POSTURAL CONTROL IN SKILLED ATHLETES IN RESPONSE TO UNEXPECTED PERTURBATION

Sheylla K. Yoshitomi[1], MS, Clarice Tanaka[1,2], PhD, Marcos Duarte[3], PhD, Fuad A. Hazime[1], MS
[1]Division of Rheumatology, School of Medicine, University of São Paulo, Brazil, sheyllaky@uol.com.br
[2]Department of Physical Therapy, Speech Therapy and Occupational Therapy, University of São Paulo, Brazil
[3]School of Physical Education and Sport, University of São Paulo, Brazil

INTRODUCTION

Judo is an Olympic sport modality based on a straight combat between two athletes, whose main objective is to dominate the adversary leading him to knock down. The achievement of a good performance requires the development of athletes' equilibrium and muscular force [1]. The role of balance is enhanced by the end of the fight with the disequilibrium of one of the adversaries, followed by his immobilization or giving up. According to the judo techniques, athletes are constantly subjected to unexpected movements imposed by their adversaries with the objective of creating opportunities to break their equilibrium to define the combat [2]. This modality leads the athlete to develop news sensorial-motors strategies and mental abilities that contribute to improve his postural control [3]. This study aimed to test the hypotheses that athletes of this modality presents better postural control in responses to unexpected perturbation than a healthy and recreationally active young group.

METHODS

Ten skilled male judo athletes and ten healthy and recreationally active young male adults (age and weight matched) participated in this study. Subjects were asked to stand still on an AMTI force plate. Using a resistant non-extendable thread we applied at the subject's upper mid spine (i.e., at the level of the inferior border of the scapulae) an external posterior perturbation (EPP) by means of halters equivalent to 6% of the subject body weight. Three trials of 40s were collected with data acquisition beginning 2s prior to the EPP. After observing that the subject reacquired apparent stability with EPP, the EPP was then unexpectedly released. Postural control was analyzed in 8 intervals of 1s each (T1 to T8) starting at the moment of EPP release. Analysis of variance was used to compare mean of COP speed and COP displacement for T1 to T8 and maximum COP displacement during T1. The α level was preset at p less than 0.05 and post–hoc (Tukey HSD test) were conducted when necessary.

RESULTS AND DISCUSSION

Athletes showed better postural control than control group. In the first second (T1) after EPP release ANOVA showed that athletes presented COP speed 16.4% lower than control group (p=0.01) (Fig. 1). Intragroup analysis showed similar COP displacement from T2 to T8 for control group. However, in athletes, COP displacement was higher during T2 than others intervals (Fig. 2). Summarizing (1) both groups presented similar reflexive response to the perturbation with no inter-groups difference in the maximum COP displacement in T1, (2) the athletes presented lower COP speed in T1 and (3) athletes were slower to bring the COP backward (T1≠T2, T2=T3=...T8). These results reveal better postural control of the athletes than the control group after the perturbation

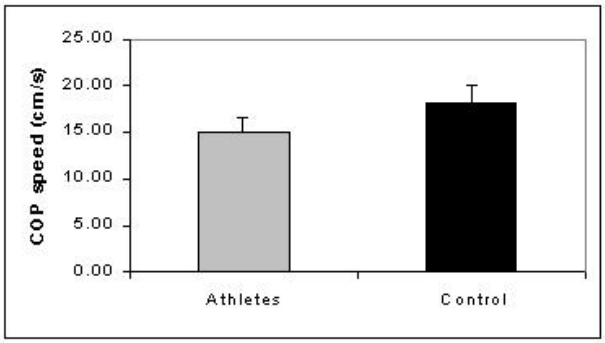

Figure 1: Mean of COP speed for athletes and control group in the T1.

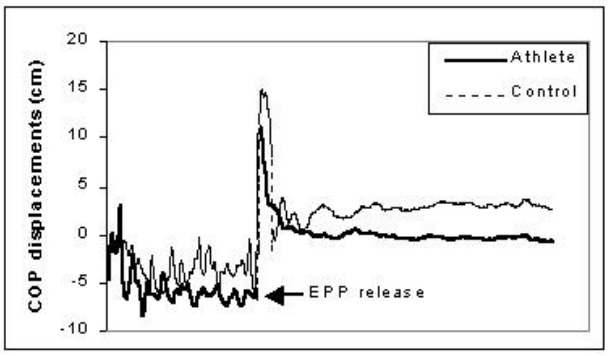

Figure 2 – Example of athlete and control subject postural control. Athlete (dark line) and control subject (light line) cop displecement during trial 2 and 3 respectively.

CONCLUSIONS

Athletes presented better postural control in response to unexpected perturbation compared to healthy and recreationally active young male adults.

REFERENCES

1. Fracarolli JL. *Biomecânica: análise dos movimentos.* 2ª ed. Rio de Janeiro: Cultura médica; 1981.
2. Perrin P, Deviterne D, Hugel F, Perrot C. Judo, better than dance, develops sensorimotor adaptabilities involved in balance control. *Gait and Posture*. 2002;15:187-94.
3. Perrot C, Deviterne D, Perrin PH. Influence of training on postural and motor control in a combative sport. *Journal of Human Movement Study.* 1998; 35:119-36.