UNIVERSITI TEKNOLOGI MARA

THE EFFECT OF HAND GRIP AND TRUNK ROTATION STRENGTH TRAINING ON THROWING BALL VELOCITY AMONG FEMALE COLLEGIATE SOFTBALL PLAYERS

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledge as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with Academic Rules and Regulations for Post-Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Throwing ball velocity is one of the important indicators that determines the softball performance. However, most of the training on throwing only focused on the major muscles and neglected the supporting muscles such as hand grip and trunk rotation muscles that may also help in improving the throwing ball velocity. Therefore, the purpose of this study was to identify the effect of handgrip strength training (HG), trunk rotation strength training (TR) and the combination of both strength training (CB) towards the throwing ball velocity among female collegiate softball players. This study was divided into two phases. Phase One of the study was conducted to identify the muscles involved in hand grip during the throwing process using Electromyography (EMG) test to capture the muscles activity. The EMG test revealed the six most active muscles in the throwing process were the Extensor Digitorum (ED), Flexor Digitorum (FD), Abductor Pollicis longus (FPL), Flexor Pollicis Brevis (FPB), Abductor Pollicis Brevis (APB), and Flexor Pollicis Brevis (FPB). These muscles were used in developing the training program for hand grip exercises that were employed in the Phase Two of the study. Seventy-two female collegiate softball players were equally assigned into four training groups which were hand grip strength (HG), trunk rotation strength (TR), combination group (CB), and control group (CG). Each group trained three days per week for six weeks. Throwing ball velocity, hand grip strength and trunk rotation strength were assessed before (pretest) and after (posttest) the six weeks training program. Paired sample t-test was used to assess the strength and velocity difference of pretest and posttest in each group. Meanwhile, one-way between groups analysis of variance was conducted to compare the mean gained score (mean difference) between each group. All groups were significantly increased in the throwing ball velocity in posttest ($p<.05$). The HG group increased by 1.45 m/s, TR by 1.62 m/s, CB by 2.08 m/s and CG increased by 0.93 m/s. The post-hoc test indicated that all training groups were significantly different compared to each other except between HG and TR group. Although both HG and TR groups also improved in the throwing ball velocity, the increment of ball velocity in the combination strength training (CB) group was more superior compared to others strength training approach (HG, TR & CG). These findings demonstrated that throwing ball velocity can be efficiently increased by combining both type of trainings (HG & TR). This is probably due to more muscle group's involvement in the CB training group, which has led to an effective submission of force during the throwing execution.

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