



Original Research Article

Nerve Conduction: A Comparative Study in Males and Females of Haryana

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ABSTRACT

Nerve conduction studies have become an important non invasive tool for diagnosis of nerve lesions. Among the various factors affecting nerve conduction gender may have a significant role. This study was planned to study the effect of gender on various parameters of nerve conduction. Nerve conduction study data of 30 males and female subject was obtained retrospectively from the lab records and analyzed. The motor nerve conduction studies for median and ulnar nerve revealed a statistically significant difference in distal motor latency and amplitude in ulnar nerve on both the sides. The amplitude was non significantly higher in females than males in both the limbs for both the nerves. Difference in conduction velocity for both the nerves on either side was obvious but not statistically significant. It was higher in females than in males.

Key words: nerve conduction study, gender difference, latency, conduction velocity.

INTRODUCTION

Nerves akin to conducting wires are channels of impulse transmission. Nerve conduction impairment is caused by many neuronal diseases and causes many muscular diseases. Nerve conduction studies have been used as prime non-invasive investigation procedure for many neuronal and muscular diseases. ^[1] The conduction in a nerve is determined by various factors like fibre diameter, degree of de-myelination, internodal distance, length of the body segment studied, height, BMR, body built and temperature. ^[2-7] Many hormonal and climatic factors also affect it. Gender differences are also one of the factors affecting nerve conduction properties. The nerve conduction velocity is the speed at

which an electrical stimulus passes through the nerves. The motor nerve conduction velocity (MNCV) is obtained by the electrical stimulation of a peripheral nerve and recording the response of a muscle which is supplied by this nerve. The time taken by the electrical impulse to travel from the stimulation site to the recording site is measured. This value is called the latency and it is measured in milliseconds (ms). The distance between stimulation site and recording site is measured and dividing it by latency gives the conduction velocity. The size of the response called the amplitude (mV) is also measured. Many studies have been published regarding normative data from Western countries with cold climatic condition. ^[8-10] the present study was aimed

to compare the effect of gender on nerve conduction properties in subtropical climate of Haryana. In the present endeavour the motor nerve conduction properties of Median and Ulnar nerve in both sex of subjects were evaluated.

MATERIALS AND METHODS

In this study we retrospectively evaluated the nerve conduction study data of 30 normal male and 30 female subjects who came for electrophysiological tests in the year 2014 in the Department of Physiology, Pt. B D Sharma PGIMS, Rohtak.

Inclusion criteria: Those subjects who formed control group in department based studies or having no other diagnosed or suspected nerve conduction abnormalities.

Exclusion criteria: All subjects with neurological complaints or diagnosed cases of neurological deficit were excluded from the study. Subjects with pre-diagnosed chronic diseases and endocrine disorders were excluded.

The data was gathered from the RMS EMG EP MK II machine after seeking permission from the institute ethical committee and the head of the department. The lab maintained controlled environment and tests were conducted in an air conditioned room fitted with faraday's cage maintaining ambient temperature between 26-28°C in quiet surroundings. Nerve conduction properties were evaluated for median and ulnar nerve on both the sides by using standard techniques of supramaximal percutaneous stimulation with a constant current stimulator and surface recording electrode for both nerves of each subject. The motor component evaluation was done on the ulnar and the median nerves. The ground electrode was secured with adhesive tapes on the dorsum of the hand, between the stimulating and the recording electrodes. The active electrodes were placed over the motor point of the abductor pollicis brevis

for the median nerve, and over the abductor digiti minimi for the ulnar nerve. The reference electrode was placed 3 cm distal over the 1st metacarpo-phalangeal joint for the median nerve and over the 5th metacarpo-phalangeal joint for the ulnar nerve. The sites of stimulation for both were the wrist, elbow and the axilla. With surface electrodes, distal stimulations were performed at the wrist (3cm proximal to the distal wrist crease) between the flexor carpi radialis and the Palmaris longus tendon for the median nerve, while they were performed posterior to the flexor carpi ulnaris for the ulnar nerve. Similarly stimulation of the median nerve at the elbow was performed medial to the biceps tendon, on the volar crease of the brachial arterial pulse, whereas for the ulnar nerve, stimulation was 3-4cm distal to the medial epicondyle, with the wrist and the elbow kept in 90° of flexion.^[1] For the proximal stimulation the stimulation was given at Axilla for both nerves.^[3]

The data so gathered was evaluated and entered into excel spreadsheet. Mean and standard deviation were calculated using excel spreadsheet. Unpaired t test was implied using online graph pad software.

RESULTS

- The average height was 169.43±5.59cm and 161.5±6.37cm for males and females respectively. The weight was 65.4±7.13 kg and 59.63±10.27 kg in males and females respectively. The average age was 40.5±8.33 years in females and 46.7±11.92 years in males.
- The motor nerve conduction studies for median and ulnar nerve revealed a statistically significant difference in distal motor latency and amplitude in ulnar nerve on both the sides. The distal motor latency was more for both the nerves in males than in females except right side median nerve. The difference

in median nerve was obvious but not statistically significant. It is clearly depicted in tables.

- The amplitude was not significantly higher in females than males in both the limbs for both the nerves.

- Difference in conduction velocity for both the nerves on either side was obvious but not statistically significant. It was higher in females than in males.

Table 1. Comparison of different parameters of nerve conduction studies of median and ulnar nerves among males and females.

Nerve	Parameter	Right side			Left side		
		Males	Females	P value	Males	Females	P value
Motor median	DML (msec)	2.92±0.52	2.93±0.95	>0.05	2.71±0.80	2.99±0.72	>0.05
	AMP (mv)	10.62±4.27	12.82±5.81	>0.05	14.99±6.44	12.19±5.001	>0.05
	CV (msec)	51.50±6.55	53.19±7.41	>0.05	54.18±7.75	51.33±7.27	>0.05
Motor ulnar	DML (msec)	2.22±0.45	1.87±0.47	<0.01	1.93±0.43	2.27±0.45	<0.01
	AMP (mv)	9.54±2.64	11.62±1.93	<0.001	11.26±2.55	9.22±2.29	<0.001
	CV (msec)	52.27±5.32	53.76±4.91	>0.05	53.17±5.66	50.61±4.59	>0.05

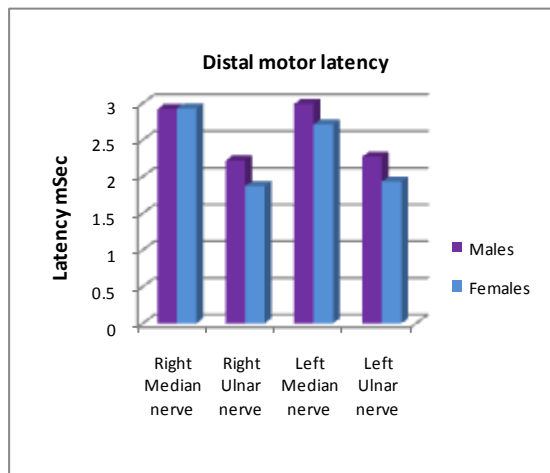


Figure 1 Sidewise comparison of distal motor latency between males and females for median and ulnar nerves

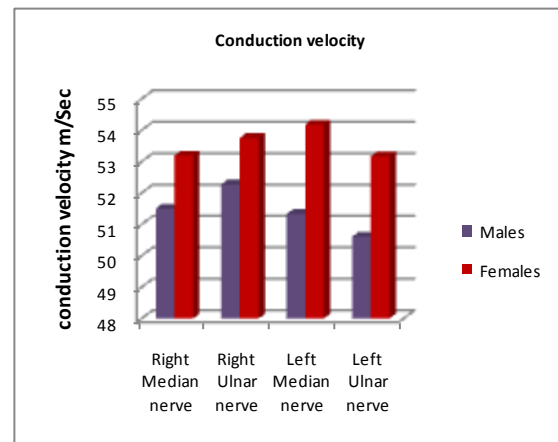


Figure 3 Sidewise comparison of conduction velocity between males and females for median and ulnar nerves

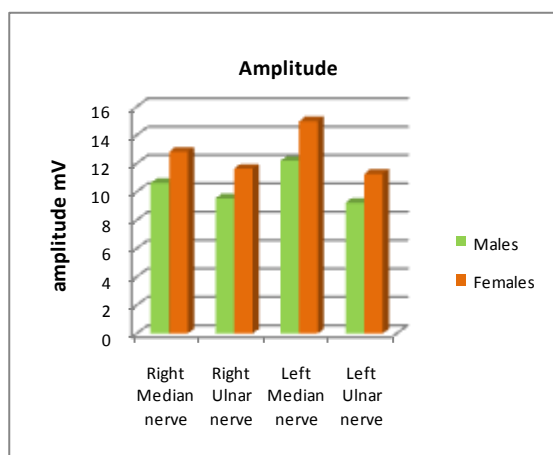


Figure 2 Sidewise comparison of amplitude between males and females for median and ulnar nerves

DISCUSSION

There was a significant difference between males and female physical parameters among the subjects. This may be one of the contributing factors for the differences in nerve conduction study parameters.

The observations of this study are similar to the previous studies of LaFratta & Smith, (1964), Stetson et al, (1992), Falck & Stålberg, (1995), Shehab, (1998), Kimura, (2005). [13-17]

Gakhar et al in their study observed that amplitude and motor conduction velocity values were higher in females in both median and ulnar nerves and latency of

median and ulnar nerve was higher in males. [18]

Kimura in his study observed that amplitude differences persist despite of the adjustment of height in different genders. [5] This study has similar findings as there was a significant difference between males and female physical parameters. This may be one of the contributing factors for the differences in nerve conduction study parameters.

Robinson et al could conclude in their study that two of four motor amplitudes were larger in men and women had significantly faster conduction velocities than men for all nerves except median motor. [6]

Bhorania and Ichaporia in their study concluded that the gender has no significant effect on conduction studies also it was observed that age and BMI had an impact on conduction. [19]

Many studies have been conducted evaluating the effect of age on nerve conduction studies and it correlated well. In this study we did not consider the effect of age which definitely has an impact on nerve conduction. In this study we focussed on gender differences in nerve conduction.

Since female population in Haryana is involved in household as well as farm works, this may also be a contributing factor.

CONCLUSION

Despite Haryana being a male dominating state females work equally with men. Females are even comparable in height and weight with males yet the physiological variations are present for hormones and psyche. Hence the pattern of findings may alter. This study aims to provide normative baseline data so that it may help in better patient diagnosis and prognosis. The difference in nerve conduction parameters was observed in males and females and

hence it is important to consider this difference before diagnosing any lesion based on electrophysiological studies. Since the study population was small and the data was retrospectively analyzed, a better planned study with larger subject population is required.

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