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THE MOTOR NERVE CONDUCTION AND VELOCITY OF ULNAR AND COMMON PERONEAL NERVE IN ATHLETES OF ANAEROBIC SPORTS

DR. BAPPASAHEB MASKE
Associate Professor and Head
Dept. of Physical Education
Sant Ramdas Mahavidyalaya, Ghansavangi Dist. Jalna, Maharashtra

Abstract

The purpose of this study was to investigate motor nerve conduction velocity (MNCV) of ulnar & common peroneal (CPN) nerves of bilateral side (i.e. dominant & non-dominant) of athletes who are engaged in an anaerobic type sport activity (sprinters & power lifters). A total of 40 male sprinters & power lifters with an average age, height and weight of 20.70±1.76 years, 171.38±3.31 cm and 71.06±6.04 Kg respectively, volunteered to participate in this study. Each subject's MNCV was measured with the help of computerized equipment called "NEUROPERFECT" (Medicaid Systems, India) and the data was analysed using Mean ±SD, t-test and Pearson correlation. Results show that MNCV of ulnar nerve of right and left side was significantly different ($p < .05$). MNCV of common peroneal nerve of bilateral side also significantly different ($p < .05$). For both ulnar and common peroneal nerves, results showed that the right ulnar nerve had significantly faster MNCV than the right CPN nerve ($p < .05$). According to the results, faster MNCV in right ulnar nerve (i.e. dominant) and left CPN as compared to left ulnar nerve and right CPN in sprinters and power lifters may be from their long term training adaptations and further it may be relate to their upper & lower extremity movement requirement of changing their movement direction quickly and skilfully.

Key Words: Motor Nerve Conduction Velocity, Sprinters, Power Lifters.

Introduction

MNCV is a measure of speed of pulse (nerve impulse) can be transmitted along a motoneuron. A fast MNCV is also an indicator of a short refractory period. In other words, the decreased refractory period may allow for greater impulse frequency, thereby increasing muscle activation levels. It is known that exercise can cause structural changes in skeletal muscles as well as an increase in excitability of motor units. But the effects of the type and intensity of exercise on these changes have not been studied in detail. Some studies suggest strength and power athletes have faster MNCV than endurance athletes. However, it has also been reported that no differences were evident between power and endurance groups (Sleivert et al., 1995). Other researchers have shown that trained individuals have faster MNCV than untrained ones (Hoyle & Holt, 1983). In theory, changes in MNCV may be an indicator of nerve system adaptation due to long-term physical suggest strength and power athletes have faster MNCV than endurance athletes (Kamen et al., 1984). However, it has also been reported that no differences were evident between power and endurance groups (Sleivert et al., 1995). Other researchers have shown that trained individuals have faster MNCV than untrained ones (Hoyle & Holt, 1983). In theory, changes in MNCV may be an indicator of nerve system adaptation due to long-term physical exercise training. Previous studies had investigated the clinical type of individuals. But it is more meaningful and interesting to test the athlete especially in which the predominant energy system is an anaerobic type like sprinters & weight lifters and that need to control their lower extremities accurately and speedy that is requiring more neural adaptation for motor nerve conduction velocity after specific physical exercise training. Therefore, the purpose of this study was to investigate motor nerve conduction velocity in upper and lower extremities (radial & sural nerve of bilateral side) of athletes who are engaged in an anaerobic type sport activity and to realize whether their neural specification would change from long term training.

Methods

Subjects total 50 sprinters & weight lifters in the age range of 18-25 years were voluntarily participated as subjects in the present study on the basis of their predominant energy system i.e. anaerobic. The dominant hand of all the subjects was right hand. The data was collected in Exercise Neurophysiology Laboratory, wherein the room temperatures were kept 24.9 ± 00.2 ºC during the MNCV testing. The right and left arm and leg was testing for ulnar and common peroneal nerve (CPN) respectively. Motor Nerve Conduction Velocity (MNCV) was assessed with the help of computerized equipment called “Neuroperfect” (Medicaid Systems, India) by using the traditional double stimulation technique. Square pulses of 0.1 ms duration and of sufficient intensity to evoke a supramaximal compound muscle action potential were applied at each stimulus point with surface stimulating electrodes. The subject lay on a wooden table with the straight arm and leg as radial and sural nerve was tested.

Statistical analysis

Data were statistically evaluated with the t test and Pearson correlation test using SPSS version 11.0 (SPSS). Significance was set at the $p < 0.05$ level

Results

The mean age, body height and body weight of the subjects were 20.70±1.76 years, 171.38±3.31cm and 71.06±6.04 kg respectively (Table 1).

Table 1 Mean ±SD of physical characteristics of an anaerobic group of players

Group	N	Age (Yrs.)	Height (cm)	Weight (kg)
Anaerobic	50	20.70±1.76	171.38±3.31	71.06±6.04

The mean values of MNCV of right and left ulnar and common peroneal nerves were 44.0 ± 6.8 m/s, 43.9± 6.5 m/s, 43.9 ± 6.2 m/s and 41.5± 7.0 m/s respectively (Table 2). It was found that the difference in the mean values of MNCV of right and left ulnar nerve were statistically significant (p < .05) and further It was found that the MNCV of right ulnar nerve was higher than left. The difference in the mean values of MNCV of right and left common peroneal nerve were also statistically significant (p < .05) and further It was found that the MNCV of left common peroneal nerve was higher than right. Results also showed that the mean MNCV of left common peroneal nerve was significantly (p < .05) more than the mean MNCV of right ulnar nerve.

Table 2 Mean ±SD of motor nerve conduction velocity (MNCV) of ulnar & common peroneal nerve

	Ulnar Nerve (m/s)	Common Peroneal Nerve (m/s)
Right	44.0 ± 6.8*	45.9 ± 6.2*
Left	43.9± 6.5*	44.5± 7.0*

The results of correlation showed that body height was positively and significantly related with body weight (r = 0.378). The MNCV of right ulnar nerve was also found to be positively and significantly related with MNCV of left ulnar nerve (r=.672) and negatively related with MNCV of right common peroneal nerve (r= -.292). The MNCV of right common peroneal nerve was also found to be positively and significantly related with MNCV of left common peroneal nerve (r=.582).

Table 3 Correlation (Pearson) among physical characteristics & MNCV of ulnar & common peroneal nerve

	Height	Weight	MNCV of Ulnar Nerve (Right)	MNCV of Ulnar Nerve (Left)	MNCV of Common Peroneal Nerve (Right	MNCV of Common Peroneal Nerve (Left)
Age	.110	-.045	.073	-.084	.081	-.063
Weight		. 278**	.020	091	.146	.232
MNCV of Ulnar Nerve (Right)			.141	.069	.110	.142
MNCV of Ulnar Nerve (Left)				. 672**	-. 291*	-.173
MNCV of Common Peroneal Nerve (Right)					-.033	.020
MNCV of Common Peroneal Nerve (Left)						.0579**

**p < 0.01; *p < 0.05. MNCV – motor nerve conduction velocity

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Discussion

In the presented study, the results showed that right and left sural nerve of sprinters and weight lifters players had faster MNCV than right and left radial nerve. The result was reasonable, since the goals of these athletes' training are known as rapid and coordinate movement.

Conclusion

The faster MNCV in right ulnar and left common peroneal nerves as compared to left ulnar and right common peroneal nerve in sprinters and weight lifters may be from long term training adaptations and further it may be related to their lower extremity movement requirement of changing their movement direction quickly and skilfully. The results of the present study also indicate that long term training is important for increasing MNCV. But the types of training may have different levels of adaptation.

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