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CO-RELATION BETWEEN FUNCTIONAL MOVEMENT QUALITY AND BODY MASS INDEX USING FUNCTIONAL MOVEMENT SCREEN IN YOUNG ADULTS

Medical Science

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ABSTRACT

This study was undertaken to find out the co-relation between functional movement quality and body mass index using functional movement screen in young adults. This was a co-relation study which included 30 samples between the age group 18-35 years according to their BMI category i.e., Underweight, Normal Weight, Overweight, Obese. Functional movement quality was assess using functional movement screen which concluded that Normal BMI and Obese category are Positively co-related whereas Overweight and Underweight category are Negatively co-related. PASE questionnaire was used to measure the physical activity which concluded low physical activity in Obese and Overweight category.

KEYWORDS

Functional Movement Screen, BMI, Young Adults, Functional Movement Quality, PASE questionnaire

INTRODUCTION

Humans have capacity to produce a nearly infinitive variety of postures and movements that require the structures of the human body to both generate and respond to forces that produce and control movement at the body's joints. [1] Body functions are defined as the physiological functions of the body systems and body structures includes organs, limbs and their components. Evidence from studies of mobility that explore body functions and structures associated with functional mobility include topics related to gait, posture, bones and joints, neurocognitive function, and pain. [2] Body structure and function interacts with personal and environmental factors, affecting the ability to perform activities and participate in society. Interventions aimed at the whole population must attend to the underlying causes of musculoskeletal disorders and promote a healthy lifestyle. [3] Hence weight gain or weight loss could be considered as one of the factors which can affect the ability to perform activities.

A healthy lifestyle can increase the longevity of a person. Managing your weight is the key to achieving all the health benefits of a healthy lifestyle.[4] Obesity, overweight and underweight are different forms of unhealthy weight and each individual should endeavor to know his or her formal weight status and also know how to maintain a healthy weight.[5] The BMI is one of the popular methods used in determining obesity. BMI is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults[6]. The BMI is calculated in the metric system as weight in kilogram divided by height in meter squared. Underweight ≤ 18.5, Normal 18.5 to 24.9 Overweight 25 to 29.9, Obese ≥ 30.

Functional movement is the ability to produce and maintain a balance between mobility and stability along the kinetic chain while performing fundamental patterns with accuracy and efficiency. [7]] Functional mobility is defined as the manner in which people are able to move around in the environment in order to participate in the activities of daily living and, move from place to place. However, it is known that improvements in functional mobility does have a positive effect on Health-Related Quality of Life.[2]

The Functional Movement Screen (FMS) is a tool that quantifies movement patterns as a way to detect performance asymmetries, and, according to the developers of the FMS, is a "ranking and grading system that documents movement patterns that are critical to normal function. [8] The FMS is designed to identify right- and left-side imbalances, as well as the inability to use mobility and stability through observing movement patterns. These imbalances and inabilities can cause the utilization of compensatory movement patterns in the kinetic chain to achieve movement goals.[9] The FMS is thought to measure the prevalence of potentially compensatory movement patterns that are believed to be inefficient. It is therefore feasible that the FMS could be predictive of a reduced level of performance.[10] The 7 tests in FMS challenge an individual's ability to perform basic movement patterns that reflect combinations of muscle strength, flexibility, range of motion, coordination, balance and proprioception. [11] The 7-task test is used to grade whole-body movement quality on a 4-point ranking system; scores of 0–3 is assigned for each test based on published criteria and a cumulative grade is given out of 21. The 7 screening tasks are as follows – Deep Squat, Hurdle Step, In-line Lunge, Shoulder Mobility, Active Straight Leg Raise, Trunk Stability, and Rotatory Stability. "Clearing" tests are also included with the SHDR, PU, and ROT to expose other potential sources of pain that may be overlooked during the primary task performance.[12]

METHODOLOGY

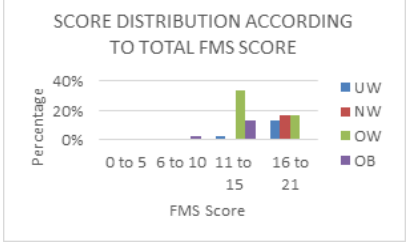
The Study was approved by institutional ethical community of Tilak Maharashtra Vidyapeeth, Department of Physiotherapy. The subjects were selected according to the inclusion and exclusion criteria. The subjects were explained about the Functional Movement Screen and the Tests to be performed. The aim and method of the study was explained to them and their informed consent was taken on the consent form. Body Mass Index was calculated in all the 30 participants between the age group of 18-35 years using Height (cm) and Weight (kg). Participants were asked to performed Functional Movement Screen and answer the PASE Questionnaire. Subjects were assessed using Functional Movement Screen and PASE Questionnaire. Participants were asked to perform FMS test as explained by the examiner. The FMS consists of 7 fundamental movement component tests that are scored on a scale of 0 to 3, with the sum creating a composite score ranging from 0 to 21 points.

RESULT

Table No. 1: Score Distribution according to Total FMS Score.

	UW	NW	OW	OB
0-5	0	0	0	0
6-10	0	0	0	1
11-15	1	0	10	4
16-21	4	5	5	0

Graph No. 1: Score Distribution of Total FMS Score.

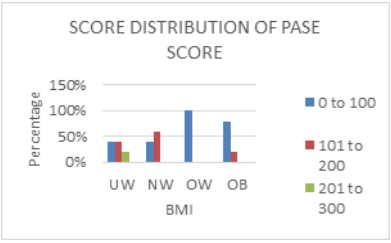


Interpretation: Graph 1 shows In UW 20% participants scored between11-15, 80% participants scored between 16-21 of Total FMS Score, In NW 100% participants scored between16-21 of Total FMS Score, In OW 67% participants scored between 11-15, 33% participants scored between 16-21of Total FMS score, In OB 20% participants scored between 6-10, 80% participants scored between 11-15 of Total FMS score.

Table No. 2: Score Distribution according to PASE Questionnaire Score.

	UW	NW	OW	OB
0-100	2	2	15	4
101-200	2	3	0	1
201-300	1	0	0	0
301-400	0	0	0	0

Graph No. 2: Score Distribution of PASE Score.



Interpretation: Graph 2 shows In UW 40% participants scored between 0to100, 40% participants scored between 101to200, 20% participants scored between 201to300, In NW 40% participants scored between 0to100, 60% participants scored between 101to200 MWC, In OW 100% participants scored between 0to100, In OB 80% participants scored between 0to100, 20% participants scored between 101to200.

Table No. 3: Co-Relation between BMI and Total FMS Score.

	BMI Category and Total FMS Score			
	NW	OW	OB	UW
CORRELATION COEFFICIENT (r)	0.8894	-0.2899	-0.9084	0.7421

*UW-Underweight, NW- Normal weight, OW- Overweight, OB-Obese.

Interpretation: The Co-relation coefficient (r) is 0.8894 for Normal BMI category which shows a positive co-relation between BMI and Total FMS Score, The Co-relation coefficient (r) is -0.2899 for Overweight BMI category which shows a negative co-relation between BMI and Total FMS Score, The Co-relation coefficient (r) is -0.9084 for Obese BMI category which shows a positive co-relation between BMI and Total FMS Score, The Co-relation coefficient (r) is 0.7421 for Underweight BMI category which shows a negative co-relation between BMI and Total FMS Score.

DISCUSSION

The Functional Movement Screen (FMS) is a relatively new tool that attempts to address multiple movement factors, with the goal of predicting general risk of musculoskeletal conditions and injuries. [13] The FMS could be predictive of a reduced level of performance. [10] BMI is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults [14].

The present study was conducted to find out the co-relation between the Functional Movement Quality and Body Mass Index (BMI) using the Functional Movement Screen in young adults. 45 participants were selected out of which 15 were not falling under the inclusion criteria, so the remaining 30 participants out of which 17 Females and 13 Males between the age group of 18-35 years have participated in the study. According to the BMI distribution these 4 categories were made for every test and co-relation was found out in these categories. All the participants were asked to perform 7 tests in Functional Movement Screen and answer the PASE Questionnaire.

A similar study was conducted in 2013 to find out the association between functional movement and overweight and obesity in British primary school children, highlighting that overweight and obesity are significantly associated with poorer functional movement in British school children compare to normal weight children. Presenting individuals FMS Scores alongside the total composite score also identified that normal weight children outperform their overweight peers and overweight peers outperforms their obese peers in functional movements requiring hamstring flexibility, shoulder mobility and balance. [11]

Present study adds by providing data examining the co-relation between weight status and Functional Movement Screen Scores in young adults. Results of this study suggests that functional movement is related to weight status with function movement quality being poorer in young adults. As obese individuals across all 7 tests underperformed than individuals with normal BMI.

This study shows a positive co-relation between the Body Mass Index and Total FMS Score in individual with normal BMI as well as in obese individuals.

The result in this study shows that in the Total FMS Score Obese individuals scored lower than the overweight and normal individuals. The PASE Questionnaire scoring supports the same and suggests of lower physical activity in overweight and obese individuals.

In all the 7 FMS components there were no significant difference in participants from underweight and normal BMI category however normal BMI category individuals outperformed that the underweight individuals. However, the scoring changes for overweight and obese individuals in all the 7 FMS test overweight individuals performed better that the obese individuals.

Out of these 7 test some test require strength (deep squat, hurdle step, inline lunge, trunk stability, push up, and rotary stability), some test in FMS requires balance (deep squat, hurdle step, inline lunge, and rotary stability tests) and some require flexibility (deep squat, shoulder mobility, and active straight leg raise). Hence it can be stated that obese and overweight individuals may have poor functional movement quality as strength, balance and flexibility can be affected due to high BMI.

The total FMS score in these BMI categories is scored highest is normal BMI category followed by underweight category whereas overweight and obese individuals scored lowest.

PASE questionnaire scorings supports the total FMS score as the highest PASE score is scored by maximum participants from normal BMI category and the overweight and obese individuals scored lower than the other BMI categories

Another study conducted in 2016 states Strength is tested in five FMS™ items: deep squat, hurdle step, inline lunge, trunk stability push up, and rotary stability. The decline in strength is more rapid than the simultaneous loss of muscle mass. [14] Thus unhealthy weight and reduced physical activity can hamper functional mobility.

A study conducted in 2020 states. There was a significant positive weak correlation between hamstring flexibility and physical activity level among Malaysian. Subjects in the “high” physical activity category obtained significantly higher scores of hamstring flexibility compared to “low” physical activity subjects in both countries. [15]. Hence it may state that low physical activity in all the categories of BMI must be the contributing factor in poor functional movement quality as well as the earlier study states higher BMI and low physical activity must the result of poor performance especially in overweight and obese population.

The Co-relation coefficient (r) for Normal BMI category which shows a positive co-relation between BMI and Total FMS Score, The Co-relation coefficient (r) for Overweight BMI category which shows a negative co-relation between BMI and Total FMS Score, The Co-relation coefficient (r) for Obese BMI category which shows a positive co-relation between BMI and Total FMS Score, The Co-relation coefficient (r) for Underweight BMI category which shows a negative co-relation between BMI and Total FMS Score. This shows that Normal BMI and Obese category has significant r value and the score is positively co-related, overweight category and Underweight category has non-significant r value and the score is negatively co-related.

In a study conducted in 2013 they stated that Total functional movement score was significantly, negatively correlated with BMI (P=.0001). Functional movement scores were also significantly higher for normal weight children compared to obese children (P=.0001). Normal weight children performed significantly better on all individual tests within the functional movement screen compared to their obese peers (P <0.05) and significantly better than overweight children for the deep squat (P=.0001) and shoulder mobility tests (P=.04). Overweight children scored significantly better than obese in the hurdle step (P=.0001), in line lunge (P=.05), shoulder mobility (P=.04) and active straight leg raise (P=.016). [11]

The present study states that BMI and Functional Movement Score are negatively co-related in Overweight and Obese category but positively co-related in Normal and Obese category. The PASE Questionnaire Score suggests of lower physical activity in overweight and obese category which may be a reason of reduced Total FMS Score in the same.

CONCLUSION

This study, based on the total FMS score and BMI category shows that Normal BMI and Obese category has significant r value and the score is positively co-related, overweight category and Underweight category has non-significant r value and the score is negatively co-related. PASE questionnaire score shows low physical activity in obese and overweight category

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