



Effects of Wearing Type of Shoes on Lower-Limb Muscle Fatigue and Ankle Stability in Young Female Workers

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ABSTRACT

Background: The ankle instability and muscle fatigue in lower limb for the resting time after work hours are important due to its influence to the decline of work-life balance as well as women’s quality of lives. **Purpose:** The purpose of this study was to investigate the effects of daylong wearing type of shoes on lower-limb muscular fatigue and ankle stability in young female adults. **Methods:** 24 female participants in their 20s were separated into 3 different wearing shoe-type groups such as slippers(n=9), sneakers(n=8) and high heels(n=7). Lower-limb electromyogram, gait balance and fatigue awareness were measured while they were walking in barefoot on treadmills after finishing their 8-hour work time. **Results:** The muscle activity of tibialis anterior, medial gastrocnemius, lateral gastrocnemius, and peroneus longus was highest in high-heel group even after workhours. The ankle stability determined by measuring overall balance, medial-lateral balance, and anterior-posterior balance were lowest in high-heel group. Fatigue awareness including physical fatigue, neurosensory fatigue and mental fatigue were highest in high-heel group. **Conclusion:** This result has shown that the wearing type of shoes affects lower-limb muscle fatigue and ankle stability even after daylong workhours were over. Also, sneakers can be the most recommendable type of shoes while high heels should be avoided for the female workers.

Keywords: shoe types, muscle fatigue, ankle stability

RESULTS

Participant Characteristics

N	Age	Height(cm)	weight(kg)	BMI
24	25.08±4.82	161.88±4.19	57.31±7.61	22.33±3.56

Table 1. Characteristics of participants. All values are Mean±Ste.

Muscle Activity

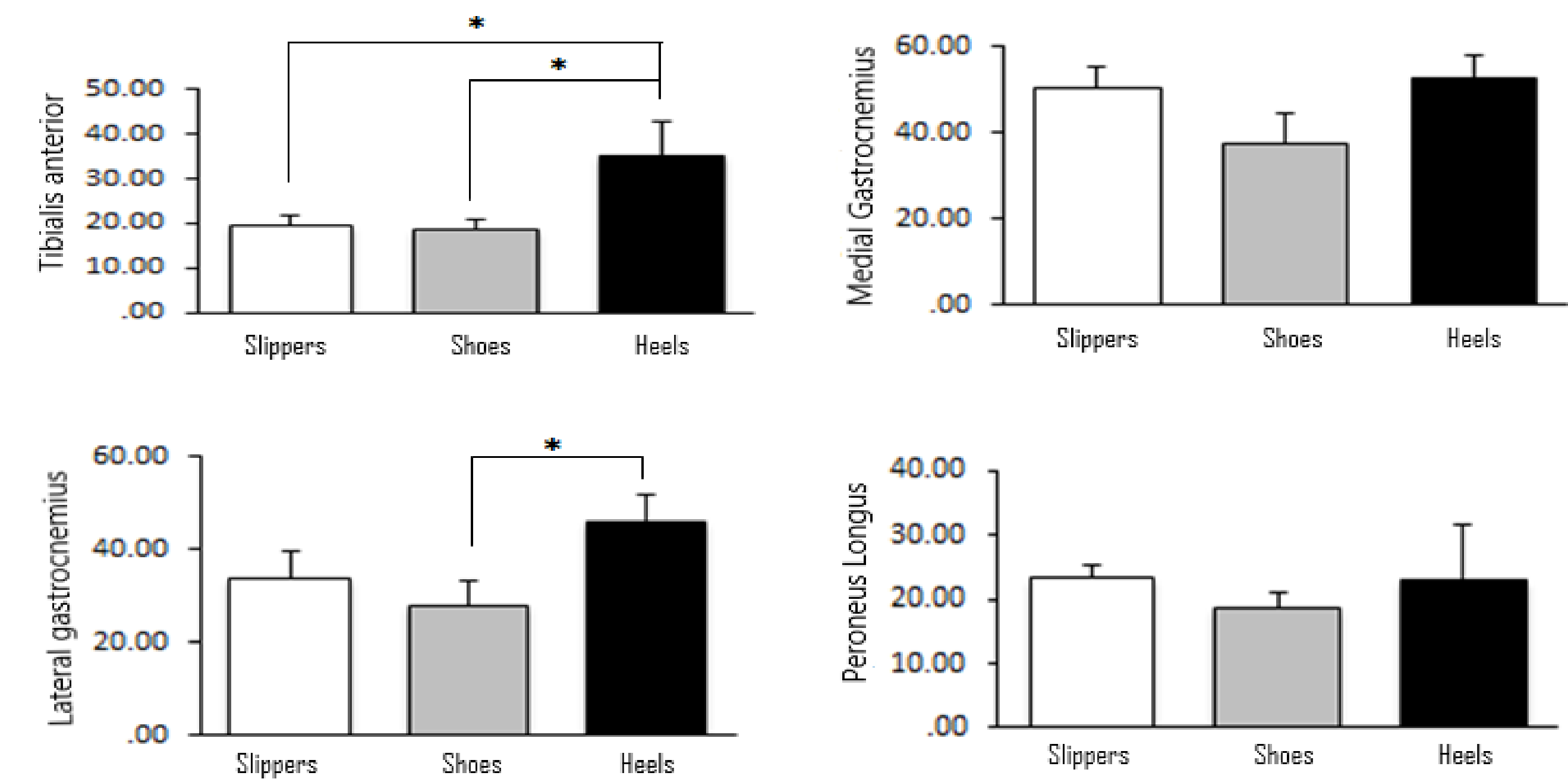


Figure 1. Measurement using the 8 channel system of NORAXON MyoResearch (USA). The Maximum Voluntary Isometric Contraction was performed before gait performance and it measured Electromyography figures when 20s-30s had been walking for 30 seconds on their average walking speed of 4km/h on treadmill without shoes

Balance

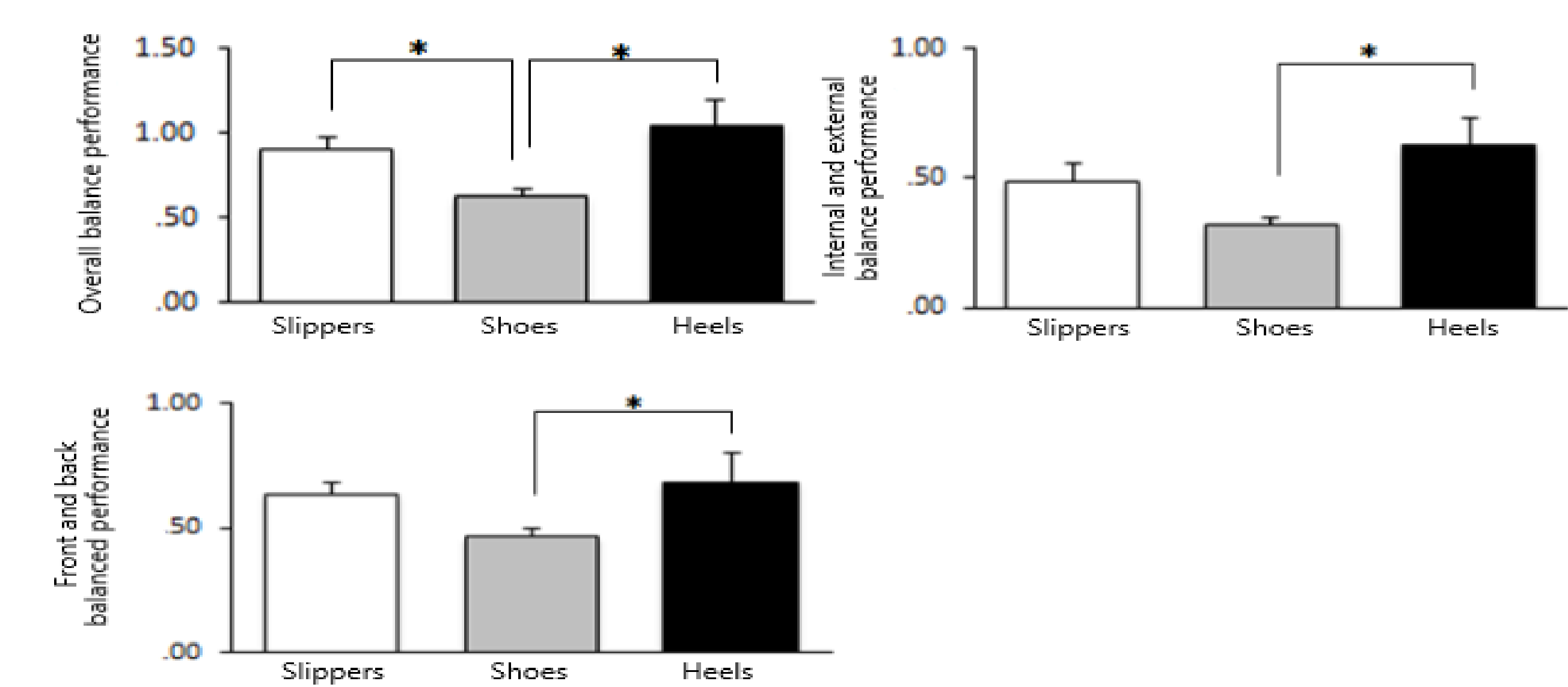


Figure 2.Static balanced performance Measurement standing on one leg with Balance System. Women in their 20s and 30s located and maintained their feet three times for 20 seconds on a designated location to collect and analyze the average performance.

Fatigue Awareness

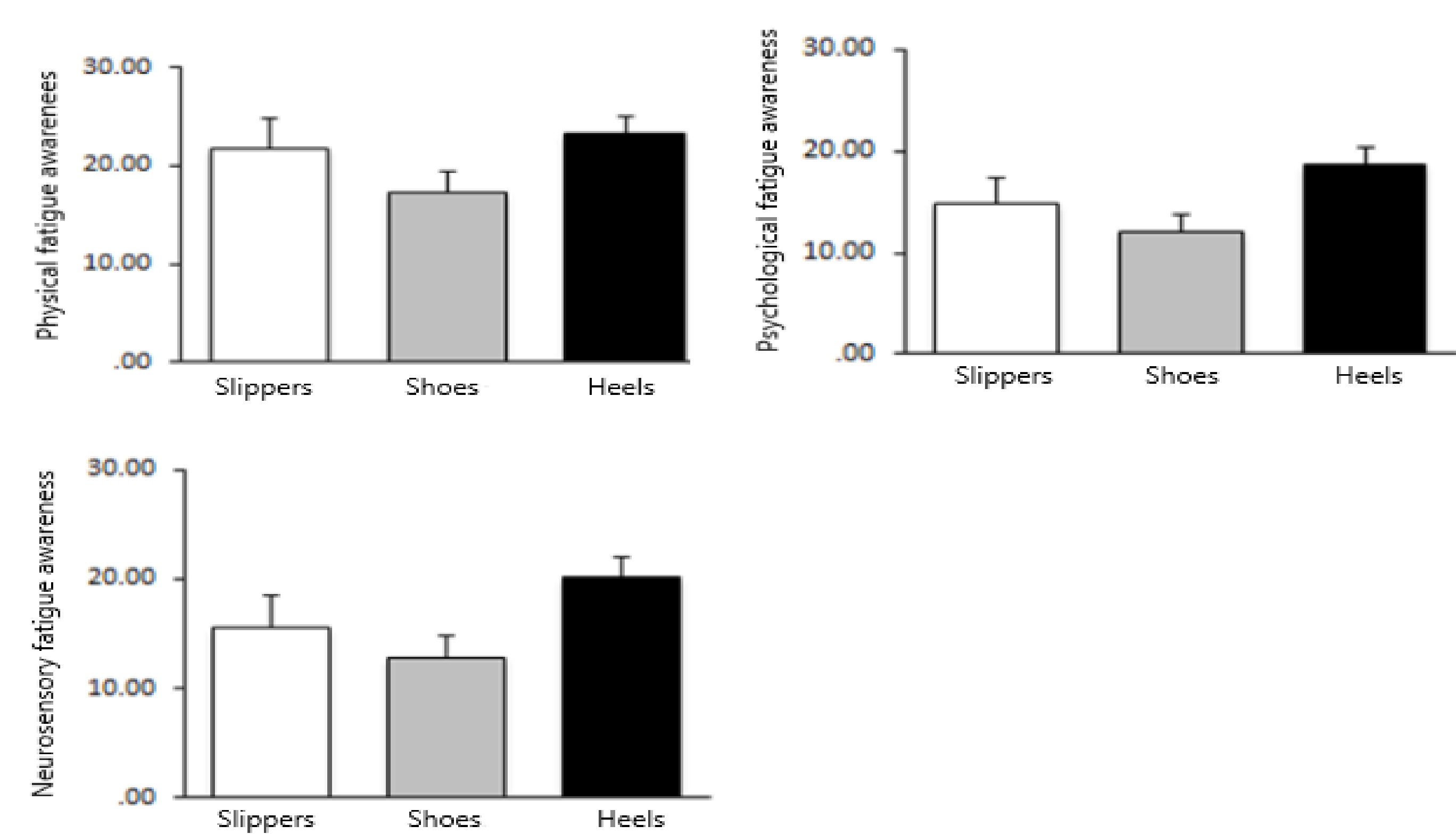


Figure 3. Measurement using the fatigue awareness symptom survey table of Industry Hygiene Association from Japan. The higher the score, the higher the fatigue.

Gait Analysis

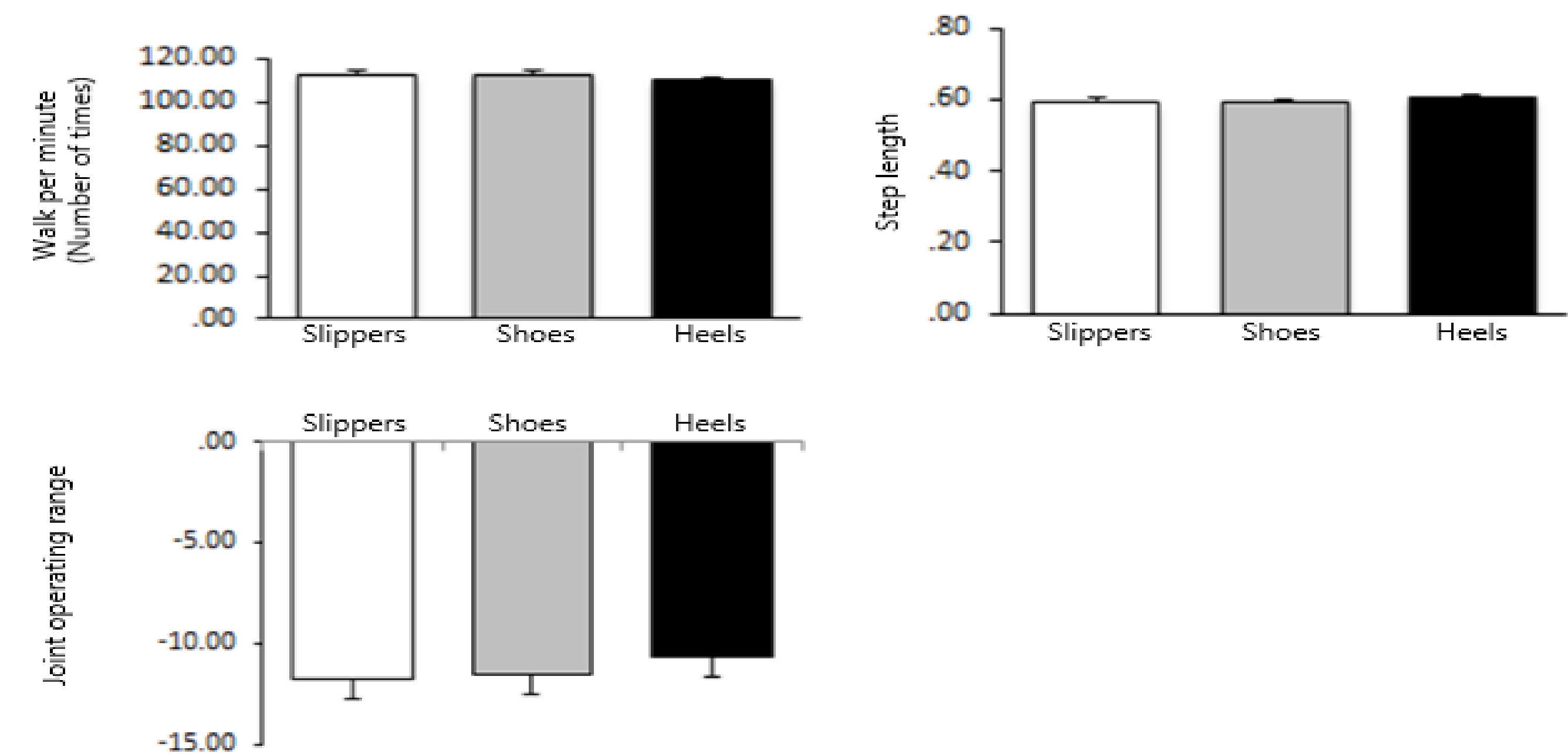


Figure 4. Measurement using Smart Balance SB-1(JEIOS, USA). It was measured by walking for 30 seconds in 20s-30s adults average gait.

CONCLUSION

Long hours of wearing shoes showed a similar level of instability and fatigue in the ankle even after taking them off. In particular, the ankle instability that persists even after taking off shoes seems to lead to physical, mental and neurotic fatigue. As a result, the choice of shoes to wear for long periods of time can reduce fatigue during work.