REVIEW OF LITERATURE

Reaction time (RT), movement time (MT), total response time (RMT), and accuracy of 3 elite and 3 novice fencers were studied by Williams and Walmslev (2000) under a dual response paradigm requiring a full lunge. Electromyographic activity (EMG) from selected arm and leg muscles was used to compare response profiles of the two groups. Although the elite subjects had slower MTs, their faster RTs resulted in significantly shorter total response times. The EMG analysis showed that in comparison to the novice subjects, onset of muscle activity was significantly faster for the elite group in five of the six muscles studied. In addition, the elite subjects showed more coherent muscle synergies and more consistent patterns of muscle coordination. Although the requirement to change targets (signaled by the arrival of a second stimulus) led to slightly more target misses for the elite group, the overall frequency was low, which indicates that it did not pose difficulty for either group. The present findings show that measures of response timing and neuromuscular coordination differentiate skill level in the fencing lunge and draw attention to practical implications for skill assessment and training.

In another study Williams and Walmsley (2000) studied Reaction time (RT), movement time (MT), total response time (RMT) and accuracy of elite and novice fencers under three levels of target choice (single-, two- and four-targets) with three variations of movement distance (short, medium and long lunge). In addition, electromyographic activity (EMG) of selected upper and lower limb muscles was used to compare the two groups. The elite subjects were faster for RT and RMT and displayed a higher level of accuracy. The hypothesis that increasing choice would cause increases in RT was not upheld. Except for some differentiation between the short and the two longer distances, the effects of movement distance were not marked. Qualitative and quantitative analysis of EMG revealed the high consistency of response patterns within subjects and highlighted the synergistic roles of selected muscles in distinguishing between elite and novice fencers. These findings confirm that differences in the technical skill of fencers can be distinguished in the laboratory through a combination of response timing measures in association with measures of muscle action. They also draw attention to practical implications for individual skill assessment and training. Analysis of pre-movement muscle activity provided moderate support for the hypothesis that it was part of a single control process and indicates that a dual
process can involve both the maintenance of postural stability and the generation of movement. It is suggested that different movement contexts can lead to different levels of coordination between the system controlling posture and that controlling movement.

In a review conducted by Roi and Bianchedi (2008) analysed the data from the literature on fencing with the aim of creating a psychobiological and multi-factorial model of fencing performance. Fencing is an open-skilled combat sport that was admitted to the first modern Olympic Games in Athens (1896). It is mainly practiced indoors, with three different weapons: the foil, the sabre and the épée, each contested with different rules. A fencing international tournament may last between 9 and 11 hours. Bouts represent only 18% of total competition time, with an effective fight time of between 17 and 48 minutes. The physical demands of fencing competitions are high, involving the aerobic and anaerobic alactic and lactic metabolisms, and are also affected by age, sex, level of training and technical and tactical models utilized in relation to the adversary. The anthropometrical characteristics of fencers show a typical asymmetry of the limbs as a result of the practice of an asymmetrical sport activity. Fencing produces typical functional asymmetries that emphasize the very high level of specific function, strength and control required in this sport. Moreover, the physical demands of fencing are closely linked to the perceptual and psychological ones, and all are subjected to a continuous succession of changes during the bouts based on the behaviour of the opponent. For this reason it is difficult to identify a significant relationship between any one physiological characteristic and performance, and performance is more likely to be influenced by perceptual and neuro-physiological characteristics. Fencers need to anticipate the opponent and to mask their true intentions with a game of feints and counter-feints, which must be supported by an adequate psycho-physical condition to prevent central and peripheral fatigue. Fencing is not particularly dangerous; however, there is a fine line between a fatal lesion and a simple wound from a broken blade. The suggestions for injury prevention fall into three primary areas: (i) actions that can be taken by participants; (ii) improvements in equipment and facilities; and (iii) administration of fencing competitions. As in every other sport, the prevention of accidents must be accomplished at various levels and above all must involve the institutions that are responsible for safety in sports.
Until now endurance in fencers has been tested by non-specific ergometer tests even though the movement patterns during fencing are considerably different. Hence Weichenberger, Liu and Steinacker (2011) evaluated a newly developed fencing-specific endurance test (FET). 2 studies were carried out: 28 fencers were tested by FET with fencing-specific footwork and incremental tests on cycle (CE) and treadmill ergometer (TM) in a random order. Afterwards fencing bouts (BOU) were conducted to determine specific physical load. Blood lactate and heart rates were measured. In a second study another group of 18 international and 20 national level fencers conducted FET to explore differences between groups. Comparison of CE, TM, FET and BOU revealed a significant correlation between FET and BOU (r=0.80, p<0.01), heart rates during CE and TM were significantly lower than in bouts (p<0.01). Performance at CE and TM hardly correlated with FET (r=0.30, p<0.05; r=0.31, p<0.05). Elite-fencers showed significantly better performance than non-elite fencers in FET (p<0.01). FET was suitable for determining specific endurance in fencers, allows a better assessment of physical demands during bouts than conventional ergometry and can be used to distinguish between fencers of different levels.

Poulis et al., (2009) examined the relation of leg preference and muscular strength in elite fencers. The dominant and nondominant extensor and flexor muscles of 30 elite fencers (M age = 18.2 yr., SD = 2.0 yr.; M height = 173 cm, SD=7.4 cm; M weight = 62.7 kg, SD=8.9 kg), who were members of the Greek national team, and 14 healthy, young, sedentary adults (8 men, 6 women; M age 23.4 yr., SD = 1.9; M height = 169 cm, SD = 10.5 cm; M weight = 66.3 kg, SD = 9.9) were tested for concentric isokinetic contraction at slow (30 to 60 degrees/sec.) and fast (240 degrees/sec.) angular velocities. Significant multivariate differences were found between groups for knee extension, angle of knee extension, knee flexion, and flexor/extensor peak torque ratio. In contrast, no significant difference was found between the dominant and nondominant legs. There was no significant difference in the flexor/extensor peak torque ratio among any of the concentric angular velocities tested. These findings suggest that long-term training in fencing influences the strength characteristics of the lower limbs.

Pradhan and Nagendra (2010) investigated the effect of two yoga-based relaxation techniques, namely, cyclic meditation (CM) and supine rest (SR), using the six letter cancellation task (SLCT). The subjects consisted of 208 school students, (132 boys, 76 girls) in the age range
of 13 - 16 years. The subjects were assessed on SLCT before and immediately after both yoga-based relaxation techniques. After both practices, the total and net scores were significantly increased, although the magnitude of change was more after CM than after SR in the net scores (14.5 versus 11.31%). The net score change in the CM session was significantly larger than the change in the SR, whereas, there was no significant change in the wrong cancellation score. After either practice, the total and net scores were significantly increased, irrespective of gender and age. Both CM and SR led to improvement in performance, as assessed by SLCT, but the change caused by CM was larger than SR.