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Predicting Ability of Dynamic Balance in Construction Workers Based on Demographic Information and Anthropometric Dimensions

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ABSTRACT

Background: Difficulties in walking and balance are risk factors for falling. This study aimed to predict dynamic balance based on demographic information and anthropometric dimensions in construction workers.

Methods: This descriptive-analytical study was conducted on 114 construction workers in 2020. First, the construction workers were asked to complete the demographic questionnaire determined in order to be included in the study. Then anthropometric dimensions were measured. The dynamic balance of participants was also assessed using the Y Balance test kit. Dynamic balance prediction was performed based on demographic information and anthropometric dimensions using multiple linear regression with SPSS software version 25.

Results: The highest average normalized reach distances of YBT were in the anterior direction and were $92.23 \pm 12.43\%$ and $92.28 \pm 9.26\%$ for right and left foot, respectively. Both maximal and average normalized composite reach in the YBT in each leg were negatively correlated with leg length and navicular drop and positively correlated with the ratio of sitting height to leg length. In addition, multiple linear regressions showed that age, navicular drop, leg length, and foot surface could predict 23% of the variance in YBT average normalized composite reach of the right leg, and age, navicular drop, and leg length could predict 21% of that in the left leg among construction workers.

Conclusion: Approximately one-fifth of the variability in the normalized composite reach of dynamic balance reach among construction workers using method YBT can be predicted by variables age, navicular drop, leg length, and foot surface.

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1. Introduction

Falling is an important hazard that threatens workers in industrial and occupational processes [1]. Falling has serious, catastrophic, and even fatal complications. In some occupations, especially construction jobs, falling is the main and most important threat to workers [2,3]. Based on the nature of work in the construction industries, which are inherently dangerous, fall accidents are one of the major causes of occupational fatalities, representing 33% of all fatalities in constructions [4]. According to the Occupational Safety and Health Administration report (2019), 21.1% of workers fatalities in private industries occurred in construction, which means one in five deaths in workers was related to construction [5].

There are some situations at construction sites where we cannot eliminate risks even through a fall arrest system which prevents accidents at construction sites [6]. Difficulties in walking and balance are considered risk factors for falling [7]. Balance is a complex motor skill that involves the interaction of several complex systems, including muscular, skeletal, and nervous systems, with the environment [8]. Therefore, numerous risk factors can result in loss of balance incidents on construction sites [9]. Good individual balance ability can be essential for safe and efficient work performance; it may also improve health, modify workability, and reduce the risk of falling [10]. Studies have shown that age, height, weight, foot shape, body composition, and level of activity, and health can affect balance ability, as well as type and severity of injury [11,12].

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