

The Interplay of Movement and Health: An Examination of Association between Rotary Stability, Physical Activity and Body Mass Index in young adults

Unpacking the Links: Rotary Stability, Physical Activity, and Body Mass Index in young adults

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Abstract: Background: Good movement quality is the ability to perform fundamental movements in a properly balanced and well coordinated manner. One of the most reliable methods of preventing injuries is to identify the compensatory movement patterns and correct them for this reason the movement screening test is used, to assess physical deficiencies in active young adults. Aim: To explore the prevalence of rotary instability among young adults. Study design: Cross sectional study. Methods: One hundred and ten participants screened in the study. Rotary stability tests were performed by the participants and it was scored, while the physical activity and flexibility were assessed using International Physical Activity Questionnaire and Sit and Reach Test. Results: Out of 105 participants 39% Participants have score 1, 46% Participants have score 2, 15% Participants have score 3. Out of 32 males 90% of males have rotary instability. Out of 78 females 80% of females have rotary instability. Conclusion: There is a high prevalence of rotary stability dysfunction and asymmetries scores in young adults.

Keywords: Dynamic trunk stability, Functional movement Screen, Movement dysfunction, Rotary stability test, Young adults.

I. INTRODUCTION

Movement is essential to human life which is a vital part of overall health and wellbeing. Good movement quality is the performance of fundamental movements in a balanced and well-coordinated manner. Poor movement quality is the inability to complete fundamental movements [1].

One of the most reliable methods of preventing injuries is to identify the compensatory movement patterns and correct them. For this reason, the movement screening tests are done to assess physical deficiencies in active young adults. Functional movement screening test is a screening tool to identify movement weaknesses and incorrect functional patterns [2].

Functional movements are the ability to produce and maintain balance between mobility and stability along the kinetic chain. Functional movements are a complex interplay of cognitive, perceptual, proprioceptive and motor functions that

includes muscular strength and endurance, flexibility, coordination and balance[3]. The FMS has been utilised by physical therapists, movement professionals to screen an individual's functional and fundamental movement pattern to produce a quantifiable measure of their movement quality (0, 1,2,3). In FMS, seven movement patterns are included, they are deep squat, the hurdle step, the online lunges, shoulder mobility, active straight leg raise, the trunk stability push up and rotary stability. Recent studies found that the inter-rater reliability was highest for the rotary stability test (ICC 0.96) [4].

The rotary stability test is a complex movement requiring proper neuromuscular coordination and energy transfer from one segment of the body to another through the torso. The rotary stability test assesses multi-planar trunk stability during a combined upper and lower extremity. It requires asymmetric trunk stability in both the sagittal and transverse plane during asymmetric upper and lower extremity movement. If the trunk does not have adequate stability kinetic energy will be dispersed (lost), leading to poor movement quality & increased potential for injury. Poor performance during this test movement is attributed to poor stability of the trunk (core) stabilisers [5].

Methodology

Study design: The study was a cross - sectional study. Participants were male and female college students (18-25 years). **Participants:** A Prevalence study performed assessing the dynamic trunk instability (Rotary stability dysfunction) among younger adults. Screened for 110 college going students 78 girls and 32 boys was done for the study from Physiotherapy college, Coimbatore. **Inclusion criteria:** In Inclusion criteria both male and female age groups of 18-25 years college students who are willing to participate were included. **Exclusion criteria:** In Exclusion criteria participants with Low back pain, recent injuries, who have undergone surgery and participants who are not willing to participate were excluded.

II. PROTOCOL

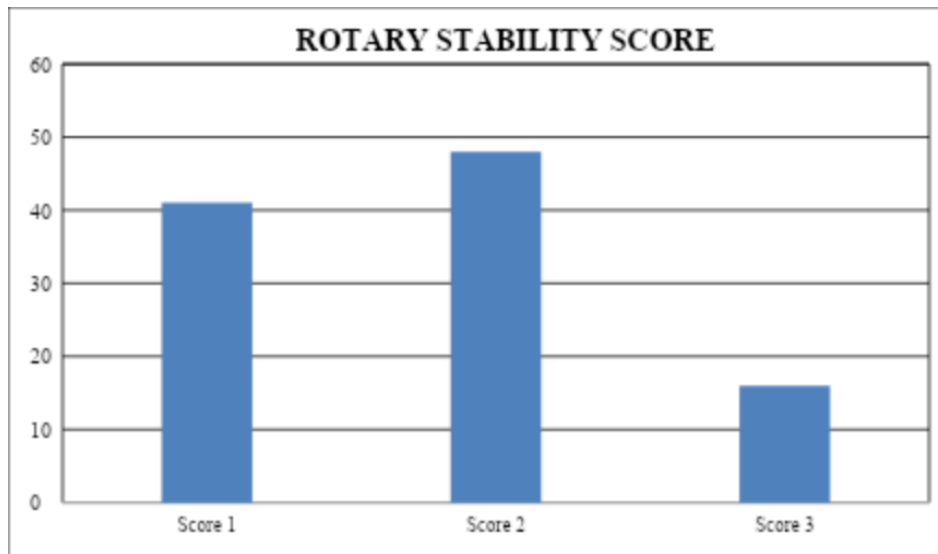
Protocol: This study was conducted at KG College of Physiotherapy. This research was carried out fully in consonance with ethical standards of the Helsinki statement. Informed consent of the participants was sought before study participation. **Assessment and Outcome Measure:** The study participants underwent demographic assessment, rotary stability test, flexibility test, and they filled out IPAQ. Demographic information was collected from the participants including age, gender, height, weight and BMI. Rotary stability test is a complex movement requiring proper neuromuscular coordination in energy transfer from one segment of the body to another segment through the torso. The rotary stability test assesses multi-planar trunk stability during combined upper and lower extremity motion. If the participant performs the correct unilateral pattern of movement it is scored as '3'. If the participant performs the diagonal pattern, it is scored as '2'. If the participant is unable to perform the diagonal pattern, it is scored as '1'. Clearing exam is performed at the end of RST. The movement is not scored, it is an observed pain response. Spinal flexion clearing test is performed, the participant assumes a quadruped position and rocks backward touching the buttocks to heels and chest to thighs reaching the arms out as far as possible. Score '0' is given if there is pain associated with this movement. Flexibility was assessed by using Sit and Reach Test. Yardstick is placed on the floor and tape is placed across it at right angles to the 15 inches mark. The participants sit with the yardstick between legs with legs extended at right angles to a taped line on the floor. Heels of the feet should touch the edge of the taped line above 10-12 inches apart. The participants slowly reached with extended arms placing one hand on the top of the other with palms facing down as far as possible. The score is the most distant point reached with finger tips. The best of three trials are recorded.

International Physical Activity Questionnaire short form was self- administered to participants to assess their physical activity levels. It is a 10 item questionnaire that can be self- administered. Participants indicate the duration and frequency of engaging in vigorous, moderate, walking and sitting activities over the last 7 days. The physical activity levels of participants were classified as being low, moderate, vigorous following stipulated guidelines.

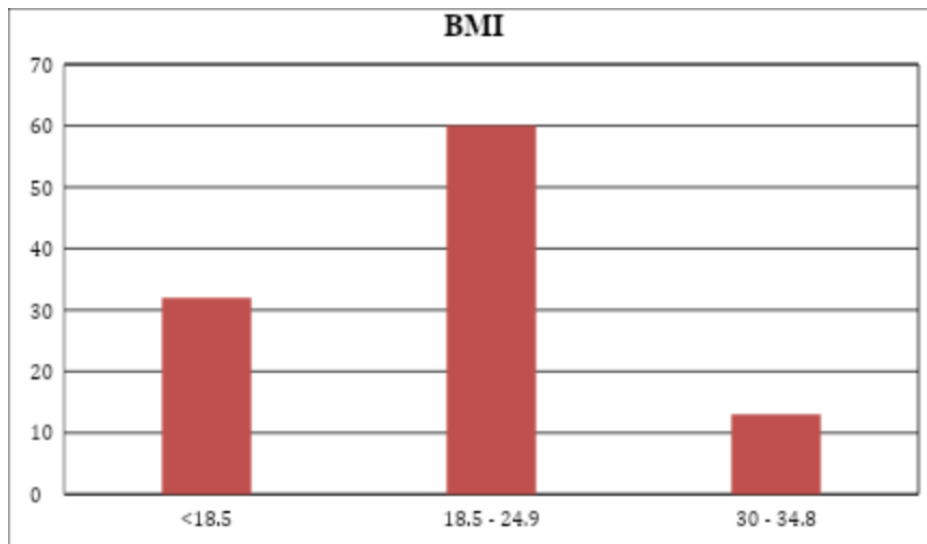
RESULTS

Out of 110 participants there are 78 females and 32 boys. In that 5 participants were excluded ,because they did not fulfill the inclusion criteria.

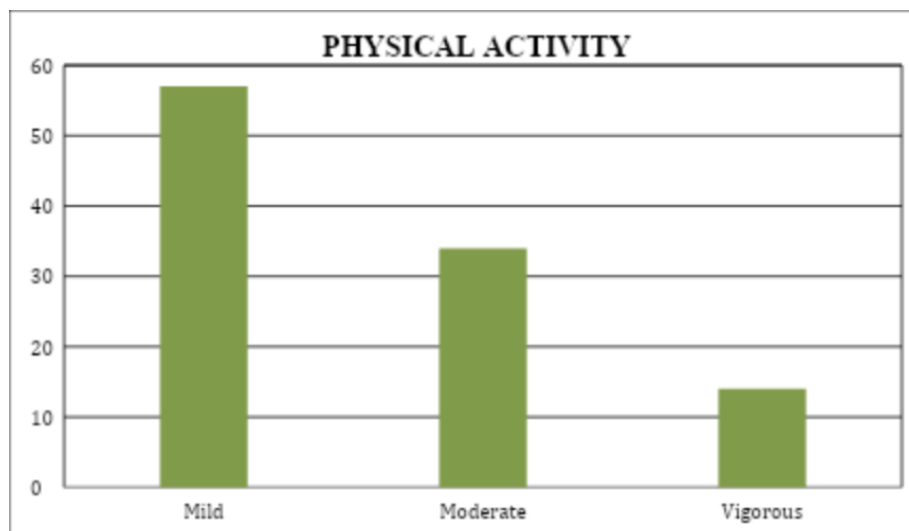
GRAPH 1: Out of 105 participants 39% participants have score 1,46% participants have score 2 and 15% participants have score 3. Out of 32 males 90% males have dysfunction in rotary stability. Out of 78 females 80% have dysfunction.



GRAPH 2: Out of 105 participants 30% participants are in underweight category, 57% participants are in normal weight category and 12% participants are in over weight category.

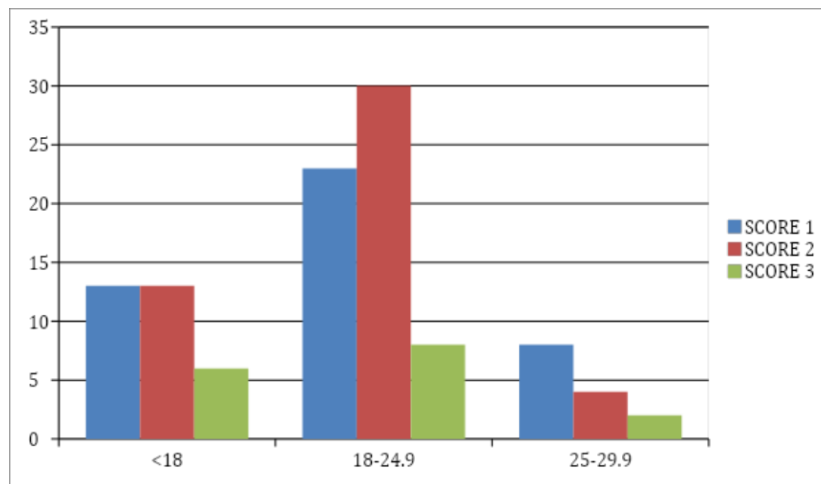


GRAPH 3: Out of 105 participants 54% participants do mild physical activity, 32% participants do moderate physical activity and 13% participants do vigorous physical activity.



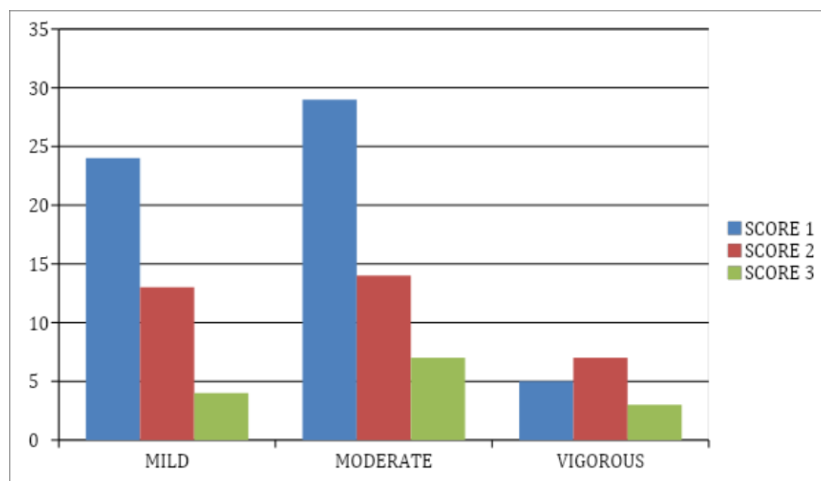
GRAPH 4: This graph shows young adults with underweight and overweight categories find it difficult to maintain a unilateral pattern of dynamic trunk stability compared to normal weight category participants.

BMI & RST SCORE



GRAPH 5 : This graph shows participants with good physical activity were able to maintain a unilateral pattern of dynamic trunk stability compared to physically inactive people.

PHYSICAL ACTIVITY & RST SCORE



Discussion The purpose of this study was to find out the quality of movement and dynamic trunk stability among young adults. Our findings indicated a high prevalence of dysfunctional, asymmetrical dynamic trunk instability in young adults with reduced physical activity and overweight and obese adults.

Rotary instability becomes most pronounced when the physical activity declines during the transition from youth to adulthood. This decline in PA levels is a cause for concern and requires attention[6].

Suboptimal movement quality characterised by compensatory movement along the kinetic chain, observed asymmetry and loss of range of motion, balance, posture and motor control of the specific movement. The source of dysfunctional movement might be a lack of physical activity and /or repetitive use of compensatory movement patterns. The development and repeated practice of dysfunctional movement patterns can lead to negative health consequences, injuries, postural abnormalities, movement pathologies, and orthopaedic abnormalities later in life. Individual functional constraints include the individual's body structure (e.g., body size, body composition, somatotype). Several reviews have indicated that overweight and obesity in adults is associated with deficits in function and performance of motor tasks musculoskeletal pain, injury, decrements in muscle strength, gait, and balance. Excess body weight imposes functional limitations and overweight and obesity alters functional movements in children[3].

The rotary stability test evaluates an individual's ability to coordinate stability and mobility across multiple planes by assessing pelvic, core, and shoulder girdle function during combined upper and lower extremity movements. A score of 2 indicates optimal performance, characterized by smooth and controlled movement with maintained spinal alignment. 1-point scorers exhibit instability, manifesting as increased shaking in the raised arm (dominant side) and less stable support on the non-dominant side [7].

III. CONCLUSION

There is a high prevalence of rotary stability dysfunction and asymmetries scores in young adults, The lower Rotary stability test scores along with their association with the Body Mass Index and Physical Activity emphasise the need for interventions that encourage physical activity to promote overall health and facilitate a timely return to normal life. Early identification of dysfunctional movements in young adults is essential to the training and sustaining of functional movements.

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