires high physical activity and as the player spends majority of time on one of the limbs this causes fatigue, and due to sudden running and stopping activities they go off balance which increases chances of injury. Hence basketball is a sport which requires dynamic balance. The ability to maintain balance is an individual feature which depends on our body structure and training, since basketball players are statistically tall and lean, it can be presumed that this ability may not be favourable for balance in basketball players. Pilates is the form of exercise that concentrates on the core muscle and help in improving the balance of individual. Therefore this study was conducted to find the effect of standing Pilates moves on balance in basketball players.

### **Aims And Objective**

#### **Aim:**

To study the effect of Standing Pilates on balance in Basketball players

#### **Objective:**

To assess balance using star excursion test in Basketball players prior to standing Pilates training.

To assess balance using Activity Specific Balance Confidence Scale Basketball Players prior to standing Pilates training. To compare pre and post values of Star excursion test and Activity Specific Balance Confidence Scale after standing Pilates in basketball players.

### **Hypothesis And Null Hypothesis**

#### **Null hypothesis**

Standing Pilates might not show effect on balance in Basketball players

#### **Alternative hypothesis**

There will be effect of Standing Pilates on balance in Basketball players

### **Method & Material**

- **Study design :** Experimental
- **Sample population :** Basketball players
- **Sample Size :** 30
- **Sampling Method :** Random

### **Inclusion criteria**

- 18-35 years
- State level players
- Playing since at least more than 2 years

### **Exclusion criteria**

- Recent knee injuries
- Acute back pain

### **Materials Used**

- Star Excursion Test
- Activity Specific Balance Confidence Scale (ICC – 0.7 to 0.92) 1995 Powell & Meyers

### **Procedure**

Prior consent of the individual was taken

Players were explained about the procedure and the need of study.

Prior assessment of individuals balance was assessed by using the star excursion test (4 directions, anterior, posterior, medial, and lateral). And for assessing patient's confidence Activity-specific Balance Confidence Scale was used.

Pilates training included standing Pilates moves for 4 weeks following the protocol

Pilates exercises were taught in 1<sup>st</sup> week and intermittent and advanced were introduced in 3<sup>rd</sup> and 4<sup>th</sup> week.

After the training was completed reassessment was done of the following players of balance and confidence to watch the effect of standing Pilates on balance and improvement in performance and skill of the players, and also a watch was kept on the risk of injury.

### **III. Result**

Mean age was 22 + 0.7 in which 13 males and 13 females were included. 4 subjects dropped out from study. Data was analysed and students paired t test was used.

Mean of pre SEBT(R) and mean of post SEBT(R) 2.51+0.58 was compared with paired t test with p value (0.000) was statistically significant. Mean of pre SEBT (L) and mean of post SEBT (L) 2.25+0.86 was compared with paired t test with p value (0.000) was statistically significant.

Mean of pre ASBC and mean of post ASBC 13.7 +3.52 was compared with paired t test with p value (0.000) was statistically significant

Mean of pre SEBT(R) and mean of post SEBT(R) for male players was 3.15+0.00 was compared with paired t test with p value (0.000) was statistically significant. Mean of pre SEBT(R) and mean of post SEBT(R) for female players was 2.47+0.36 was compared with paired t test with p value (0.000) was statistically significant. Mean of pre SEBT (L) and mean of post SEBT (L) for male players was 2.10+0.48 was compared with paired t test with p value (0.000) was statistically significant. Mean of pre SEBT (L) and mean of post SEBT (L) for females 2.42+0.05 was compared with paired t test with p value (0.000) was statistically significant.

**Data Analysis:** Statistical analysis for this study was done by using the students paired t-test. A paired t-test was used as the statistical tool to compare the results between the pre-post value of SEBT and ASBCS. The probability value for this study was P (0.00) which was considered as statistically significant. All scoring was performed by the same 30 subject.

### **IV. Discussion**

The results for this study showed statistically significant effect of standing Pilates on balance and increased confidence and abilities of young basketball players to perform on basketball court. The ability to maintain balance is an individual feature which depends on our body structure and training, Since basketball players are statistically tall and lean, it can be presumed that this ability may not be favourable for balance in basketball players leading to alteration in balance.<sup>(15)</sup> Since basketball involves abrupt and intense changes in direction, high frequencies of starting, stopping, and physical contact, hence it may be associated with the ability to maintain balance while moving, Shooting, dribbling, etc.<sup>(13)</sup> It is hypothesized that basketball players who remain uninjured over the course of a sport season would demonstrate significantly greater core strength measures than those who reported an injury. Core stability has an important role in injury prevention. Pilates can help to improve your core

muscle contraction.<sup>[14]</sup> Pilates uses a systematic practice of specific exercises designed to stretch, strengthen and balance the body. Pilates involves proper breathing techniques in conjunction with sport training, rehabilitation. Also it teaches your body to favour one leg or overdevelop certain muscle groups through the evenness of exercises eliminating fatigue and reducing risk of lower extremity injury in-turn improving confidence and improvement of performance during sports season<sup>(17)</sup>

Moria Merrithew, founder of the STOTT PILATES, has incorporated pilates and sports medicine to improve athletic performance inspired from the original exercises by Joseph Pilates.<sup>(17)</sup> Standing pilates improves balance and confidence may lead to task-specific neural adaptations at the spinal and supraspinal levels by suppressing spinal reflex excitability such as the muscle stretch reflex during postural tasks which leads to less destabilizing movements and improved balance.<sup>(14)</sup> The presence of significant improvement in agility may also be attributed to neurological adaptation to activity and proprioceptive action of the trained joints and soft tissues. Another factor that might have played role in improvement could be motor recruitment. According to the improvements due to plyometrics were a result of enhanced motor unit recruitment pattern. According to Craig neural adaptations usually occur when athletes respond or react as a result of improved coordination between the CNS signal and proprioceptive feedback. However, it could not be determined whether synchronous firing of the motor neurons or better facilitation of neural impulses to spinal cord resulted in neural adaptations. Therefore, more studies are needed to determine neural adaptations as a result of dynamic balance training and how it affects agility.<sup>(16)</sup> Therefore the purpose of this study was to examine the effect of standing Pilates on balance in basketball players.

## V. Conclusion

Pilates showed significant improvement on balance in Basketball Players

### Future Scope Of Study

- Larger sample size.
- Different Geographical Areas.
- Longer duration.
- Advance equipment for analysis of balance like Force plate Analysis or EMG analysis.

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