ANTICIPATORY POSTURAL ADJUSTMENTS DURING LUNGE IN FENCING

Summary

The proper process of motor control determines both the effective performance of activities of daily living and the technical and tactical effectiveness of an athlete during a sport fight. Therefore, the purpose of this study was to determine the impact of performance conditions (self-paced, reaction response), starting position (width of the base of support) and distance and size of the target for the onset of the anticipatory postural adjustment during lunge in fencing.

The study included 8 elite epee fencers, members of Polish National Team (age 21.8 ± 3.27, body height 173.6 ± 10.49, body weight 64.8 ± 8.62) and 10 students of the Academy of Physical Education in Katowice (age 21.4 ± 0.8, body height 161.7 ± 6.07, body weight 58.5 ± 6.3) who were familiar with the technique of fencing lunge. All the participants were women. The main task was to perform a simple attack with lunge as rapid as possible at a specific target in various starting conditions. In the first part of the experiment, the subjects performed a simple attack with lunge to 50 cm wide target starting from their preferred en garde position, and then from en garde position in which the distance between the subject's feet was increased and reduced by 20%. In all three variants of foot positioning, the subject performed a simple attack with a lunge in three reaction response conditions: self-paced, simple and choice reaction time. In the second part of the experiment, took part only the group of fencers. Their task was to hit a 50 cm and 10 cm wide target with simple attack with lunge from three different distances from the target, corresponding to 145%, 150% and 155% of the height of the examined subject.

To record the onset of the fencing lunge, a 3D wireless accelerometer (Noraxon) was used. Anticipatory postural adjustment was measured by surface electromyography (Noraxon, Telemyo DTS Desk Recevier) from the anterior tibialis muscle (APA_{EMG}) and by the force platform (AMTI, AccuGait, USA) based on the COP pathway (APA_{COP}). All devices have been synchronized using the MaxPro software.

The results show that fencers are characterised by later onset of anticipatory postural adjustments compared to the control group, regardless of the starting conditions. Anticipatory postural adaptation in the fencers (APA_{EMG} and APA_{COP}) and in the control group (APA_{COP}) occurred significantly earlier when performing a lunge in self-paced manner than under reaction time conditions ($p < 0.05$). The changes in the base of the support did not affect the time of APA_{EMG} and APA_{COP} in the fencers and APA_{COP} in the control group. However, significant and

inversed changes were observed in the time of APA_{EMG} in the control group in comparison to fencers in reaction response and base of support conditions ($p < 0.05$). Among the fencers, the onset of APA_{EMG} scaled with the task difficulty index, while APA_{COP} did not show a significant correlation with the index of difficulty.

The later in the onset of APA in fencers may be a result of the fact, that the simple attack with lunge is basic motor skill, which is highly automated during years of training and performed in each training session under various of starting conditions. The differences in the onset of APA_{EMG} and APA_{COP} under different starting conditions, as well as lack of the effect of APA_{COP} scaling with index of difficulty indicate, that in this study, two independent mechanisms of feedforward motor control were observed - early and anticipatory postural adjustments.