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Letter to the Editor

Investigating the Mechanics of Locomotor Movements in Obese or Overweight Individuals with Flatfoot: A Letter to the Editor

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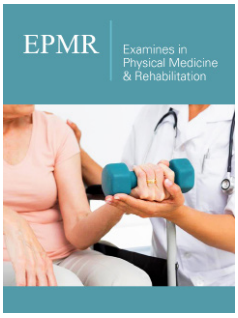

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Abstract

Obesity has emerged as a major global health concern and may influence the mechanics of locomotor movements. Abnormal locomotor patterns in obese or overweight individuals can increase the risk of serious musculoskeletal injuries, including reduction of the medial longitudinal arch, decreased shock absorption capacity, increased knee and lower back pain, elevated joint moments, reduced time to reach peak ground reaction forces and consequently increased loading rates, tibial microfractures, patellofemoral pain syndrome, iliotibial band syndrome, plantar fasciitis, and other soft tissue injuries. Considering the importance of locomotor mechanics in obese or overweight individuals with flatfoot and the limited number of studies in this field, further scientific investigation is warranted. Therefore, researchers in the field of biomechanics are encouraged to conduct more studies focusing on this issue.

Keywords: Obesity; Overweight; Flatfoot; Locomotion and biomechanics

Letter to the Editor

Obesity and overweight are considered among the major health challenges of the modern world, and their prevalence continues to increase steadily. Previous studies have indicated that obesity and overweight are complex chronic conditions that are closely associated with the development of several other diseases. From a physiological perspective, obesity and overweight are directly related to the occurrence of diabetes, cardiovascular diseases, cancer, depression, infertility, respiratory disorders, impaired brain function, fatty liver disease, biomechanical disorders, and many other health complications. In this regard, numerous studies worldwide have reported that engaging in aerobic exercise programs can play an important role in preventing these conditions [1,2].

Locomotor activities such as walking, running, mountaineering, stair climbing, and similar movements are commonly selected by individuals with obesity or overweight as practical strategies to achieve an ideal body weight. Studies have shown that performing submaximal aerobic exercise in combination with an appropriate nutritional pattern can improve the quality of life of this population. However, some individuals within this group experience additional musculoskeletal abnormalities. Flatfoot is one of the most common lower extremity deformities and is closely associated with a reduction in the medial longitudinal arch of the foot. From a biomechanical standpoint, impairment in the supporting arches of the foot may affect the distribution of ground reaction forces, muscle electrical activity, balance, and other kinetic and kinematic variables.

At first glance, the simplicity of this topic might suggest that extensive research has already been conducted in this area. However, a comprehensive review of the literature

on locomotor movement mechanics in obese and overweight individuals with flatfoot both nationally and internationally reveals that only a limited number of studies have investigated the related kinetic and kinematic variables. Evidence from domestic studies suggests that corrective exercise programs, such as those based on the National Academy of Sports Medicine (NASM) protocol, along with supportive devices, may partially improve loading rate characteristics in obese individuals with flatfoot [3,4]. Moreover, the interaction between body mass and foot posture may influence the magnitude and distribution of mechanical loading during locomotion. Individuals with flatfoot may have a reduced capacity to absorb and redistribute impact forces, whereas increased body mass may further increase the external loads acting on the lower extremities. Nevertheless, previous studies indicate that locomotor activities in obese individuals may increase the risk of several musculoskeletal injuries. These include a reduction in the medial longitudinal arch (flatfoot), decreased shock absorption during locomotor movements, increased pain in the knee and lower back regions, increased joint moments, reduced time to reach peak ground reaction forces and consequently increased loading rates, tibial microfractures, patellofemoral pain syndrome, iliotibial band syndrome, plantar fasciitis, and other soft tissue injuries [5].

Considering the importance of locomotor movement mechanics in obese or overweight individuals with flatfoot and the limited number of studies addressing this topic, further research in this area appears necessary. Therefore, researchers interested in the field of biomechanics are encouraged to investigate the kinetic and kinematic characteristics of locomotor movements in obese and overweight individuals with flatfoot in comparison with healthy individuals. In addition, future studies should examine the effects of different exercise protocols and foot arch–supporting devices using larger sample sizes while also considering potential gender differences. In particular, the combination of excessive body mass and a reduced medial longitudinal arch may increase the mechanical demands placed on the foot and lower-extremity joints during locomotion. A recent letter to the editor highlighted that locomotor movements in overweight or obese individuals with flatfoot may be associated with impaired shock absorption, altered ground-reaction-force distribution, elevated joint moments, increased loading rates, and a greater risk of lower-extremity musculoskeletal problems [6]. These effects may be especially relevant during repetitive activities such as walking and running, in which the foot must repeatedly absorb, transmit, and redistribute impact forces.

Conflict of Interest

The author declares no conflict of interest.

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