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A relationship study between trunk muscle endurance with static and dynamic balance in female collegiate students

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Abstract
Fatigue of trunk muscle contributes to spinal instability over strenuous and prolonged physical tasks and therefore may lead to injury. The purpose of the study was to assess the relationship between trunk muscle endurance with static and dynamic balance in female college students. Thirty-three Female college students studying under West Bengal State University (age 21±2, height 155.05±2.6 weight 47.4±5.3) took part in the study. In first phase, static balance was measured using a quantifiable clinical test called the single-leg stance test. Star excursion balance test (SEBT) is one of the reliable and feasible methods and was used to assess dynamic balance as it challenges a person's ability to maintain a stable base of support simultaneously performing reach movement. Trunk muscle endurance was assessed using Sorensen test of trunk extensor endurance test, trunk flexor endurance test and side bridge endurance test. A Pearson's product moment correlation was applied to test if the trunk muscle endurance measures significantly correlate the static and dynamic balance at 0.05 level of significance. Based on the findings of the study, the result clearly indicates significant relationship of trunk muscle endurance with static and dynamic balance in female college students

Keywords: Trunk muscle endurance, static balance, dynamic balance

Introduction
Core strength exercises strengthen your core muscles, including your abdominal muscles, back muscles and the muscles around the pelvis. Strong core muscles make it easier to do many physical activities. Core exercises train the muscles in your pelvis, lower back, hips and abdomen to work in harmony. This leads to better balance and stability, whether on the playing field or in daily activities. Balance ability has a significant effect on athletic performance. In fact, most sports and other physical activities depend on stable core muscles. Poor endurance of trunk muscle may induce strain on passive structure of lumbar spine and hence result in low back pain. Sufficient endurance of core muscles has an essential role in balance, coordination and sports specific tasks. Impairments in trunk muscle attributes, such as decreased trunk strength or endurance, are a likely pathway by which these pathophysiologic changes influence balance and mobility status.

Statement of the Problem
Assessment of Relationship between Trunk Muscle Endurance with Static and Dynamic Balance in Female College Students.

Methodology
Thirty-three Female college students studying under West Bengal State University (age 21±2, height 155.05±2.6 weight 47.4±5.3) took part in the study. In first phase, static balance was measured using a quantifiable clinical test called the single-leg stance test. Star excursion balance test (SEBT) is one of the reliable and feasible methods and was used to assess dynamic balance as it challenges a person's ability to maintain a stable base of support simultaneously performing reach movement. Trunk muscle endurance was assessed using Sorensen test of trunk extensor endurance test, trunk flexor endurance test and side bridge endurance test.

Statistical Analysis

A Pearson's product moment correlation statistics was applied to test if the trunk muscle endurance measures significantly correlate the static and dynamic balance**.** All the Statistical analysis was performed using the statistical software SPSS 20.0.0. (SPSS Inc. Chicago, IL, U.S.A.). The level of significance was set at 0.05 level.

1 3 2

Fig 1: Single leg stance test, **2:** Excursion balance test **3:** Star Anterior reach direction of SEBT for Right stance leg

4 5 6

Fig 4: Trunk extensor endurance test **5:** Trunk flexor endurance test **6:** Side Bridge endurance Test

Results

Analysis of Co-Efficient Of Correlation of Trunk Muscle Endurance with Static and Dynamic Balance In Female College Students

Table 1

Trunk muscle Endurance parameter	Static Balance	Dynamic Balance(Right)	Dynamic Balance(Left)
Trunk Extensor Endurance Test	0.375*	0.376*	0.395*
Trunk Flexor Endurance Test	0.378*	0.384*	0.362*
Side Bridge Endurance Test(Right)	0.442*	0.441*	0.413*
Side Bridge Endurance Test(Left)	0.395*	0.354*	0.360*

*Significant at 0.05 level.

'r' value required to be significant at 0.05 level with 31 degree of freedom was 0.349.

Discussion of Findings

Sports participation or sports training has an effect on balance ability which has been demonstrated earlier. Long term athletic training augments neurosensory pathways and stimulates cutaneous nerve receptors or mechanoreceptors in the muscles, ligaments and joint capsule of knee and ankle joint as demonstrated by improved balance and proprioception (Aydin *et al*., 2002) [1]. Therefore, the established effects of long term athletic training on balance and proprioception could be one of the rationales for the balance performance of female college students. Qualitative changes in posture and movement can occur dramatically and spontaneously as a result of gradual changes in parameters of strength, endurance, range of motion, movement velocity, and recruitment strategies.

On the other hand, the trunk area contains pelvic girdles, therefore stabilizing muscles should be activated dynamically in the beginning of movement to provide a strong foundation from which force is produced and motion starts. College students are also found to have better strength, range of motion, proprioception, neuromuscular control as well as sensory motor function for better balance ability as well as athletic performance. Sufficient endurance of core muscles has an essential role in balance, coordination and sports specific tasks of the male college students.

Conclusions

Based on the findings of the study, the result clearly indicates

significant relationship of trunk muscle endurance with static and dynamic balance in college students. The challenge in addressing trunk endurance is to apply our knowledge and skills to design exercise programs that still incorporate principles of kinesiology, biomechanics, neuroscience, physiology, motor learning, and psychology–but within the context of the environment, personal goals, and societal demands to improve endurance and subsequently balance to achieve optimal performance of athletes.

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