

ABSTRACT

Title

Influence of a performance level of fencers on reaction time and activation of selected muscles during a lunge.

Problem

The motion efficiency of offensive or defensive actions implemented during the match of fencing is related to the consolidation of movement patterns in the CNS through the training process and competition situations. In this regard, muscle activation during a lunge, which is the most common form of attack, may be important for the resulting performance of fencers. The attack during a match is usually initiated by the occurrence of visual stimuli (eg. opponent's arm movement). Throughout the training process and practice, in which the given model situations are repeated, occurs a creation of a specific purpose motion program stored in memory. Fencers are during the match often exposed to situations where they have to respond simultaneously to multiple stimuli that have to be adequately evaluated. The appropriate response may be associated with the movement or ignorance of stimuli, therefore will this work also deal with the level of complex reaction time. When measuring complex reaction time so-called "additional" stimulation will be used, it is increasing the number of stimuli, but should not lead to physical reaction of the fencer. The results of the present work related to complex reaction time can then be confronted with the Hick's law, which demonstrates the relationship of the reaction time on the number of stimuli generated.

The work is based on the assumption that there are detected differences in variables (muscle activation, reaction time) between different performance levels of fencers. This assumption is based on results and claims of previous studies and scientific literature, where the authors draw attention to the fact that there are differences in the effectiveness of applied motion and speed of processing information from the environment between experienced and less experienced athletes.

Objective

The aim is to determine whether there are differences between different performance groups of fencers in selected characteristics (variables):

- a) activation of selected muscles during a lunge,
- b) level of simple and complex reaction time,
- c) reaction time during different motion task,
- d) time required to perform a lunge

Methods

Surface electromyography was used to analyze the temporal activation of selected muscles during a lunge. The level of reaction time to visual stimulation was monitored by Fitrosword device that has been developed primarily for measuring simple and complex reaction time and the speed of the lunge. The research sample consisted of 43 épée fencers divided into appropriate groups based on current performance (elite fencers, subelite fencers, novices). Elite fencers participate in Czech championships, international competitions and World Cup competitions. Subelite fencers participate in domestic competitions and Czech championships. Novices did not participate in any competitions in the discipline épée.

Results and conclusions

After comparing elite and subelite fencers we can say that there were no significant differences in temporal activation of any of the five monitored muscles. The differences, however, occurred in a comparison of these two groups with a group of beginners in temporal activation of *m. deltoideus pars anterior* (MDA). The activation of this muscle was in a group of elite fencers identified much earlier than in the group of beginners. A similar difference was also found between subelite fencers and beginners.

Among the monitored groups of fencers was no significant difference in the values of simple reaction time. The difference did not occur even in the comparison of pairs from groups (elite vs. subelite, subelite vs. beginners, elite vs. beginners).

In the presented work were not found differences between groups in the values of complex reaction time of the two stimuli, nor in the values of complex reaction time to three stimuli. These results also support the validity of Hick's law, which was reflected in all three groups of fencers.

The results clearly indicate that all observed groups reached similar values of total lunge time (there was no statistically significant difference).

Key words

fencing, lunge, simple reaction time, complex reaction time, surface electromyography

