A Study on Outsole and Insole Effect by Evaluating the Kinetics and Kinematics of Lower Extremity

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ABSTRACT

Objective: The aim of this study is outsole effect by evaluating the kinetics (ground reaction forces, knee and ankle moments) and kinematics (joints angles) of lower extremity in walking and running. Background: In the past, consumers made purchase decision mainly based on the price, brand and shoe aesthetics. However, with the advancement of biomechanics and huge effort in researching and exploring the potential functions of footwear, the general public is increasingly concern about the shoes functions. Method: Ten healthy subjects (age: 20-30 years) with no foot and musculoskeletal pathologies. The kinetics and kinematics tests were 8 camera motion capture system, 12 meter walkway and treadmill with force plates embedded. This study compared two shoes (new functional shoes and control shoes) and two insoles (special and normal). The new functional shoes with the specially designed outsole with thicker mid foot region promotes mid foot strike. Results: New functional shoes show higher posterior force and high anterior force and decrease in vertical GRF during both walking and running. New functional shoes show increased ankle dorsiflexion angle at initial contact and knee flexion angles, also reduced ankle plantar flexion moment and knee flexion moment. Special insole show reduced ankle inversion angle at initial contact. Conclusion: New functional shoes enhances sports performance by providing larger propelling force to the body and provides better control of level walking and running. Special insole limits ankle inversion to reduce risk of ankle sprain.

Keywords: Functional shoes, Mid foot strike, Lower extremity, Kinematics, Joint moment