

Plantar Center of Pressure and it's Effect on Golf Swing Distance and Accuracy

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INTRODUCTION

Previous golf research have focused on both equipment and human factors. While these are two separate areas of focus, the goal remains the same - skill improvement of the participants, thereby increasing their enjoyment. Human factor studies have investigated both kinematic and kinetic factors of human performance while executing golf skills. Prior studies have investigated the differences in kinetic and kinematic differences between novice amature, elite amature and professional golfers. The purpose of this study was to facilitate a golf shot of greater accuracy and distance by passively displacing an amature's plantar Center of Pressure (CoP) anteriorly. To passively displace a subject's plantar CoP heel lifts were placed under the original insole of golf shoes. Subjects executed golf swings with a 5 iron and a driver (1 wood). Subjects achieved greater distances and accuracy with the use of heel lifts.

REVIEW AND THEORY

Gastwirth et al. (1991), and Ebbeling et al. (1994) have shown a relationship between heel height and plantar CoP. Anteriorly displaced plantar CoP is directly proportionate to increased heel height (Gastwirth et al. , 1996; and Ebbeling et al., 1994).

Professional golf instructors advise learners to "shift their weight" towards the front of the foot while swinging a golf club. Instructors claim that this improves both distance and accuracy of the golf swing. It begs the question - if a novice amature's plantar CoP was passively displaced anteriorly, would there be an increase in accuracy and distance? The investigators found it necessary to investigate this possibility, as there have not been any previous biomechanical studies of this nature conducted.

The investigators hypothesize that increasing anterior CoP displacement will result in greater accuracy and distance achieved by novice amature golfers.

PROCEDURES

Subjects with a handicap of 18 were asked to hit golf balls using a the *Golf-o-Max*[®] golf simulator with a 5 iron and driver (1 wood). Subjects were chosen based in similar distances achieved with both clubs. Subjects were asked to perform multiple golf swing trials for the three conditions of: 1 no heel lift (5I-HL0); 2 heel lift of 63.5 mm (¹/₄ inch) and a 6° incline (5I-HL1); and 3 heel lift of 127 mm (½ inch) and a 10° incline (5I-HL2). Heel lifts were constructed using nicholplast foam. To displace a subject's CoP, heel lifts were placed under the original insole of golf shoes at the base of the heel counter. Each condition was repeated using a driver (1 wood): (D-HL0), (D-HL1), (D-HL2). Total horizontal distance achieved as well as horizontal distance from the flag were recorded and averaged.

RESULTS & DISCUSSION

The results presented are averages of the trials performed by the subjects. The average distances achieved using the 5 iron for the conditions of 5I-HL0, 5I-HL1, 5I-HL2 were: 195.1 m, 197.7 m, and 198.9 m respectively. The average distances from the flag were: 7.67 m, 6.13 m, and 6.57 m

respectively. The average distances achieved using the driver for the conditions of D-HL0, D-HL1, D-HL2 were: 206 m, 232 m, and 246 m respectively. The average distances from the flag were: 18.85 m, 11.74 m, and 12.75 m respectively

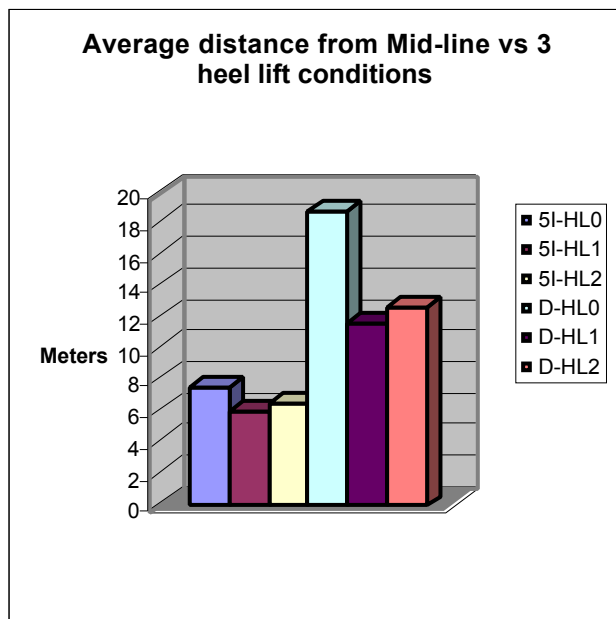


Figure 1. Accuracy average achieved by subjects using 5 iron and driver for each heel lift condition

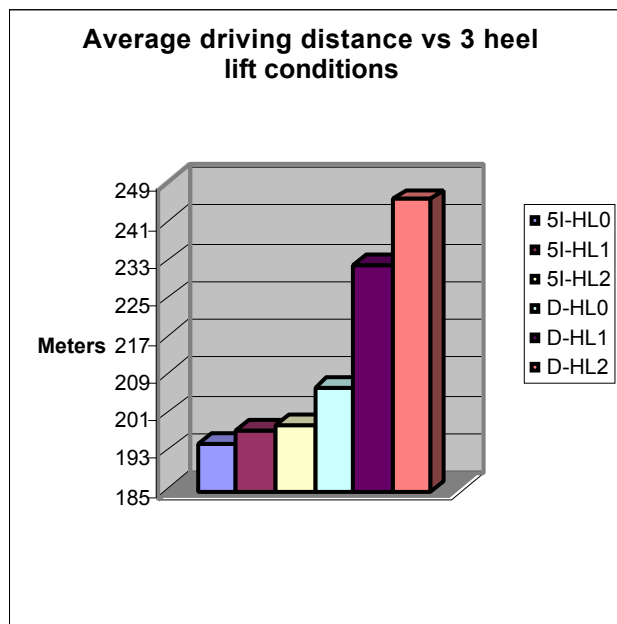


Figure 2. Average distances achieved by subjects using 5 iron and driver for each heel lift condition

It has been shown that a passively displaced plantar CoP with the use of heel lifts resulted in greater distances and accuracy achieved by novice amateur golfers. In order to reduce the likelihood of heel slippage, the investigators recommend that additional heel lift be added at the heel of the mid-sole of golf shoes.

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