



RESEARCH ARTICLE

NORMATIVE DATA OF NERVE CONDUCTION STUDIES OF UPPER LIMB AROUND THE ROHTAK REGION OF HARYANA IN INDIA

¹Dr. Vishal Goel, ^{2,*}Dr. Ashish Arvind and ³Dr. Sushma Sood

¹Demonstrator, Department of Physiology, Pt. B D Sharma PGIMS, Rohtak, Haryana, India

²Senior Resident, Department of Physiology, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India

³Professor and HOD, Department of Physiology, Pt. B D Sharma PGIMS, Rohtak, Haryana, India

ARTICLE INFO

Article History:

Received 14th March, 2016
Received in revised form
07th April, 2016
Accepted 15th May, 2016
Published online 30th June, 2016

Key words:

Upper limbs,
Median nerve,
Ulnar nerves,
Conduction Velocity,
Normative data.

ABSTRACT

The objective of this study was to establish the normative data of motor nerve conduction velocity of median and ulnar nerve in normal healthy adults around the Rohtak region of Haryana.

Method: An observational descriptive study was conducted in randomly selected 60 healthy subjects of both sexes of general population around Rohtak who were between the ages of 18 and 66 years by using RMS EMG EP Mark-II. Motor studies were performed on the ulnar and median nerves, both proximally and distally along the forearm on both side of arm. Parameter included Motor distal latency, amplitude and conduction velocity of ulnar and median nerves.

Result: In the right median nerve, distal latency (DL) was 2.92 ± 0.76 ms, the amplitude (CMAPA) was 11.72 ± 5.17 mV, the conduction velocity (MNCV) was 52.35 ± 6.99 m/s. In the left median nerve distal latency (DL) was 2.85 ± 0.77 ms, the amplitude (CMAPA) was 13.59 ± 5.89 mV, the conduction velocity (MNCV) was 52.76 ± 7.58 m/s. In the right ulnar nerve, motor distal latency (DL) was 2.05 ± 0.49 ms, the amplitude (CMAPA) was 10.5 ± 2.52 mV, the conduction velocity (MNCV) was 53.02 ± 5.13 m/s. In the left ulnar nerve distal latency (DL) was 2.1 ± 0.47 ms, the amplitude was 10.24 ± 2.6 mV, the conduction velocity (MNCV) was 51.89 ± 5.2 m/s. This data was compared with the previous studies which had been carried out for normative data on nerve conduction studies

Conclusion: Normative conduction parameters of the median and ulnar nerves in the upper limbs were established for the NCV laboratory in Pt. B D Sharma PGIMS, Rohtak. The mean motor nerve conduction parameters for the tested nerves compared favorably with the existing literature data.

Copyright©2016, Dr. Vishal Goel et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Dr. Vishal Goel, Dr. Ashish Arvind and Dr. Sushma Sood, 2016. "Normative data of nerve conduction studies of upper limb around the Rohtak region of Haryana in India", *International Journal of Current Research*, 8, (06), 33471-33473.

INTRODUCTION

Nerve conduction study is a part of electro diagnostic procedures that help in establishing the type and extent of abnormality of the nerves. There are anatomical and physiological aspects to nerve conduction velocity. Every clinical neurophysiology lab need to set up its own normative data for its population required in clinical practice to identify the abnormal subjects. The conduction velocity of the nerve depends on the fibre diameter, degree of myelination and the internodal distance. Other factors such as age, temperature, height gender and limb are physiological variables affecting nerve conduction study.

They have to be taken into consideration while doing nerve conduction study. However, these factors vary according to different geographic region. Many studies have been published regarding normative data from western countries with cold climatic condition (Bhorania and Ichaporia, 2009; Pawar et al., 2011).

Aims and Objectives

The primary purpose of this study was to provide normative electrophysiological data for commonly tested upper limb nerves in carefully screened normal healthy adult.

MATERIALS AND METHODS

The following study was carried out in the department of Physiology, Pt. B.D. Sharma PGIMS, Rohtak. A total of 60

*Corresponding author: Dr. Ashish Arvind,

Senior Resident, Department of Physiology, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi, India.

healthy individuals, 30 males (mean age 46.7±11.9) and 30 females (40.5±8.33) of age group 18 - 66 years were included in the study. Motor nerve conduction study was performed on the ulnar and median nerves, both proximally and distally along the forearm on both sides. Parameter included Motor distal latency, amplitude and conduction velocities of ulnar and median nerves. This study was performed in accordance with ethical standards of the institute. Exclusion criteria included any metabolic diseases, nerve compression, neuropathy, fracture, radiculopathy, intake of drugs, any addictions etc. Study was carried out at a controlled room temperature of 25°C. RMS EMG EP Mark-II machine was used. For motor study: sensitivity: 2-5 Hz, low frequency filter: 2-5 Hz, high frequency filter: 10 kHz and sweep speed: 2-5ms/mm. For sensory studies: sensitivity: 10-20µv/mm, low frequency filter: 5- 10Hz. High frequency filter: 2-3 kHz, sweep speed: 1-2 ms/mm. Supramaximal strength of stimulus was used. Duration for motor and sensory study was at 100µs.

females. Further results of present studies were compared with the results of the previous studies in Table 1.

DISCUSSION

NCS reference values are used to define the limits of normal function, with test values outside the range suggesting the presence of some form of neuropathy. For NCS, reference values should be established from the local population because previous studies have shown differences in NCS function related to ethnicity and demographic factors (Shahabuddin *et al.*, 2013). Electro-diagnostic studies also allow to judge whether the main site of damage is the axon or the myelin sheath. Knowing whether a patient has a disease affecting the nerve axons (axonal neuropathy) or the myelin sheaths (demyelinating neuropathy) helps to guide the physician to a diagnosis among the many causes of peripheral neuropathy.

Table 1. Comparison of motor nerve conduction parameters of median and Ulnar nerves between the Present study and those reported by others

| Nerve | Parameter | Hennessey <i>et al.</i> 1994 n=44 | Falco <i>et al.</i> 1992 n=51 | Kimura, 1984 | Shehab <i>et al.</i> 1998 n= 50 | Robinson <i>et al.</i> 1993 n=44 | Present study n=60 (male+ females) | |
|--------|------------|--------------------------------------|----------------------------------|-----------------|------------------------------------|-------------------------------------|---------------------------------------|------------|
| | | | | | | | Rt side | Lt side |
| Motor | DML (msec) | 3.2±0.4 | 3.5±0.5 | 3.49 | 3.1±0.3 | 3.6±0.4 | 2.92±0.76 | 2.85±0.77 |
| Median | AMP (mv) | 12.1±3.8 | 9.2±3.1 | 7.0 | 11.1±2.8 | 9.5±2.9 | 11.72±5.17 | 13.59±5.89 |
| | CV (m/sec) | 59.5±4.4 | 54.4±5.4 | 57.6 | 56.5±3.5 | 54.4±3.8 | 52.35±6.99 | 52.76±7.58 |
| Motor | DML (msec) | 2.6±0.3 | 2.7±0.3 | 2.59 | 2.4±0.3 | 2.9±0.4 | 2.05±0.49 | 2.1±0.47 |
| ulnar | AMP (mv) | 12.6±2.3 | 9.9±1.8 | 5.7 | 9.2±2.2 | 8.4±2.1 | 10.5±2.52 | 10.24±2.6 |
| | CV (m/sec) | 63±4.8 | 61.6±4.1 | 58.7 | 60.4±5.2 | 56.3±6.2 | 53.02±5.13 | 51.89±5.2 |

Abbreviations

| Abbreviations | Full Form |
|---------------|---|
| CMAP | Compound Motor Action Potential |
| CMAPA | Compound Motor Action Potential Amplitude |
| DL | Distal latency |
| MNCV | Motor nerve conduction velocity |

Median motor nerve conduction study

Active electrode was placed over the abductor pollicis brevis and reference electrode placed over the proximal phalanx of the thumb. Ground electrode was placed over dorsum of hand. The site of stimulation was at the wrist between palmaris longus and flexor carpi radialis tendon at the second crease and at the elbow crease, medial to biceps tendon and brachial artery.

Ulnar motor nerve conduction study

Active electrode was placed over the mid portion of abductor digiti minimi and reference electrode was placed over proximal phalanx of little finger. Ground electrode was placed over dorsum of hand. The site of stimulation was at palmer aspect of wrist just medial or lateral to flexor carpi ulnaris tendon and slightly above the ulnar groove at the elbow.

RESULTS

The study was conducted on 60 subjects. These 60 subject were further categorized into 30 males and 30 females. Data of nerve conduction studies were separately analyzed for males and

It has been investigated that NCV, distal latency (DL) and amplitude of motor action potential (MAPA) have useful diagnostic value (Bano *et al.*, 2013).

The present work mainly concerned with the study of various electro-diagnostic parameters, i.e. DL, MNCV and CMAPA in normal healthy subjects for comparison with patient suffering from neurological and orthopedic problems. This study analyzed the nerve conduction parameters of commonly tested nerves of upper limbs i.e. ulnar and median nerves of both side. Our aim is to establish normative and reference values for NCV labs. A comparison was made between results obtained in this study and other published data. The results of this study for the motor parameters of the ulnar and median nerves agree generally with Hennessey *et al.* (1994) and Falco *et al.* (1992). Distal motor latency and amplitude of median and ulnar nerve was in close proximity to that reported by Kimura (1998), Shehab *et al.* (1998), Hennessey *et al.* (1994), Falco *et al.* (1992) and Robinson *et al.* (1993) Motor conduction velocity of median nerve is in close proximity to results obtained from Shehab *et al.* (1998) Falco *et al.* (1992) Robinson *et al.* (1993) MNC of ulnar nerve is also in close proximity to results obtained by Robinson *et al.* (1993)

Conclusion

Our results provide one with normal reference values of most commonly tested peripheral nerves of upper limbs i.e. median and ulnar nerve. The distal latency, amplitude and motor nerve conduction velocity of these nerves compared favorably with the existing literature data. This result will be helpful in comparison with neurology and orthopedic patient data.

REFERENCES

- Bano, H., Rukhsana, N., Mannan, F. and Mannan, A. 2013. Electrodiagnostic study in healthy subjects and patients of motor neuropathy of upper and lower limbs. *Pak J Physiol.*, 9(2).
- Bhorania, S. and Ichaporia, R.B. 2009. Effect of limb dominance on motor nerve conduction. *Indian J Physiol Pharmacol.*, 53(3):279-282.
- Falco, F.J., Hennessey, W.J., Braddom, R.L., Goldberg, G. 1992. Standardized nerve conduction studies in the upper limb of the healthy elderly. *Am J Phys Med Rehabil.*, 71:263-271.
- Hennessey, W.J., Falco, F.J., Goldberg, G., Braddom, R.L. 1994. Gender and arm length: influence on nerve conduction parameter in the upper limb. *Arch Phys Med Rehabil.*, 75:265-269.
- Kimura, J. 1984. Principles and pitfalls of nerve conduction studies. *Ann Neurol.*, 16: 415-428.
- Pawar, S.M., Taksande, A.B. and Singh, R. 2011. Normative data of upper limb nerve conduction in central india. *Indian J Physiol Pharmacol.*, 155(3):241-245.
- Robinson, L.R., Rubner, D.E., Wohl, P.W., Fujimoto, W.Y. and Stolov, W.C. 1993. Influences of height and gender on normal nerve conduction studies. *Arch Phys Med Rehabil.*, 74:1134-1138.
- Shahabuddin, S., Badar, D., Moizuddin, K. M., Sami, L.B. and Solepure, A.B. 2013. Normative values for nerve conduction study among healthy subjects from Aurangabad. *International Journal of Recent Trends in Science and Technology*, 8(1):55-61.
- Shehab, D.K. 1998. Normative data of nerve conduction studies in the upper limb in Kuwait: are they different from western data? *Med Principles Pract.*, 7: 203-208.
