Effects of the shoes and insoles on gait patterns in the flatfoot

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INTRODUCTION

The person with a flat foot deformity suffers an increasing mechanical overloading on their foot. It's regarded to be associated with the lower limb musculoskeletal pathologies including the plantar fasciitis, Achilles tendonitis, and patello-femoral joint pain. Foot insoles have been shown to be successful treatment to reduce the patients' symptom. However, few studies have been done on the effects of the foot insoles. The purpose of this study was to examine the effects of the shoes and foot soles in flatfoot during level walking.

METHODS

Eleven adults with flatfoot including six males and five females (age: 46years, weight: 65kg, height: 161cm) participated in the study. The arch index [1] calculated by the ratio of the navicular height to the foot length was used to assess our subjects' longitudinal arch. All subjects were measured while standing.

Markers with Helen Hayes set-up were attached on subjects. An eight-camera Motion Analysis System (Motion Analysis Corporation, Santa, CA,USA) and EVaRT 4.2 software were used to capture and track the body markers. Ground reaction force was measurement with two Kistler force plates (Kistler Instruments, Inc., Amherst, NY). Kinematic and kinetic data of lower extremity during a gait cycle were then calculated and analyzed by OrthoTrak 6.0 software.

Data were collected and analyzed in three conditions: walking barefoot, walking with shoes, and walking with shoes and insoles. Every paticipant has his own shoes and insoles made from the Jun-Da Biotechonology CO., LTD, Taiwan. The shoes were made of rubber and PU. The insoles were made of Vinyl- acetate and 12%±3% far infrared nanopowders (Figure 1).

A repeated-measure ANOVA was used to compare the temporal-spatial, kinematic, and kinetic parameters during the stance phase under three experimental conditions with SPSS 11.0 software, 0.05 as a significant level.

Figure 1: The shoes and insoles

RESULTS AND DISCUSSION

The stride length and supporting time for walking with shoes and insoles were significantly longer compared with walking barefoot ($p<0.05$). The step length for walking with shoes was significantly longer compared with walking barefoot ($p<0.05$). It indicated that the weight bearing phase was longer while wearing shoes and insoles.

The shoes or shoes with insoles increasd the peak knee flexion and ankle dorsiflexion angle in stance phase and reduced the peak ankle plantarflexion compared to barefoot ($p<0.05$) (Fig.2). There were no significant differences in the joint forces between the three conditions. The peak knee adduction moment and ankle dorsiflex moment were significantly gretater for walking with shoes or with shoes and insoles compared to walking barefoot ($p<0.05$) (Fig.3). The peak ankle plantarflex moment was significantly smaller for walking with shoes and insoles than walking barefoot ($p<0.05$) (Fig.3). These changes indicated that the pronation deformity in the flatfoot may be improved when wearing shoes and insoles due to the elevated medial longitudinal arch. Therefore, the gait patterns in flatfoot with shoes and insoles were approaching normal.

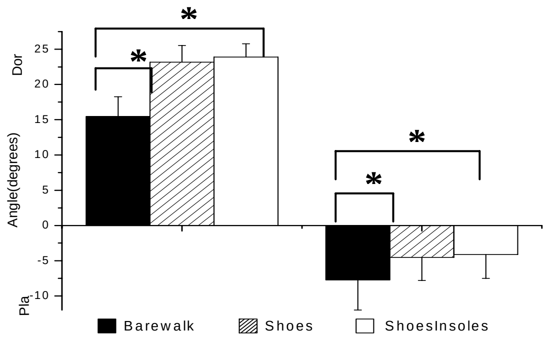

Figure 2: The peak ankle doriflexion and plantarflexion in stance phase under the three conditions (*P<0.05).

Figure 3: The peak ankle doriflexion/plantarflexion moment in stance phase under the three conditions (*P<0.05).

CONCLUSIONS

Wearing shoes and insoles significantly reduced the ankle plantarflexion angle and moment. These results provided that it might improve the pronation deformity in the flatfoot when wearing shoes and insoles.

REFERENCES

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