ANALYSIS OF THE APPROACH RUN AND THE TAKEOFF IN THE JAPANESE JUNIOR LONG JUMPERS

Ikko Omura[1], Akira Iiboshi[2], Hiroyuki Koyama[3], Yuya Muraki[3], Michiyoshi Ae[4]
[1]Shigakukan Univ., Kagoshima, Japan, [2] Kagoshima Univ., Kagoshima, Japan.
[3]Tsukuba Univ. Grad. School, Ibaraki, Japan. [4]Tsukuba Univ., Ibaraki, Japan email: ioomura@shigakukan.ac.jp

INTORDUCTION

The approach run and the takeoff in the long jump are important factors to determine the distance of the jump. Many studies on the approach or the takeoff in the long jump had been done. Recently, Omura et al. [2, 3] have focused on the characteristics of the step frequency, step length, support time, non-support time and visual control [1] during the approach run to investigate the effective approach run. They reported that Japanese junior long jumpers showed the unsteady step frequency during the approach run, and the longer non-support time during the last three or four steps compared to the Japanese top long jumpers. However, more studies are needed to discuss proper approach run for the junior long jumpers.

The purpose of this study was to investigate the approach run of Japanese junior long jumpers to obtain the fundamental findings on effective approach run and the takeoff.

METHODS

Sixteen boy's long jumpers, with personal best records ranging from 7.17m to 7.87m, were filmed at the final of 2003 and 2004 Japan High School Track & Field Championships by the Biomechanical Project team of the Japan Amateur Athletic Federation. Two digital video cameras were used in this study. One camera was placed at the stands sideway to the runway, and filmed the whole of the steps of the approach (60f/s). All the trials of each jumper were analyzed using FRAME DIAS system (DKH Co., Japan), and calculated step length, step frequency, support time, non-support time. The visual control was calculated from standard deviation of the horizontal distance from the toe of the support foot to the front edge of the takeoff board (i.e. the toe-board distance) [1]. Another camera was placed at a distance of 20m perpendicular to the takeoff board, and filmed the jumpers from the 3rd last steps to takeoff (60f/s). The best performance of each jumper was analyzed, and the several joint angle & angular velocities were calculated. Approach velocities were measured with Laveg Sport (Henley Japan co., Japan)

RESULTS AND DISCUSSION

The approach velocities of the top three jumpers (ranging from 10.3m/s to 10.4m/s) were higher than those of the other junior long jumpers. However, the values were lower than those of the Japanese top jumper (10.8m/s; 8m18) and the World's class jumper (Phillips; 11.0m/s, 8m31). Furthermore, most of the jumpers (including two of top three jumpers) decreased their approach velocities prior to the takeoff. From these results, Japanese junior long jumpers should improve their approach velocity and the preparatory motion for the takeoff.

Hay[1] investigated how the elite long jumper use a visual control strategy, based on the data for the horizontal distance from the toe of the support foot to the front edge of the takeoff board (i.e. the toe-board distance).

As for the visual control in present study, the maximum value of the standard deviation was recorded from the 3rd last stride to the 12th last stride, and the maximum frequency was recorded at the 3rd last stride (five jumpers). Hay [1] revealed that the maximum value of the standard deviation was recorded from the 1st last stride to the 8th last stride, and the maximum frequency was recorded at the 5th last stride for the elite long jumpers. Such a difference between the Japanese junior jumpers and the elite long jumpers reported by Hay might be due to the difference of the physical ability, approach velocity, and the performance level. Hay [1] also established the standard value for assessment of the approach run. According to his study on the elite long jumper, the maximum standard deviation of 0.20m or less was classified as "very good", and that of 0.25m or more was classified as "poor". In this study, more than the half of the jumpers (nine of sixteen jumpers) showed the maximum standard deviation of 0.25m or more (poor), and the maximum value of the junior jumpers was 0.47 m. These results suggested that the approach run of the junior long jumpers were unstable; therefore they have to spend more time to improve and stabilize their approach run.

The peak angular velocities of the free leg during the takeoff for the top three junior jumpers were greater than those of other junior jumpers. And also, the peak angular velocity was observed at the similar phase for the elite long jumpers. These free leg movements for the top three junior jumpers might be effective to obtain the distance of jump. Therefore, it is conceivable that they had mastered the proper technique for the takeoff.

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