ABSTRACT

STRENGTH OF SHOULDER ROTATOR MUSCLES AND ITS RELATIONSHIP TO THROWING PERFORMANCE IN CHILDREN

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Background: External (ER) and the Internal Rotators (IR) of the shoulder play a vital role in the throwing mechanism and any alteration in their activity is likely to have a major effect on the throwing performance. Considerable amount of work has been done on muscle strength and imbalances between Isokinetic External Rotators (ER) and Internal Rotators (IR) of the shoulder in adult throwers, shoulder injuries in throwing and their rehabilitation, but there was a paucity of research linking throwing performance and Isometric and Isotonic Shoulder rotator muscles strength. Aims and Objectives: Studying the relationship between Isometric and Isotonic strength and strength ratios of the shoulder rotators and throwing performance in the age group of 16-18. In addition to this, the study also attempts to find out the effect of end range Isometric training of ER and IR muscles and its effect on throwing performance measured as distance. Materials and Methods: Isometric and Isotonic strength of ER and IR was measured using strain gauge and 1RM methods to find out the ratios between the two groups. Throwing performance was measured as distance which was studied for its relationship to throwing performance. End range Isometric Training was given to ER muscles in 60 subjects to improve ratios and the change in throwing distance was observed in this group over a period of 8 weeks. Results: The major findings of this study were the significant correlations between Strength ratios of ER:IR measured isometrically and isotonically and throwing distance. The ratio of ER: IR was approximately .61 at 70° but was found to be .59 when measured at 90° of External Rotation which was statistically significant. The results of our study revealed a significant correlation of isometric ratios of ER: IR and throwing performance measured as throwing distance. The 1 RM ER: IR ratios were found to be 0.62 and there was no statistical differences between Isometric and isotonic ratios. The Isotonic ratios were also strongly correlated to the Standing Throw (ST) (r=0.48) whereas the correlation was weak to moderate with the Step Throw (SPT) (r=0.36). In the second phase of the study, there was very little improvement (statistically insignificant) between 0-4 weeks of Isometric training. Between 4-8 weeks there was significant improvement in the ER:IR ratios and accordingly a significant change was observed in the throwing distances both in Standing Throw (ST) as well as in Step Throw (SPT). Conclusion: Based on our results, we would like to suggest that Isometric Strength ratios of Shoulder Rotators have the potential to affect throwing performance and therefore their assessment near end ranges can provide useful information. Isotonic methods are also useful tools to evaluate shoulder muscle imbalances in addition to Isometric techniques. The authors would also like to suggest isometric training of shoulder rotators near end ranges to improve throwing performance.

Key words: External rotators, Internal rotators, Isometric, Isotonic, Standing Throw