A PILOT STUDY ON COMPARISON OF CUSHIONING ABILITY OF CLOTH SPORT SHOE WITH OTHER ATHLETIC FOOTWEAR

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KEY WORDS: cloth sport shoe, human pendulum, cushioning.

INTRODUCTION: Previous studies assessed the cushioning ability of different athletic footwear including running shoes and court shoes. In recent years, concern about the protective function of cloth sport shoe, a kind of low-price and popular athletic footwear in the youth generation for sport activities, has become popular in Hong Kong and the People's Republic of China. However, the cushioning ability of cloth sport shoe was still left uninvestigated. The purpose of this study was to give a preliminary assessment on the cushioning performance of cloth sport shoe compared with other types of sport shoes.

METHODS: A human pendulum design was used to better control for the lower limb biomechanics. One male subject (age 23.8 yr, mass 68.4 kg, and height 1.73m) participated in this study. Five shod conditions (running shoe, basketball shoe, cloth sport shoe, tennis shoe, and barefoot) were chosen. Subject performed five consecutive impacts to a vertically wall-mounted force platform (Kistler, model 9281CA) by the left heel with controlled impact velocity 1.15 ms^{-1}, which simulates the situation in running. A heel first contact was achieved with straight leg and loose ankle by placing a cushion beneath the left shank. A slightly dorsi-flexed ankle to ensure a heel first contact was not employed in this study as it might reduce the range of plantar movement, thus reducing the cushioning ability. Force signals were sampled at 1000 Hz. The cushioning ability was compared by peak impact force. One-way ANOVA was applied to see significant difference between shod conditions.

RESULTS AND DISCUSSION: No significant difference ($p=0.996$) was found between impact peak force of cloth sport shoe (2.20 ± 0.10 BW) and barefoot conditions (2.21 ± 0.09 BW). Comparing with the barefoot condition, running shoe gives better cushioning significantly (1.91 ± 0.06 BW, $p=0.006$), while the basketball shoe (2.40 ± 0.09 BW, $p=0.026$) shows negative effect. This may be due to the reduction of plantar movement at the ankle joint with basketball shoes, as they have a high-cut design to provide lateral stability. However, with a low-cut design, tennis shoe (2.27 ± 0.06 BW) shows no significant difference with barefoot ($p=0.663$) and basketball shoe ($p=0.166$).

CONCLUSION: Cloth sport shoe shows neither significant positive nor negative effect on cushioning. Further investigation with more subjects within the age group of youth generation will be done. A velocity transducer will be employed to give accurate control of the impact velocity in future studies.