

LEGEND OR HISTORY? A BIOMECHANICAL ANALYSIS OF EXTRA WEIGHTS ON STANDING LONG JUMP

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INTRODUCTION

The standing long jump was one of the events in the ancient Olympic Games. It goes a legend: Ancient athlete Phayllos jumped five feet more than 50 feet, and threw the discus five feet less than 100 feet. Many studies had proved that extra weights was held in the hands of the athletes during the competition[3], and some investigator found that extra weights would increase the jump distance[1], [2], [4], but they did not explain the mechanism that increases the performance. The purposes of this study are to prospect the reality of the ancient excellent jumping performance of Phayllos, and to investigate the effect of extra weights on standing long jump performance.

METHODS

Eight male collegiate athletes were studied. All subjects performed no extra load, light extra load (load 2-4kg), heavy extra load (load 6-8kg), super heavy extra load (load 10-12kg) standing long jumps. A Redlake high speed camera (125Hz) was synchronized with a Kistler force platform (1250Hz) to collect the data of eight male athletes. Based on a frequency content analysis of the digitized coordinate data, marker trajectories were filtered at 10.5 Hz using a fourth order Butterworth filter. The kinematic and kinetic variables were calculated by SPSS for Windows (Version 12.0, Chicago, IL) with alpha level of 0.05.

RESULTS AND DISCUSSION

The results indicate that the landing distances were enhanced when loading, but there was no significant difference between the four groups (see figure1). In addition, propelling duration, the horizontal impulse (see figure2), landing distance (see figure3) increased with loaded jumps. In contrast, flight distance, CG vertical velocity at takeoff decreased with loads. In this study, the most important parameters had significant differences between the four groups were landing distance and the horizontal impulse, but landing distance was not the key reason enhanced jumping distances because when subjects performed with loads, they changed landing postures and they landed earlier. When subjects performed with loads, the propelling duration was prolonged, and it increased the horizontal impulse, it may be the main reason enhanced performance.

CONCLUSIONS

It was suggested that proper extra weight will enhance the jumping performance, and the most optimal extra weight among these subjects is about 5.3% of the subjects' body weight.

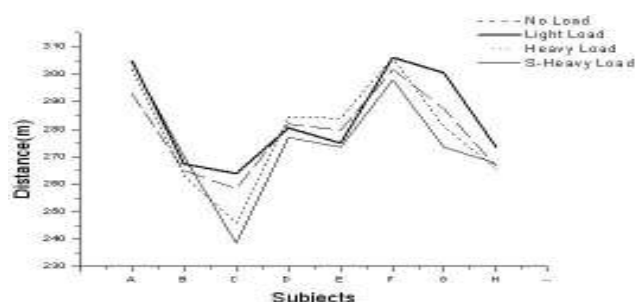


Figure1. Jumping Distance of the four groups

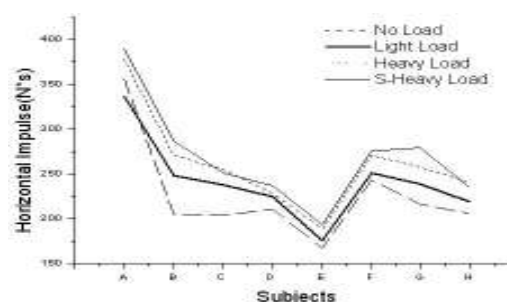


Figure2. Horizontal Impulse of the four groups

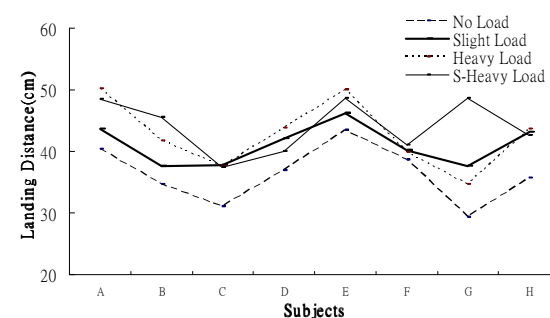


Figure3. Landing Distance of the four groups

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