

## **ANAEROBIC PERFORMANCE OF ADOLESCENTS *VERSUS* ADULTS: EFFECT OF AGE AND SOCCER TRAINING**

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### **ABSTRACT**

Anaerobic performance, whether expressed in absolute or relative to body mass, was shown to be lower in children and adolescents as compared to adults. This study examined the interaction of age and soccer training on indices of anaerobic power. Subjects consisted of 36 boys (18 soccer players; age =  $13.9 \pm 1.2$  yr., and 18 untrained boys; age =  $19.3 \pm 1.2$  yr., and 38 adult males (19 soccer players; age =  $24.1 \pm 2.3$  yr., and untrained males; age =  $21.7 \pm 1.6$  yr.). Anaerobic performance was assessed by Wingate anaerobic power test using a flying start. A tow-way ANOVA revealed significant interaction ( $p < 0.01$ ) between age and training in absolute peak (PP) and mean (MP) anaerobic power. However, when anaerobic power was related to body mass, the interaction became insignificant. Analyses of the main effects revealed that training had a significant ( $p < 0.01$ ) effect on MP (W/kg), but not PP. Further analysis of MP (W/kg) data showed that training was significantly effective among adults but not among adolescents. It was concluded, therefore, that soccer training did not improve adolescent's PP and MP as much as it did in adults.

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## **INTRODUCTION**

Anaerobic performance, whether expressed in absolute or relative to body mass, was shown to be lower in children and adolescents as compared to adults <sup>(1, 2, 3)</sup>. Compared to aerobic power, studies that address anaerobic trainability of children and adolescents are considerably limited. Most of research findings indicate significant improvements in anaerobic performance measures of elite soccer players <sup>(4)</sup>, and non-athletic boys <sup>(5)</sup> following interval training. Resistance training, however, failed to increase anaerobic power as measured by all out cycle exercise test in a group of young hockey and soccer players <sup>(6)</sup>.

Cross-sectional comparisons of young athletes versus non-athletes revealed mix results. Falgairette, et al. <sup>(7)</sup> found no differences in peak and mean power between active and non-active preadolescent boys. In another study, however, prepubertal wrestlers were reported to have greater anaerobic power than non-athletes <sup>(8)</sup>.

Thus studying anaerobic performance in trained versus non-trained adolescents as compared with adults may shed light on some aspects of adolescent's anaerobic trainability.

## **PURPOSE OF THE STUDY**

To examine the interaction of age and soccer training on peak (PP) and mean (MP) anaerobic power, as measured by all out cycle exercise test, in four groups of trained/untrained adolescents and adults.

## **MATERIALS AND METHODS**

### **Subjects:**

Thirty-six adolescent boys (18 soccer players and 18 untrained boys), and 38 adult males (19 national soccer players, and 19 untrained males) volunteered to participate in this study. Body fat percent was estimated from triceps and sub-scapular skinfolds using equation from slaughter, et al. <sup>(9)</sup>.

### **Anaerobic Power testing:**

Anaerobic performance was assessed using Wingate anaerobic power test (10), conducted on a friction-loaded cycle ergometer (Monark 814E), interfaced with a microcomputer. The resistance was set at 0.075 kg per kg of body mass. The test commenced from a rolling start while the weigh basket was supported. Peak power during the highest 5-second interval was used as the peak anaerobic performance, while the mean power over the 30-second period was used as the measure of mean anaerobic performance.

### **Statistical Analysis:**

Data were reported as means (standard deviations). A two-way ANOVA (age by training status) was used to test the interaction of age and training on measures of anaerobic power. The level of significance was set at 0.05.

## RESULTS

The findings of the study are presented in tables 1 through 3. From these tables, we can briefly state the following:

- 1- There were significant interactions between age and training, in absolute peak and mean anaerobic power.
- 2- When the values of anaerobic power were related to body mass (W/kg), the interactions became insignificant.
- 3- Training showed a significant main effect ( $p = 0.003$ ) on mean power, with a large magnitude ( $ES = 0.80$ ), among adult males.
- 4- Training showed an insignificant main effect ( $p = 0.13$ ) on mean power, with a moderate magnitude ( $ES = 0.47$ ), among adolescent boys.

## CONCLUSION

- 1- Soccer training did not lead to a significant improvement on peak or mean anaerobic power, as measured by all out cycle exercise test, in adolescent boys
- 2- The magnitude of training effects on anaerobic performance of young soccer players is found to be moderate ( $ES = 0.47$ ).
- 3- This low training effect on adolescent's anaerobic power, compared to what was seen in adult soccer players, may be related to differences in maturation, qualitative and quantitative aspects of youth soccer training, or both.

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**Figure1: Mean Anaerobic Power (W/kg)**

