

Neurobiomechanical and motor control comparison between gait with and without high heel shoes

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Abstract— The purpose of this study was to examine and compare the effect of wearing high-heel shoes on neuromuscular activation and motor control mechanics during gait between gait with and without high heel shoes executed by teen girls. Ten healthy females participated in the current study. All right-side muscles present significant differences between barefoot and high heel shoes conditions except for vastus lateralis and vastus medialis. During the contact phase, significant within-subjects' effects were evaluated for the VL, ST, BF, and RVM muscle time of peak amplitude and peak amplitude. It can be concluded that the use of high heel shoes for a long time can increase the unpleasantness of the joints and muscles and can cause a change in the musculoskeletal functions as well as to the joint's functions. Therefore, designers and producers of high heel shoes can use our results.

Keywords—Neurobiomechanics, Motor control, high-heel, teen girl, shoe

I. INTRODUCTION

High-heeled shoes are widely used by young and teen women, and they spend many days with these shoes in parties and other formal places [1]. Shoes are very important because play an important role in human life and lifestyle [2]. Among the various types of shoes, high-heeled shoes play an important role because the heels in the shoes change the gait pattern and neuromuscular activation pattern. Therefore, the purpose of this study was to examine and compare the effect of wearing high-heel shoes on neuromuscular activation and motor control mechanics during gait between gait with and without high heel shoes executed by teen girls.

II. METHODS

Ten healthy females participated in the current study (Age of 16 ± 2.26 years, the height of 158 ± 2.31 cm, the weight of 54 ± 5.43 kg). Six electives lower limb muscles were tested bilaterally: Gastrocnemius Medial (GM), long head of Biceps Femoris (BF), Vastus Lateralis (VL), Vastus Medial (VM), Semitendinosus (ST) and Tibialis Anterior (TA) [3], [4].

III. RESULTS

All right-side muscles present significant differences between barefoot and high heel shoes conditions except for vastus lateralis and vastus medialis ($p < 0.05$). During the contact phase, significant within-subjects' effects were evaluated for the VL, ST, BF, and RVM muscle time of peak amplitude and peak amplitude. In addition, significant differences observed 90 and 60 percent of the gait period.

IV. DISCUSSION

The aims of the current paper were analysis the effects of wearing high heel on lower limb neuromuscular activation and motor control mechanics during gait between gait with and without high heel shoes executed by teen girls. Based on our results, wearing high heels shoes change gait biomechanics and muscle co-activation and neuromuscular activity pattern. Therefore, it can be concluded that the use of high heel shoes for a long time can increase the unpleasantness of the joints and muscles and can cause a change in the musculoskeletal functions as well as to the joint's functions. Therefore, designers and producers of high heel shoes can use our results.

V. CONCLUSION

The contribution of the study consists of providing novel quantitative information on the variability of thigh-muscle co-contractions, in terms of onset-offset muscular activation, excitation intensity, and occurrence frequency. Thus, the present findings can be useful in the clinical context and for designing future gait studies.

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