

PERIPHERAL NERVE CONDUCTION VELOCITIES AND HANDEDNESS – IS THERE ANY CORELATION?

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ABSTRACT:

BACKGROUND: Nerve conduction velocity is affected by various physiological parameters like diameter of nerve fibre, age, sex, height and temperature. Very little is known regarding the role of nerve conduction velocities in determining handedness. Present study was conducted to correlate the role of peripheral nerve conduction velocities in determining handedness.

OBJECTIVE: To correlate the role of peripheral nerve conduction velocities in determining handedness.

MATERIALS and METHOD: The study was performed on 40 right handed healthy M.B.B.S. students in the age group ranging from 18 to 25 yrs, free of neurological signs and symptoms.

The sensory and motor nerve conduction velocities of median and ulnar nerves in right and left hand were measured and compared by using “ NICOLET COMPASS PORTA BOOK II” E.M.G. machine.

The data was analysed and Z test was used to calculate the statistical significance.

RESULT: There was no significant statistical difference in the sensory and motor nerve conduction velocities of median and ulnar nerves in the left and right arm of an individual. The results were found to be equivocal.

CONCLUSION:

Thus it can be concluded that the conduction velocities of the peripheral nerves do not play any role in handedness. It is determined at cerebral level and moreover training plays an important role.

KEY WORDS: nerve conduction velocity (NCV), Electromyography (EMG), handedness, sensory, motor, median nerve, ulnar nerve.

INTRODUCTION:-

The nerve conduction studies are most often used to diagnose disorders of peripheral nervous system. In recent years electrophysiological methods have found a definite place in investigation and diagnosis of certain neurological disorders.

It has been proved that nerve conduction velocity depends on various factors like myelination and diameter of nerve fibers, age, sex, temperature and height. Very little is known regarding role of conduction velocities in handedness.

In our present study we have compared sensory and motor nerve conduction velocities of median and ulnar nerves of both Right and Left hand in Right handed individuals and tried to assess the correlation between handedness and nerve conduction velocity.

MATERIAL AND METHODS:-

The study was conducted on 40 right handed healthy medical students in the age group ranging from 18 to 25 years, free from neurological signs and symptoms.

Edinburg Handedness Inventory (Oldfield1971) was used to assess hand preference (Tan U 1988).^[9]

The motor and sensory nerve conduction velocities of the median and ulnar nerves were measured by using "Nicolet compass portabook II" E.M.G. machine.

The motor nerve conduction study involves the response of the muscle to the supramaximal stimulation of its motor nerve at two points along its course i.e at elbow and wrist. Biphasic action potential was recorded.

For measuring median nerve motor conduction velocity, the recording and the reference electrodes were placed over abductor pollicis brevis along the thenar eminence. The ground electrode was placed over the forearm between the recording and stimulating electrodes and stimulation was given along the median nerve at elbow and wrist.

Similarly to assess the ulnar motor conduction velocity, the recording and reference electrodes were placed on the abductor digiti minimi and stimulation was given along the ulnar nerve at elbow and wrist.

For measuring sensory nerve conduction velocity the ring electrodes were placed on the index finger for the median nerve and little finger for the ulnar nerve. Cathode was placed at 1st interphalangeal joint and anode 4 cms distal to it. Ground electrode was placed over the palm and stimulation was given with the help of electrodes at the wrist over the median and ulnar nerves respectively.

The response obtained varies widely in different individuals.

The latency, amplitude and duration were measured from the curve obtained and the distance between the two stimulating points was measured in mm using a flexible tape. The conduction velocity(CV) in motor fibers was calculated as follows:-

$$CV = \frac{\text{Distance between proximal and distal stimulating sites(mm)}}{\text{Proximal latency(msec) - Distal latency(msec)}}$$

OBSERVATIONS AND RESULTS

Motor and sensory conduction velocities were determined in 40 individuals, age ranging from 18 to 25 yrs. Z TEST was used to calculate statistical significance. The results are as follows.

Table 1. Motor and Sensory NCVs of Median nerve of Right and Left hand and their comparison

	Motor NCV (m/sec) (Mean ± SD)		Sensory NCV (m/sec) (Mean ± SD)	
Right hand	60.82± 4.48	Z = 0.12 (N.S)	53.40± 5.22	Z = 0.13 (N.S)
Left hand	60.70± 4.60		53.55± 4.70	

Table 2. Motor and Sensory NCVs of Ulnar nerve of Right and Left hand and their comparison

	Motor NCV (m/sec) (Mean ± SD)		Sensory NCV (m/sec) (Mean ± SD)	
Right hand	60.97± 5.48	Z = 1.32 (N.S)	52.32± 7.30	Z = 0.25 (N.S)
Left hand	62.65± 5.90		51.97± 4.48	

(SD= standard deviation) (m/sec= meter/second)

Statistical Analysis:- The results were expressed as mean ± SD. The standard error of difference between two mean was taken. Z test was applied. By using the said test p value was found to be non significant. (p<0.05 significant)

Result:- There was no statistical difference in the sensory and motor nerve conduction velocity of median and ulnar in the right and left hand of an individual.

DISCUSSION:-

Similar studies were carried out in the past by several researchers. Tan U^[10] in 1985 found that there was no statistical difference in the nerve conduction velocities in the left and right hand of the subject and concluded that the nerve conduction velocities cannot contribute to the mechanism of handedness.

Kamen G., Greenstein S. S. and De Luca^[6] in 1992, Trojaborg W.1964, Sathiamoorthy^[8] in 1990 carried out same studies but the results were not significant.

Bhorania et al^[1] in 2009 also found there was no significant difference in velocities between right and left limbs of the same individuals in relation to motor nerve conduction velocities.

Harinder J. Singh et al^[4] in 2011 found limb dominance did not have any significant effect on the motor nerve conduction velocity of upper limb.

Our present study suggests that there is no statistical difference in motor and sensory nerve conduction velocity of median and ulnar nerves in right and left hand respectively in same individual.

CONCLUSION:

The conduction studies showed that there was no significant statistical difference in motor and sensory nerve conduction velocities of median and ulnar nerves in right and left hand of an individual.

Thus it can be concluded that the conduction velocities of the peripheral nerves do not play role in handedness as it is primarily determined at the cerebral level and more or less depends on training.

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