SHOE INSOLE INTERVENTION TO REDUCE FALLS AND INJURIES

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Despite a number of strategies to minimise falls risks, older adults tend to avoid voluntary and continuous engagement into interventions without cost effectiveness and simplicity. Shoe-insole modification may be a practical intervention if it alters foot geometry inside a shoe and improves gait patterns to prevent falls. The current study designed a shoe-insole structure with 2.2 dorsiflexion and 4.5 eversion built-in inclinations on the entire insole surface. Ankle dorsiflexion is fundamental for higher swing foot clearance to reduce tripping falls. Eversion support may also regulate excessive lateral foot centre of pressure (CoP) excursion to prevent ankle sprain and associated falls. Three young male participants (Age: 21 ± 3 yrs., Height: 1.70 ± .08m, Body Mass: 65.3 ± 2.65kg) conducted gait testing on an 8m walkway repeatedly to collect 60 step cycles for both non-insole and insole conditions. Optotrak motion capture system (NDI) recorded swing foot clearance at 100 Hz while AMTI force plates obtained ground reaction forces data, therefore CoP movements. Minimum foot clearance (MFC) was defined as the local minimum vertical toe-ground clearance during mid-swing, where higher MFC prevents tripping falls. The tested insole increased MFC by .20cm on average, considered to effectively reduce tripping falls. Lateral CoP excursion (lateral displacement from initial CoP location at heel contact to the most lateral CoP location during the initial phase of loading response) was reduced by 1.18cm (61%) due to insole walking, possibly indicating the lower risk of ankle sprain and sideways balance loss. Despite these positive effects, further validation is necessary with a sufficient sample size including the older population. It is also essential to consider negative aspects of continuous dorsiflexion and eversion support. For example, the tested insole may disturb functionally important supination. Prior to practical use, human trials for a prolonged period of time are required for insole intervention.