

**Original article:**

## **Impact of limb dominance on motor nerve conduction studies in healthy population: A normative nerve conduction study**

**<sup>1</sup>Dr Motilal C Tayade , <sup>2</sup>Dr Ramchandra G Latti**

<sup>1</sup>Associate Professor in Physiology, Department of Physiology, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni.

<sup>2</sup>Professor in Physiology, Department of Physiology, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni.

\*Corresponding author: Email: drmcetayade@gmail.com



### **Abstract:**

**Introduction:** Nerve conduction studies are working on the mechanism activating nerves with the help of controlled electrical stimulation with the help of small pulses over various points over skin and measures the response receiving from it. A number of factors are affecting these results like age, temperature, dominance etc. , of these very few works is seen on limb dominance though initially if found less important. Hence to highlight this issue we planned to assess two sets of nerves respectively median nerve and ulnar nerve over limbs.

**Material and methods:** In the present study motor nerve conduction velocity of the median nerve and ulnar nerve were measured by using Clarity Medicare's OCTOPUS- 2 Channel EMG Machine available in our Department. It is a state of art automated machine measuring motor nerve conduction studies in a simple manner.

**Results:** In our present study, there was found no statistically significant difference (  $P < 0.05$ ) in the velocity between dominant hands and nondominant hands with median nerve as well as ulnar nerve.

**Conclusion:** From the present study, we may conclude that there was observed nonsignificant impact of dominance over motor nerve conduction studies in the normative healthy population.

**Keywords:** Motor nerve conduction velocity, limb dominance

### **Introduction:**

Nerve conduction studies are working on the mechanism activating nerves with the help of controlled electrical stimulation with the help of small pulses over various points over skin and measures the response receiving from it. There is found the application of depolarising square wave electrical pulses to the skin over a peripheral nerve producing a propagated nerve action potential recorded at a distant point over the same nerve: and a compound muscle action potential (CMAP) arising from the activation of muscle fibers in a target muscle supplied by the nerve.<sup>1,2</sup> These are recorded with using surface or needle electrodes.<sup>3</sup>

This provides valuable information about the condition of nerve and its electrophysiological characteristics. A number of factors are affecting these results like age, temperature, etc. , of these very few works is seen on limb dominance though initially it was found less important. <sup>4</sup>Hence to highlight this issue we planned to assess two sets of nerves respectively median nerve and ulnar nerve over limbs. We chose these nerves for convenience of study.

**Study methodology:**

The present study work was carried out in the Department of Physiology. We included healthy subjects in this study. In the present study 60 male medical students in the age group range from 17 years to 24 years comprising of 30 as of right handed and 30 as left-handed were included in the present study.

**Inclusion criteria:**

Age range: 17 years – 24 years

No systemic illness like diabetes mellitus, hypertension or any neuropathy

No history of any addiction like tobacco or alcohol

No history of any radiculopathy, fracture, nerve compression, any form of neurological disorders, history of any medication

**Exclusion criteria:**

Any systemic illness like diabetes mellitus, hypertension or any neuropathy

History of any addiction like tobacco or alcohol

History of any radiculopathy, fracture, nerve compression, any form of neurological disorders, history of any medication

We explained all the procedure to students. Written informed consent was obtained. All the subjects were called in the morning session to avoid any diurnal variation.

The sample size was estimated with online calculator.

In the present study motor nerve conduction velocity of the median nerve and ulnar nerve were measured by using Clarity Medicare's OCTOPUS- 2 Channel EMG Machine available in our Department.

It is a state of art automated machine measuring motor nerve conduction studies in a simple manner.

1. For motor nerve conduction velocity the median nerve was stimulated supramaximally at two points along its course respectively at the wrist and antecubital fossa (elbow).
2. Recording and reference electrodes were placed over the abductor pollicis brevis along the thenar muscle border.
3. Ground electrode was placed over the forearm.
4. For ulnar the nerve was stimulated at the wrist, below the elbow, and above the elbow.
5. Recording electrodes were placed above ADM and FDI.

**Motor nerve conduction study machine setting:**

Sensitivity: 2-5 mv/mm, Low frequency filter: 2-5 Hz, High-frequency filter: 10 KHz, Sweep speed: 2-7 ms/cm. Supramaximal stimulation range: 30-60 mv.

Conduction velocity = distance (mm) / L1 -L2 ms. Where, L1 = Proximal latency , L2 = Distal latency. Distance in millimeter is the distance between two stimulating sites respectively the wrist and antecubital fossa

We collected data and statistical analysis was done using SPSS version 22.

The results were expressed in Mean± Standard Deviation. The standard errors of difference between two means were taken. Afterward, we applied the Z test. By using the said test, P-Value was found < 0.05 (non significant)

**Results:**

Table 1) The record of motor nerve conduction velocities (median nerve & ulnar nerve)

Group	Extremity	Motor nerve conduction velocity (mt/sec) (Mean + S.D.) Median Nerve	Motor nerve conduction velocity (mt/sec) (Mean + S.D.) Ulnar Nerve
Right hander subject	Right hand	52.71±3.11	60.29±2.11
	Left hand	53.27±1.01	61.20±1.61
Left hander subjects	Right hand	53.22± 1.50	61.43±0.87
	Left hand	54.01±0.91	62.19±1.25

In our present study, there was found no any statistically significant difference ( P<0.05) in the velocity between dominant hands and nondominant hands with median nerve as well as ulnar nerve.

**Discussion:**

Assessment of the functional ability of nerves provides us detailed information concern with different neuromuscular disorders. Electrophysiological recordings provide us very sensitive information about measuring nerve conduction studies. <sup>5</sup>Though there is commonly observed that different factors affecting these reading, is limb dominance shows any alterations was questionable. With this view, we carried out this study. In our present study,

There was found no statistically significant difference ( $P < 0.05$ ) in the velocity between dominant hands and non-dominant hands with median nerve as well as ulnar nerve. A similar study work conducted by Harinder Jot Singh et al (2011) showed that the motor nerve conduction velocity was greater in the right limb as compared to the left limb for both the median nerve and the ulnar nerves, though the difference was not statistically significant. Our study also demonstrated that the latency of the median nerve of the right upper limb was less as compared to that of the left upper limb, with significant difference.<sup>6</sup>

While another study conducted by Navin Gupta, Sharmila Sanyal and Sashmi Babbar (1985) demonstrated no significant difference in the motor nerve conduction velocity (MNCV) in the right and left limbs. The MNCV was also the same in the left and right limbs as was observed in a study which was conducted by Tan U.<sup>7</sup> A study reported by Hennessey et al (1994) on the median and ulnar nerve conduction in young adults concluded that handedness has no effect on the nerve conduction parameters.<sup>8</sup>

It is a well-known fact that cerebral dominance is affecting on various motors activities like speech, facial recognition, etc., herewith no much data is available associated with nerve conduction studies and limb dominance.<sup>9,10</sup> Though in our present study has not shown any significant difference associated with dominance but these data added to literature making it more meaningful. We previously worked on these facts with a small sample size and herewith reported outcomes showing no significant association.<sup>11</sup>

Electrophysiological studies are more sensitive than clinical examinations as clinical examinations fail to offer quantitative results and the electrodiagnostic tests are the least variable non-invasive measures of neuropathy. Evaluation of neuropathy is generally undertaken by electrophysiological measurements.<sup>12</sup>

#### **Conclusion:**

From the present study, we may conclude that there was observed non-significant impact of dominance over motor nerve conduction studies in the normative healthy population.

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