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Research Article

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Different sole hardness for badminton movement

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ABSTRACT

In this study, we used biomechanics testing on the typical badminton movement to compare the shoe hardness effect on the body kinetics response. Six excellent badminton players participated in this test. Heels of ground reaction forces and landing time were collected through force-measuring system and video analysis system. Our results indicate that the peak ground reaction forces was less when wearing the badminton shoes with less hardness sole, but no statistically significant difference. Meanwhile, the heel landing time was less in the shoes with higher hardness sole. Badminton shoes are not only shall protect the foot joints and muscles in exercise or competition, but also possess the function to improve the athlete's reaction speed.

Keywords: Badminton shoes, sole hardness, heel landing.

INTRODUCTION

Badminton is very popular among people of various ages and its popularity is still in increasing trend [1]. In order to further improve athletic training level of badminton, prevention sports trauma to ensure that the continuous movement of good development, sports biomechanics research is necessary to discuss the inherent theory and applied to daily training guidance [2]. With the badminton sport technology gradually mature, professional badminton shoes to improve the match performance is becoming increasingly important. Just during one match, the players need to do all kinds of complex movements, such as sudden stop, start, jumping and so on. Although there is no direct physical confrontation, but the complexity, sudden and persistent of the movement is very fierce[3]. However, in the competition include flexible mobile footwork and good sudden stop, jumping of technology the realization are dependent on the interaction of between sports shoes with the ground.

Badminton with high-intensity and prolonged exercise collision characteristics, can easily lead to lower extremity injury for badminton player. To analyze the damage situation of 56 athletes of 3 badminton teams in Guangzhou found that foot and ankle part of the damage came in second place(16.98%), the total probability of injury will be as high as 47.16%, if we add up all the injury on thigh, leg, knee, foot and ankle[4]. Although this investigation has regional limitations, but there is still a certain representativeness. There has been a large number of sports shoes research on the effects have shown that a impact on lower limb loading and kinematics of athletic shoes, indeed can change the technical features of the movement[5].

Based on the situation and development of the research, the main point is to take the most common classic badminton footwork of Right-court lunge step as an example to analyze the characteristic of Plantar Foot Pressure by using modern Biomechanics technology, while landing to the court. Simultaneously, comparing the different Biomechanical feature of badminton shoes, we want to go further on the point that the biomechanical characters of lower limbs would be effect by different badminton shoes and potential factors. Finally, we consider that this research about badminton shoes could give some theoretic support the badminton shoes design and material optimizationin the future.

EXPERIMENTAL SECTION

The subjects selected were highly skilled badminton players. A total of 6 professional male badminton players volunteered to participate in the present study.

Fig. 1 Construction of testing badminton shoes, the difference only in sole hardness

Soles hardness value according to the experiment, using Asker Durometer (Type C) hardness tester test, the soles hardness values were 58 and 68 (Fig.1). Two Badminton shoes that significant differed only in shoes sole hardness, in the sole design and other material application wasn't exist significant difference, and the weight of the shoe no obvious difference, were used in the present study.This study is to compare the heel landing time and vertical ground forces by the influence of different the shoes sole hardness of badminton, in the most common classic badminton footwork of Right Front-court Lunge Step in the process of action. The main biomechanical parameters are time and maximum ground vertical forces of contact with the ground to the whole feet fully touch of heel. Kinetic data were collected simultaneously with thekinematic data using a force platform (Kistler, Switzerland) that was placed in the center of the paly platform. Kinematic data of heel landing time were collected using ahigh-speedvideo cameraat a sampling rate of 500 Hz.

RESULTS

Results of the ground maximum vertical force which found when wearing the soft soled shoes was slower than when wearing the harder soled shoes (Fig.2). No other significant differences in ground maximum vertical forces were observed between the soft soled shoes and harder soled shoes (p=0.08).

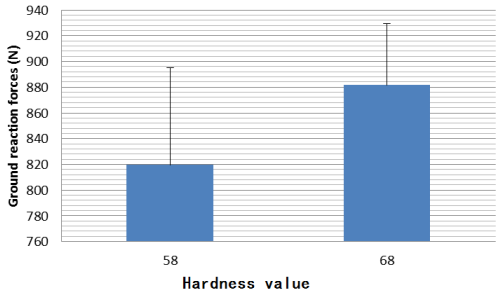

Fig. 2 Ground vertical force comparison in different hardness condition

Statistics of the heel parts to achieve maximum ground vertical force used timewhich found wearingthe soft soled shoesof the amount of time an average of 0.033 s and wearingthe harder soled shoes of the amount of time an average of 0.028 s, soft soled shoes of the amount of time near the significantly greater than the harder soled shoes of the amount of time (Fig.3).

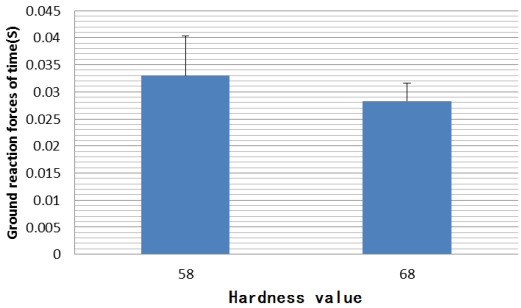

Fig. 3 Peak ground vertical force appearance time in different hardness condition

Heel landing time is refers tocontact with the ground to the whole feet fully touch of heel use time in Subjects completed classic badminton footwork of Right Front-court Lunge Step in the process of action. Statistics of the heel landing time which found when wearingthe soft soled shoes was slower than when wearingthe harder soled shoes (Fig.4). No othersignificant differences in heel landing timewere observed between the soft soled shoes and harder soled shoes (p=0.535).

DISCUSSION

This study found that the heel of the maximum ground vertical forces and the time of maximum ground vertical forces will change with various hardness badminton shoes in the action of Right-court lunge step to catch net ball. The greater the hardness of the shoe sole, the ground vertical forces that the heel suffered will be larger, but in the study, it showed no significant difference, the result is same to the early research. After the test for the ground vertical forces when the subjects in walking state with hard and soft shoes, The ground vertical forces what the hard shoe suffered is greater than the soft one , but it didn't show the significant difference.

Above show that the difference of soles hardness can really change the range of ground vertical forces,the bigger of the soles hardness value, the ground vertical forces is high, and the buffer action will be smaller. But the study found that the changes of sole hardness is no significant difference to the influence of heel landing time, instead of the heel landing time of the low hardness of shoesis short, this is different from the traditional understand. But the results of this study are just from a small sample size explored [6]. Further studiesshould to increase study subjects andmore strict control of experiment action, eventually, find the most suitable of sole hardness needs of badminton sport, in order to provide reliable theoretical data of research and development badminton shoes.

REFERENCES

[1] D Lo;K Stark,*NationStrength and Conditioning Association Journal***1991**, 13, 6–13.
[2] M Rong; YD Gu; GQ Ruan,*Advanced Materials Research.*, **2012**, 394, 546-548.
[3] Y Wei; *China Sports Science***2009**, 10, 89-96.
[4] X Yu;GQ Xu,*Journal of PLA Institute of Physical Education*,**2005**, 24, 100-102.
[5] TE Clarke;EC Frederick;LB Cooper,*Int J Sports Med*, **1983**, 4, 247-251.
[6] S Fan, M Wang, *Journal of Chemical and Pharmaceutical Research*, **2013**, 5(11), 164-171.