

## COMPARISON OF EFFECT OF TEMPERATURE ON LATENCY AND AMPLITUDE OF RIGHT AND LEFT HAND MEDIAN MOTOR AND SENSORY NERVE IN HEALTHY MALE AND FEMALE

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### ABSTRACT

**Objective:** With a lot of importance attached to electro-diagnostic test of evaluating nerve conduction velocities, the accuracy of results is of extreme importance. A small error like incorrect recording of skin temperature can result in wrong diagnosis. So, a study was planned to look for the effect of temperature on latency and amplitude of sensory and motor median nerve. **Material and Methods:** The present study was conducted in the Department of Physiology, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur (M.P.) after obtaining ethical clearance, both motor and sensory components of Median nerves were examined in 60 age sex matched medical students using surface and ring electrodes. Different temperatures i.e. hot and cold were maintained with the help of water bath and skin temperature was measured by using Digital Mercury Thermometer. **Results:** 35 out of 60 students were males and 25 were females, aged between 17-25 years, having no signs or symptoms of neurological impairment. Our study revealed that increasing temperature from 29<sup>0</sup> C -39<sup>0</sup>C showed no statistically significant change (p>0.05) in latency and amplitude of right and left median motor and sensory nerve of male and females. **Conclusion:** our study concluded that the latency and amplitude of median nerve conduction in male and females is independent of temperature variations.

**KEYWORDS:** Amplitude, Latency, Median Nerve, Temperature.

### INTRODUCTION

Nerve conduction study is a part of electro diagnostic procedures that help in establishing the type and extent of the abnormality of the nerves. There are anatomical and physiological aspects to nerve conduction velocity. The conduction velocity of the nerve depends on the fiber diameter, degree of myelination and the inter-nodal distance. Other factors such as age,

temperature, height, gender, and limb are the physiological variables affecting nerve conduction study. Nerve conduction studies (NCS) are an objective, quantitative, and reproducible measure of peripheral nerve function and are widely used in the diagnosis of neuropathies (1). They have also been used to monitor neuropathic disease progression (2) and

the efficacy of interventions in clinical trials (3,4) Nerve conduction studies are being increasingly used in diagnosis and prognosis of various neurological diseases. Nerve conduction studies assess the peripheral motor and sensory functions by recording the evoked response to stimulation of peripheral nerves. They have an important role in evaluation of peripheral and entrapment neuropathies by confirming the clinical suspicion of neuropathy. Identifying the predominant pathophysiology such as conduction block, axonal demyelination, and temporal course of the disease i.e. Acute, sub acute or chronic,. With steady improvement in recording apparatuses; nerve conduction studies have become a simple and reliable test of peripheral nerve function (5). Temperature variation in the tissue surrounding a nerve is an important factor influencing the velocity of the nerve impulse. Nerve conduction studies are the most common method for diagnosis of peripheral neuropathy. (6,7,8,9,10 )

With so much of importance attached to this electro-diagnostic test, the accuracy of results is of extreme importance. A small error like incorrect recording of skin temperature or disregarding it totally can result in disastrous diagnosis.

This study attempts to determine the effect of temperature on median motor and sensory nerve latency and amplitude and compare the same in healthy male and female.

## MATERIALS AND METHODS

The present study was conducted in the Department of Physiology, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur (M.P.).Sixty (60) Medical student, 35

male and 25 female healthy volunteers aged between 17-25 year were recruited from the First M.B.B.S batch of N.S.C.B. Medical College, Jabalpur (M.P.), having no signs or symptoms of neurological impairment. Nerve conduction study of Median nerve both motor and sensory bilaterally was performed with help of computerized machine RMS Aleron 201 EMG and NCV, using surface and ring electrodes. Different temperature i.e. hot and cold was maintained with the help of water bath and skin temperature measured by using Digital Mercury Thermometer.

### Surface stimulation was performed as per steps following steps

**S<sub>1</sub>** –First stimulus placed at the wrist between the Palmaris Longus and Flexor Carpi Radialis tendon at the second crease.(Approximately 1cm proximal to the most distal crease.)

**S<sub>2</sub>** - Second stimulus placed at the elbow crease, medial to the Biceps tendon and Brachial artery.

The criteria of selection of cases was random. The nerve were stimulated supramaximally with the wave pulses of 0.2ms duration for every recording of sensory median nerve conduction velocity and motor median nerve conduction velocity.

After obtaining the first motor and sensory record at a room temperature the forearm including the elbow was cooled in a thermostated waterbath at 32<sup>0</sup> C for 10 minutes. The upper extremity was then lifted from the bath and dried, the electrode were reapplied over the marked points and recording was performed again. Then the arm was immersed in the water again and cooled the forearm including the elbow at 29<sup>0</sup> C for 10 minutes. Similarly recording was done at 39<sup>0</sup> C. Hence, the

temperature was changed stepwise to 32<sup>0</sup> C, 29<sup>0</sup> C and 39<sup>0</sup> C .(11)

At each temperature the arm was in waterbath for 10 minutes before the nerve conduction examination, the skin temperature was measured just before the stimulation at site of the recording and stimulating electrode at the wrist with the digital mercury thermometer

## RESULTS

35 out of 60 students were males and 25 were females, aged between 17-25 years, having no signs or symptoms of neurological impairment.

**Table1- Comparison of change of right hand median motor & sensory nerve latency & amplitude recorded at different skin temperature of male and female.**

Parameter s	Male (n=35)	Female (n=25)	Significance	
<b>Motor Latency</b>	1.84 (±0.33)	1.85(±0.07)	t=0.08	p>0.05
<b>Sensory Latency</b>	1.65 (±0.39)	1.86(±0.06)	t=2.07	p>0.05
<b>Motor Amplitude</b>	0.33 (±0.09)	0.24(±0.05)	t=0.10	p>0.05
<b>Sensory Amplitude</b>	0.25 (±3.51)	0.22(±0.07)	t=0.01	p>0.05

Mean and standard deviation of latency and amplitude of right median motor and sensory nerve recorded at various skin temperature.

**Table2-Comparison of change of left hand median motor& sensory nerve latency & amplitude recorded at different skin temperature of male and female.**

Parameter s	Male (n=35)	Female (n=25)	Significance	
<b>Motor Latency</b>	2.54(±0.34)	2.48(±0.07)	t=0.47	p>0.05
<b>Sensory Latency</b>	1.72(±0.38)	1.67(±0.05)	t=0.49	p>0.05
<b>Motor Amplitude</b>	0.32(±0.09)	0.24(±0.06)	t=0.09	p>0.05
<b>Sensory Amplitude</b>	0.26 (±3.51)	0.22(±0.08)	t=0.01	p>0.05

Mean and standard deviation of latency and amplitude of left median motor and sensory nerve recorded at various skin temperature.

## DISCUSSION

In our present study among 60 students, 35 were males and 25 were females. On comparing change in latency and amplitude of right and left median motor and sensory nerve of male and females while decreasing temperature from 29<sup>0</sup> C -39<sup>0</sup> C , the result of our study showed that there was no statistically significant change (p>0.05)

Diana S. Stetson et al. studied effects of age, sex and anthropometric factors on nerve conduction measures. The result of their study showed that there is no association between gender and median nerve conduction measures which supports our study. (12,13,14,15 )

Thakur et.al study revealed a contrary results that males had higher CMAP amplitude, longer latencies

and duration whereas amplitude was higher in females. Thakur et al done there study on room temperature so this may be a reason of difference with our study.(16)

## CONCLUSION

The observation of this study on comparing change in nerve conduction parameters of right and left hand median motor and sensory nerve in both male and female showed that there was no statistically significant change. This indicates that there was same effect of temperature on latency, amplitude and conduction velocity of male and females.

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