



The relationship between sit-to-stand task and fat tissue & lean body mass

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1. Introduction

Overweight [Body Mass Index (BMI) $\geq 25 \text{ kg/cm}^2$], currently one of the important health issues, can be defined through fat tissue mass (FTM) and lean body mass (LBM) [1]. The increase in body weight considerably reduces trunk and lower extremity strengths, body power, and ability to control postural stability [2]. These functional disturbances may result in significant impairment in individuals' functional ability such as sit-to-stand (STS). STS is one of the most common functional tasks in daily activities that is performed at least 60 times by healthy individuals in a daily routine [3]. Presenting the relationship between STS and FTM & LBM may provide insight into the impact of fat tissues on STS ability of individuals with overweight.

2. Research Question

To what extent do FTM and LBM are associated with movement strategies of STS task in individuals with overweight?

3. Methods

Participants who had no musculoskeletal disorder were recruited from the Department of Physiotherapy and Rehabilitation, Marmara University cohort with ongoing follow-up. Fifty-one individuals with overweight with no diagnosis of any health condition included in the study. The Balance Master System (NeuroCom version 8.1, International, Inc., USA) was used to evaluate the STS movement. STS task was analyzed by means of weight transfer time (second), rising index (force exerted by legs-% BW), sway velocity (degrees), and weight-bearing symmetry (%). The FTM and LBM were regressed against each STS parameter including age as a covariate.

4. Results

Overall, the regression models could explain 1-10% of the

variabilities in STS parameters: weight transfer time (3%), rising index (10%), sway velocity (6%), weight-bearing symmetry (1%). FTM was significantly associated with rising index ($B: -0.22, p = 0.02$), sway velocity ($B: 0.30, p = 0.02$), but not with weight transfer time ($B: -0.01, p = 0.39$) and weight bearing symmetry ($B: 0.16, p = 0.21$). LBM was only significantly related to rising index ($B: 0.27, p = 0.01$); yet, not with weight transfer time ($B: -0.01, p = 0.81$), sway velocity ($B: 0.10, p = 0.73$), weight bearing symmetry ($B: 0.16, p = 0.23$).

5. Discussion

This study revealed that FTM and LBM can explain the significant percent of the variation in the rising index during the STS task, meaning a decrease in FTM and an increase in LBM provided support to rise up during the STS task. This may be associated with the greater ability to gain momentum to raise up in individuals with high LBM and low FTM. Moreover, an increase in FTM deteriorated postural stability. This pattern may be result of a shift in the center of gravity in individuals with higher FTM. Improving lean tissue mass and decreasing fat tissue would be an effective strategy to improve STS in the overweighted population to increase their agility and could reduce their risk of falls.

References

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