

## **Influence of Muscle Volume on Jumping Performance in Healthy Male and Female Youth and Young Adults**

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**Introduction:** Various studies underlined the effect of different variables such as age, gender, muscle type, muscle mass and cross-section, hereditary traits, training and body composition on anaerobic performance (Bencke et al., 2002; Mayhew et al., 2001). Additionally, muscle fascicle length, leg volume and muscle mass were of great importance in muscle strength developing in anaerobic sport (Armstrong et al., 2001). Therefore, athletes need higher amount of muscle mass, muscle cross section, leg volume and mass for a better anaerobic performance. Thus, the present study's objective is to investigate the relationship between vertical jump performance and muscle volume according to sex and age. We hypothesized that the lower limbs' muscle volume could be considered the determining factor in intersexual differences in vertical jumping performances.

**Methods:** One-hundred eighty healthy males (n=90) and female (n=90) performed three different types of vertical jumps (VJ): Squat jump (SJ), Counter Movement Jump (CMJ), and Counter Movement Jump with arms (CMJ with arms). We used Anthropometric method to calculate leg muscle volume.

**Results:** Across age groups, leg muscle volume differed. For both genders in the SJ, CMJ, and CMJ with arms, significant age, gender, and interaction effects were found. From the age of 14-15, males performed significantly better than females and large effects size became apparent in SJ (d=1.09, P=0.04), CMJ (d=2.18; P=0.001) and CMJ with arms (d=1.94; P=0.004). For age group 20-22 years significant difference in VJ performance between males and females. Extremely large effect size became apparent in SJ (d=4.44; P=0.001), CMJ (d=4.12; P=0.001) and CMJ with arms (d=5.16; P=0.001). When performances were normalized for lower limb length, these differences persisted. Following normalization to leg muscle volume, males elicited better performance when compared to females just in the 20-22 age group in SJ (p = 0.005), CMJ (p = 0.022) and in CMJ with arms (p = 0.016). For males participants, a significant correlation were found between muscle volume and SJ (r = 0.70; p < 0.01), CMJ (r = 0.70; p < 0.01) and CMJ with arms (r = 0.55; p < 0.01).

**Discussion:** The study showed that leg muscle volume was different across age groups. 20-22 years groups presented higher leg muscle volume compared to 9-10 years and 14-15 years. SJ, CMJ and CMJ with arms increased significantly over age groups for both males and females. From the age of 14-15, performances were significantly higher in male groups compared to female groups. These differences were also maintained when performances were normalized to the lower limbs length. Even normalization to lower limbs muscle volume, males elicited better performance when compared to females. This difference persisted only for the 20-22 years groups.

### **Biography**

Dr. Souhail Bchini is a distinguished figure at the Higher Institute of Sport and Physical Education in Ksar Said, affiliated with the University of La Manouba, Tunisia. His contributions to sports education are remarkable.