Motor Nerve Conduction Velocity of Sprinters & Long Distance Runners of Selected Nerves of both Upper and Lower Limbs

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Abstract

Background: The aim of this study was to describe motor nerve conduction velocity of selected nerves of both the upper and lower extremities in sportsmen. Thirty high-level sprinters (100mts & 200 mts) and thirty high level distance runners (3000mts) were volunteered to participate in the study. Method: Motor Nerve Conduction Velocities (MNCV) of Ulnar and Common Paroneal Nerve (CPN) were recorded with the help of computerized equipment -Neuroperfect (Medicaid Systems, India) with standard techniques of supramaximal percutaneus stimulation with constant current and surface electrodes. The anthropometric measurements taken were Body Height (cms), Age (yrs) and Body weight (kgs). The neurophysiological parameters taken were MNCV of Ulnar Nerve (upper extremity) and Common Peroneal Nerve (lower extremity) of both sides (i.e.dominant and non-dominant) of the body. The room temperature was maintained at 37 degree Celsius. Results: Significant differences in motor nerve conduction velocities were found between dominant and non-dominant limbs in each group. Ulnar nerve conduction velocity measured from above elbow to below elbow was significantly higher in the sprinters than long distance runners. The CPN nerve conduction velocity is significantly higher in distance runners as compared to sprinters. Conclusion: The motor nerve conduction velocity of ulnar nerve was found to be higher in sprinters as compared to the distance runners, and the MNCV for CPN is higher in distance runners as compared to sprinters. The MNCVof ulnar and CPN were higher in dominant limbs (i.e. arms & legs) of both sides of the body as compared to non dominant limbs.

Key words: Motor nerve conduction velocity, ulnar nerve, Common Peroneal Nerve

Introduction

The players are creating and breaking new records in today's competitive sports. Traditionally the motto of Olympic festival is faster, higher and stronger is still alive in the field of physical education and sports science. The level of physical fitness and motor ability is increasing day to day because of the development of science and technology.

The anthropometric and motor nerve conduction studies in sports are the measure of the analysis of relationship between anthropometric characteristics and neurophysiological functions. With the growth of athletic participation there has been a commensurate increase of sports-related neurological disorders. Prompt evaluation and treatment of the professional and recreational athletes enable an earlier return to competition *(Payne and Morrow, 1993).* Their technical advancement has developed

during the past 10years, and in addition to using the traditional anthropometric methods and the facilities to measure aerobic and anaerobic exercise performances as well as the exercise changes in neuro-physiological function has also witnessed progression. The modern coaching methods are prepared for the development of physical fitness, exercise neuro-physiological ability and sports anthropometrical assessments.

Most sports-related traumatic peripheral nerve injuries result in transient motor and sensory symptoms and motor nerve conduction studies can best evaluate and confirm the diagnosis and identification of the peripheral neurologic disorders. Absence of neurologic disorders may redirect the evaluation to alternative explanations for weakness or atrophy of the skeletal muscles *(Wilmore and Costil, 1994).*

Material and Methods

The study was conducted on a group of 60 male athletes comprised of 30 sprinters and 30 distance runners in the age range of 18 to 25 years. Each subject was screened for any sign or symptoms of either peripheral neuropathy or compression syndrome of both the extremities. Motor nerve conduction velocity (MNCV) of ulnar nerve (upper extremity) and Common Paroneal Nerve (lower extremity), was recorded by using computerized equipment -Neuroperfect (Medicaid Systems, India).

The anthropometric variables, including age (yrs), height (cm), weight (kg) were recorded for the study. Selected variables were expressed in mean and standard deviation (±SD) for comparison among sprinters (n=30), and distance runners (n=30), who underwent the same testing procedures in the Exercise Science Laboratory of Department of Sports Science, Punjabi University Patiala.

The standard techniques of supramaximal stimulation with a constant current stimulator and surface electrode recording on both the upper and lower extremities of dominant and non dominant side of each subject i.e. right and left side, while the subject was lying in supine position was employed. The room temperature was kept at 37^0C for all the subjects.

Results & Discussion

Table 1a: Mean ± SD of Antropometric Variables and MNCV of Ulnar Nerve (Upper extremity) of Sprinters & Distance runners (N=30)

Anthropometric Variables					
Sprinters			Distance runners		
Age, yrs	Ht., cm	Wt., kg	Age, yr	Ht., cm	Wt., kg
23.07 ±1.77	170.3 ±4.1	72.6 ±7.4	24.06 ±1.6	170.1 ±4.1	72.63 ±7.4

Table 1b: Mean ± SD of MNCV of Ulnar Nerve (Upper extremity) of Sprinters & Distance runners (N=30)

MNCV (m/sec)			
Upper Extremity (Sprinters)		Upper Extremity (Distance runners)	
Rt. Ulnar	Lt. Ulnar	Rt. Ulnar	Lt. Ulnar
47.95 ± 12.3	43.89 ± 5.7	42.26±7.17	41.4 ± 7.4

In the present study, the mean age in case of sprinters is 23.07±1.77, the mean height is 170.3±4.1 & the mean weight is 72.6±7.4. For distance runners, the mean age is 24.06±1.6, the mean height is 170.1±4.1, the average weight (kg) is 72.63±7.4 respectively.

In neurophysiologic evaluation of upper extremities in sprinters, The MNCV of right ulnar is 47.95±12.39 m/s and the MNCV of left ulnar nerve is 43.89±5.7 m/s. In case of distance runners, the MNCV for right ulnar is 42.26±7.17 m/s,

and the MNCV of left Ulnar nerve is 41.4±7.4 m/s. Thus, the value of MNCV of right & left ulnar nerve of sprinters in the present study is higher in sprinters as compared to the distance runners.

Table 2a: Mean ± SD of Antropometric Variables of Right & Left CPN (Lower extremity) of Sprinters & Distance runners (N=30)

Anthropometric Variables					
Sprinters			Distance runners		
Age	Ht.	Wt.	Age	Ht.	Wt.
23.07±1.77	170.3 ±4.5	72.6 ±7.4	24.06±1.6	170.1±4.1	72.6±7.4

Table 2b: Mean ± SD of MNCV of Right & Left CPN (Lower extremity) of Sprinters & Distance runners (N=30)

MNCV (m/sec)			
Lower Extremity (Sprinters)		Lower Extremity (Distance runners)	
Rt. CPN	Lt. CPN	Rt. CPN	Lt. CPN
56.63 ± 6.6	49.89 ± 5.7	56.63 ± 6.6	49.89 ± 5.7

The results of the present study, the neurophysiological evaluation of lower extremity shows that the mean MNCV of right Common Peronial Nerve (CPN) in Sprinters is 56.63±6.6m/s and the MNCV for left common peroneal nerve is 49.89±5.7 m/s respectively. In case of Distance runners, the MNCV of right CPN is 59.8±6.15 m/s and the MNCV of left CPN is 51.7±6.7 m/s, which are higher as compared to the MNCV of sprinters in lower extremities of both sides of the body. Thus, the value of MNCV of right common peronial nerve (CPN) in the present study is higher in distance runners as compared to the sprinters.

Summary and Conclusions

In the present study, the mean MNCV of right Ulnar in sprinters is 47.95±12.3 m/s, and of left ulnar is 43.89±5.7 m/s and the MNCV of right common peronial nerve (CPN) is 56.63±6.6 m/s and of left CPN is 49.89±5.7. Whereas, the MNCV of right ulnar in distance runners is 42.26±7.17 and for left Ulnar is 41.4±7.4 m/s, which is low as compared to MNCV of Ulnar nerve of sprinters on both sides of the body. Moreover, the MNCV of right CPN in distance runners is 59.8±6.15 m/s, and the MNCV of left CPN, is 51.7±6.7 m/s. whereas, the MNCV of sprinters for right CPN is 56.63±6.6 m/s, and MNCV of left CPN is 49.89±5.7 m/s. This is lower as compared to MNCV of right CPN & left CPN of distance runners of both sides of the body (right & left). It is also observed, that the MNCV in dominant limbs (Arms & Legs) was higher when compared with the non dominant limbs in both the groups i.e. Aerobic (distance runners) & Anaerobic (sprinters) groups. Thus the results of this study shows that a further research work will be needed to carry on a large number of subjects with additional nerves and variables of MNCV like Amplitude, latency etc. of extremities of both sides of the body of the subjects.

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