

# **The effects of knee flexion on muscle activation and performance during chin-up exercise**

## **ABSTRACT**

Background and Study Aim Chin-up is an exercise that is done to improve the strength, muscular endurance and size of the upper back and arm muscles. There are many ways to perform chin-up exercises including by performing it with different forms of knee flexion. This study aims to examine the effects of knee flexion on muscle activation and performance during chin-up exercise. Material and Methods a total of twenty-one healthy trained male (age 20-25 years old) were recruited and were instructed to perform chin-up exercises in three knee conditions: i) knee fully flexed, ii) partial knee flexed, and iii) straight knee. Chin-up performance was measured by the number of repetitions performed in three sets. Muscle activation was measured using EMG and taken from latissimus dorsi (LD), posterior deltoid (PD), and biceps brachii (BB) during both concentric and eccentric phase. One-way repeated measure Analysis of Variances (ANOVA) were conducted to compare the muscle activation and number of repetitions performed across the three variation of chin-up exercise. Results Findings showed that during the concentric phase, BB recorded higher muscle activation during straight knee compared to knee fully flexed and partial knee flexed,  $p < .05$ . In addition, chin-up performance during straight knee and partial knee flexed were better than knee fully flexed,  $p < .05$ . Conclusions The results of this study demonstrated the importance to consider techniques manipulation during exercises due to its effects on acute responses as shown by number of repetitions and muscle activation in this study that might also affect the long-term outcomes.