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Original Research Article

Survey of body mass index (BMI) on median motor nerve conduction velocity (NCV) in normal population of Malwa region

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ABSTRACT

Introduction: Nerve conduction studies reveal technique to work on peripheral nerve being capable in revealing nerve-related issue. It aids in distinguishing from a nerve injury to situation where muscles are affected due to a nerve lesion. While, in that respect much dissimilarity persist in use of Nerve Conduction Velocity (NCV) in different nerves with regard to place, sex, mass & other ethnographical facts i.e. Span of life. This has been viewed in performing nerve conduction studies while ethnograpical part differs for different geological region.

Aims and Objective: The purpose of present work is to do the Nerve Conduction Variables (NCV) studies in rt. median nerve in usual well young of Malwa region and to study the outcome of B.M.I on it.

Materials and Methods: A total 110 healthy participants from the periods of 20 and 50 years, with none nerve lesion, being examined at IMCHRC, Indore. All trial were completed on JAVA RMSAleron-201 series. Scrutiny on SPSS 10.0 series.

Results: The mean of NCV firstly rises among periods of 20-30 yrs, 31-40 yrs & 40-50years, preceded by a fall in the mean NCV of elbow–wrist segment which significantly fall while the mean of B.M.I rises with increasing length of life. It is to be noted that NCV was inversely related to an increase in B.M.I in the volunteer the mean NCV of Set 1 > Set2, Set3, Set 4 with $P < 0.05$ that toply relevant.

Conclusion: Usual parameter for conduction in peripheral nerves to be used in the test of peripheral nerve lesion. B.M.I has a definitive effect on NCV. So, this factor has been put into concern during interpretation of results during nerve conduction studies. Therefore, it should also be used for research purposes & in prognosis approach.

1. Introduction

Nerve conduction velocity grown to be a important appliance for detection & prediction of neurological disorders.[1] Influence of B.M.I are well recognized.[2] NCS assess stimulus in axon on transcribing to muscle supplied through that nerve.[3] However factor vary according to different geologic region. Higher Cerebral function[4] like speech, language description of face & identifying musical theme & utilizing hand for fine motor movement to be viewed with[5] laterlization. Handedness & nerve conduction velocities to be evaluated well.[3] Several Studies evaluated the effect of B.M.I on nerve conduction velocity. Many of these test lies on[6] Caucasion subjects.

Presently normative values are used for thin & obese Subjects during evaluation of nerve conduction study. Also enable[7] clinicians to compare groups of peripheral diseases: Degenerative & Axonal degeneration.[4]

Peripheral nerve i.e median is being chosen for NCV as it is easily being catched.[1,5] On exciting of this nerve through

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a little speed electric current by electrodes which has been put on the skin at intervals leads to production of nerve impulses.[6] The nerve Conduction velocity has constituent as: (a) Motor NCS, (b) Sensory NCS, (c) H- reflex & (d) F-wave study.[8]

This shows how a aggregate of work done in the past has impact on ethnograpical framework on NCV, to be performed in this location. This work therefore done to determine the NCV in rt.median nerve in general well adults in local population & to access the influence of ethnograpic factor age.

2. Objectives

Surveying B.M.I effect on NCV in median motor nerve of well adult masses.

3. Materials and Methods

The work was done in Neurophysiology Laboratory o, IMCHRC, Indore. It is **c**ross-sectional work with Institutional Ethical Committee approval. This work has a sample size of 110 volunteer as derived from SPSS, type 10.

3.1. Preference criteria

Normal person in dissimilar age set (20-50) years, free of any neurological lesion, or of any record over the time.

3.2. Debarring reason

1. Any person of neurological lesion.
2. Any person having myopathy.

The volunteer were splitted in four set of males & females in accordance to increasing length of life to distinguish during examination. Set 1 consists of periods around 20 and 30 years comprising of 51 volunteer; Set 2 consists of periods comprising of 31-40 years comprising 22 volunteer. Set 3 and Set 4 consist of periods around 41-50 and 51-60 years, respectively, comprising of 25 and 12 volunteer in that sets.

3.3. Consensus

Enlightened consent had been taken from the volunteers. The assessment being done to peaceful setting; the patients were made thoroughly explained about the plan of action. Interval was therein between examinations, in order to lessen discomforts in Volunteer.

3.4. Tools for testing & procedure

All measurements have been performed with the help of standard channel 2 Physiograph having JAVA (RMS) Aleron-201 version. JAVA RMS Aleron-201 version is a techniqually personalised to fast & pliable performance. Its operating system & machinery are particularly designed for real examination in field machine which are completely personalised for different examination & nerve muscle size with computer choice of amplifier, filter & sweep setting.

NCV to be carried out in a quiet situation in room temperature between 29°C and 33°C. Volunteer to be relaxed to laboratory set up, to feel calm. In rt. median nerve, the active surface electrode to let on the motor point of abductor pollicis brevis in the upper third of thenar projection near the 1st metacarpophalangeal joint & stimulating electrode were put over antecubital fossa nearby & wrist latterly & ground electrode over inside palm.

Volunteer record data from distal activation taken for analytical review of present work.

CMAP consist of different constituent as:

1. Amplitude: To be taken from the baseline to the rising height.
2. Lat 1: It is period of stimulus to initial rising deflection off the baseline.
3. Lat 2: Period of 1st change in CMAP in later stimulation at S2 (site
4. Span: Correspond to density of small fibers. This calculated with the start to the positive peak.
5. Area: It is the outcome of difference to the lat1 and lat2. Whatever, it requires computer analyses.[9]

To all volunteer, an orthodromicmotor type of nerve examined. Surface electrodes included. Measuring electrodes had been put on volunteer skin with gluey tape. The size of each nerve was determined with a pliable measuring tape. For security, a ground electrode to be placed such joining bracing & measuring electrode.[7]

3.5. Theory

Motor nerve being quicken to two points in route. The pulse being made to record Compound Muscle Action Potential (CMAP). It is important to ensure a supramaximal stimulation keeping the cathode close to the active recording electrode.

MNCV to be derived by calculating the length in millimetre intervining two points of stimulation, which is divided by the latency difference in millisecond. The NCV was expressed as m/s.

Conduction velocity: D /PL-DL m/s[3]

Where PL is the proximal latency (lat1) and DL is the distal latency (DL) (lat2) and D is the distance between the proximal and DL.[6]

3.6. Recording procedure

3.6.1. MNCS variables

Estimator with water dipped felt point put at the right median nerve which was put down.

3.6.2. Right median nerve

Median nerve contribute major portion of forearm flexors and thenar muscles provides sensory innervation to the lateral aspect of palm and dorsal surfaces of terminal phalanges along with the palmer surface of thumb, index, middle, and half of ring fingers.[9]

3.6.3. Location

Research performed in the supine position (Figure 1).

1. Active electrode: Placement was half-way to mid-point of distal wrist crease and 1stmetacarpophalangeal joint[7]
2. Reference electrode: Placement was slightly away from 1st metacarpophalangeal joint.
3. Ground electrode: Placed in back of hand. If stimulus artifact interferes with the recording, the ground put near the active electrode, joining the electrode and cathode.
4. Stimulation point (S1): Cathode to be put 9 cm towards the active electrode in a line measured first to the mid-point of the distal wrist crease and then to a point ulnar to the tendon of the flexor carpi radials. The anode to be near.
5. Stimulation point (S2): Cathode to be put medial to the brachial artery pulse in the antecubital region. The anode to be near.
6. Machine setting: Sensitivity - 10 mv/division, low-frequency filter-20H2 and high-frequency filter–3 KHz, and sweep speed - 10 ms/division.[10]

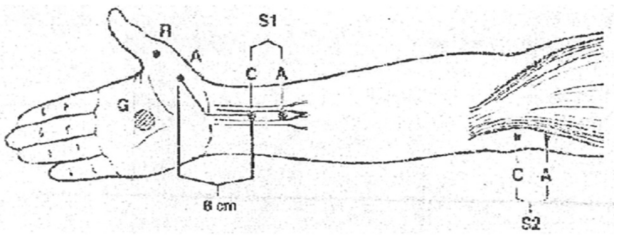

Fig. 1: Electrode placement

3.7. Statistical methods

Evaluating by SPSS 10.0 series. Values derived had expressed in the form of mean and standard deviation. P value to be significant if it was found to be <0.05. The Shapiro-Walk test with two sample mean used.

4. Results

1. Table 1 shows a fall in NCV of elbow-wrist segment with rise in mean B.M.I.
2. The mean B.M.I for period Set 2 > period Set 1 with P = 0.111 which is non-significant while mean B.M.I for period Set 3 & period Set 4 > age Set 1, with P = 0.024 and 0.006, respectively, which is statistically significant.
3. Table 3 shows a negative co-orelation which is statistically significant shown by Shapiro-wilk test between B.M.I & NCV.

Table 1: Variation in NCV with different B.M.I

Mean B.m.i (in kg/m^2)	NCV of rt. median nerve (elbow– wrist segment) in m/s
21.27+4.09	29.67-98.36 m/s (71.2±21.2)
22.84+2.20	31.85-61.25 (55.5±22.8)
23.06+7.32	31.85-61.25 (55.5±22.8)
24.85+5.11	43.29-77.92 (52.0±14.4)

Table 2: Comparison of mean B.M.I & NCV of Set 1 with Set 2, Set 3 & Set 4

Set	B.M.I	NCV-e–w
1	21.27	71.2
2	22.84	55.5
1	21.27	71.2
3	23.06	53.4
1	21.27	71.2
4	24.85	52.01

Table 3: Co-relation B.M.I & NCV

	N	Mean	Std. Error of mean	Std. Deviation
BMI	110	23.4	0.36	3.94
NCV	110	64.55	1.30	14.20

r=0.75(p=0.01) negative correlation statistically significant

5. Discussion

This work has been done to find the NCV in the rt. median nerve for usual well adults along with influence of B.M.I on it in the Malwa region. Our study had been done on 110 normal human & establishes a strong negative.

Coo-relation to biological factors, that is, B.M.I. The results of various works describe the statistical significance of associations.

Our works shows the finding on median motor nerve conduction velocity had a significant negative relationship with BMI. It might be due to thicker subcutaneous tissue in person with higher BMI. As the adipose tissue in epineurium have some relation to amount of body fat,[11] although true that the amount of such fat may affect the nerve conduction. Our finding are in contrast with Baqai HZ et al[12] who reported no effect of BMI on nerve conduction studies. However, our observation are in favour with Awang MS et al[13] Who come across that slowing of

nerve conduction velocity with rising BMI in median motor nerve.

In present study, we found effect of BMI greater on motor conduction study which is statistically significant in contrast Pawar SM et al.[14] found the outcome of BMI more on sensory nerve conduction as compared to motor study which was statistically non-significant.

Though B.M.I influence median motor nerve conduction velocity, which is statistically significant. So this biological factors should be utilized while diagnosing diseased neurological situation, otherwise normal persons may be considered as diseased & would be put on unnecessary remedy.

6. Conclusion

The adjunct of the result obtained in our study & as per the above discussion it can be concluded that there is a inverse correlation exist between mean B.M.I & NCV while, B.M.I are statistically significant to NCV. So this phenomenon should be used for accessing the neurological & diseased conditions. While interpreting clinical NCS finding & could be considered for comparative & proportional studies. In this way, this work hold a firm value.

7. Source of Funding

None.

8. Conflict of Interest

None.

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