

A STUDY OF THE LEG JOINTS MUSCLE STRENGTHS RATIOS FOR DIVING ATHLETESYing Liu¹, Qi Yan¹, Xiaoni Lin² and Xin Ma¹¹Beijing Research Institute of Sports Science, Beijing, China²Beijing Diving Team, Beijing, China**KEY WORDS:** isokinetic

INTRODUCTION: In diving, excellent power is needed for the athletes to complete the complex diving movements. This research focused on studying the relationships between the power and absolute strength as well as the ratios among the strengths of muscle groups of hip, knee and ankle. Further in-depth analysis of these relationships was also conducted.

METHODS: 12 female athletes were selected, among them 7 national-level aged from 17~20, 5 Beijing city-level aged from 11~14. Isokinetic strength measurement system from MERAC of USA was used and the testing speeds of 60 degree/second (referred as "absolute strength") and 240 degree/second ("quick strength") were set. The absolute strength test is performed for 6 times and the quick strength test for 10 times. The highest normalized peak torques (peak torques/body weight) was used for calculating the percentage ratio of quick strength peak torques to absolute strength peak torques, defined as A, which is used as an important indicator for the analysis.

RESULTS AND DISCUSSION: ①Hip Joint Muscle Strengths: The testing results showed the A values for flex and stretch of hip joints all above 74%. ②Knee Muscle Strengths and the Muscle Groups Balance: The A values of the knee joints stretching muscle fall between 61~64%. Though a balanced strength is extremely important, test data showed significantly lower flex to stretch strength ratios for the Chinese diving athletes compared to those of other sports, as demonstrated by the following rankings: at the quick strength speed, track and fields 59% > rowing 53% > weight lifting 52% > diving 51%; and at the absolute strength speed: track and fields 75% > rowing 63% > weight lifting 58% > diving 51%. ③Ankle joint muscle strengths: The results on ankle joints demonstrate some specific characteristics. The average A values for left and right ankle flexion are 92% and 93% respectively; while the average A values for extend ankle are 58% and 53% respectively.

CONCLUSIONS: ①The A values for hip stretch, knee stretch and ankle extend demonstrate a descending order, where $A(\text{hip}) > A(\text{knee}) > A(\text{ankle})$. ②The absolute strength, the quick flex strength, the quick stretch strength, as well as flex-stretch muscle ratio of female diving athletes are all lower than those of athletes of some other sports. ③There is no significant difference between the athletes of national-level and the younger Beijing city-level in the A values for hip and knee. However, the absolute strength of ankle joints for the later are weaker, resulting in the higher quick strengths than the absolute strength, indicating the needs for increasing the strengths, especially the flexing strength, of the ankle joints of the younger athletes.

REFERENCES:

Zhang Yue, et al. (2002). Comparative study of isokinetic strength of knee extensors and flexors of weight lifters, rowers and track and field athletes. *Sport Science*, Vol.22 No. 4.