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Outcome of Height and BMI on Nerve Conduction Velocity in Patients Attending Index Medical College, Indore: A Cross-Sectional Study

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Abstract

Background and Aim: Electrical conduction of motor and sensory nerves of the human body is evaluated by Nerve Conduction Velocity, which is a part of electro-diagnostic procedures, which help in set up the type and character of the nerve and commonly used to evaluate function of nerve. Present study was performed with an aim to know the effect of Height and BMI on median motor nerve conduction velocity. *Materials and Methods:* A Descriptive Cross–Sectional was conducted in the Department of Physiology, Index Medical college Hospital and Research Centre, Indore. The study group included 55 female medical students with age 18 to 23 years in secretory phase of menstrual phase. Nerve conduction velocity was calculated by recording evoked electromyogram (EMG) by stimulating median nerve at elbow and at wrist with the help of EMG electrodes and isolated stimulator by using Power lab 8/30 series with dual Bioamplifier. Statistical analysis was done by using Karl Pearson Correlation coefficient. *Results:* There is quite negative correlation effect with height on motor nerve conduction velocity with "r" value -0.26, and results was found to be not statistically significant. There is slender negative correlation effect of BMI on conduction velocity with "r" value -0.17 which was also non-significant. *Conclusion:* Through escalating height and BMI, nerve conduction velocity is diminishes which was found to be not significant statistically. The above two biological factors be required to be taken into contemplation as understanding nerve conduction studies.

Keywords: BMI; Correlation; Height; Indore; Nerve Conduction Velocity.

Introduction

Electrical conduction of motor and sensory nerves of the human body is evaluated by Nerve Conduction Velocity, which is a part of electro-diagnostic procedures, which help in set up the type and character of the nerve and commonly used to evaluate function of nerve. Nerve conduction velocity is exaggerated by many physiological and technical variables. Physiological variables such as age, height, gender, upper limb versus lower limb, temperature affects conduction velocity. Diameter and myelination of the nerve fibers also affect nerve conduction velocity [1].

Nerve conduction studies (NCS) are carry out to identify the disorders of the peripheral nervous system [2,3]. These facilitate the clinicians to differentiate the two major groups of peripheral diseases: demyelination and axonal degeneration [4]. These also assist in localizing the site of the lesions [5,6].

Height and low body mass index (BMI) have been reported as peril factor for ulnar neuropathy at elbow and high BMI as risk factor for carpel tunnel syndrome [7]. BMI was also found to have negative association with sensory nerve action potential amplitude [8]. In evaluation of diabetic peripheral neuropathy, BMI is very significant factor to be taken into deliberation [9]. Thus, sway of BMI on nerve conduction study is vital for considering research.

Many studies have been done previously to evaluate the influence of the anthropometric factors such as age, height and body mass index on the nerve velocities [10-12]. Peroneal and sural NCV connected inversely with height and with predictable axonal length, while median motor and sensory NCV failed to show any significant relationship to height [13]. So Present research was carried out with an aim to

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know the outcome of height and body mass index (BMI) on median motor nerve conduction velocity.

Material and Methods

A Descriptive Cross – Sectional was conducted in the Department of Physiology, Index Medical college Hospital and Research Centre, Indore. Ethical clearance was obtained from the institutional ethics board and written informed consent was taken from all the participants. The study group included 55 female medical students with age 18 to 23 years in secretory phase of menstrual phase. Subject with history of fever, neurological abnormalities, any limb deformities and history of systemic diseases were excluded. Body Mass Index (BMI) was calculated as the ratio of weight and square of Height in meters, using Quetelet Index.

Nerve conduction velocity was measured by recording evoked electromyogram (EMG) by stimulating median nerve at elbow and at wrist with the assist of EMG electrodes and isolated stimulator by utilizing Power lab 8/30 series with dual Bioamplifier.

After elucidation the process, the subjects were made to lie down on the couch. Setting with instrument was done. The EMG electrodes were placed on the abductor pollicis brevis muscle. Active electrode was positioned on muscle bulk & reference electrode was placed on tendon. The course of right median nerve was traced. The EMG was recorded by stimulating median nerve using isolated stimulator at wrist first and elbow at latter. The distance between two points of stimulation was calculated. The latent period was noted from recording. Disparity in the latent period for two stimulation was calculated.

Statistical Analysis

The data was coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) Windows software program. The variables were assessed for normality using the Kolmogorov-Smirnov test. Descriptive statistics were calculated. Statistical analysis was done by using Karl Pearson Correlation Coefficient.

Results

A Descriptive Cross – Sectional was conducted in 55 female medical students with age group 18 to 23 years in secretory phase of menstrual phase at the Department of Physiology, Index Medical college Hospital and Research Centre, Indore. The mean height of the individuals is 1.7±0.5 meter and BMI is 20.34±1.44 kg/m2. Median Motor Nerve conduction velocity in right hand is 57.98±2.43 meter/second.

There is quite negative correlation effect with height on motor nerve conduction velocity with "r" value -0.26, and results was found to be not statistically significant. There is slender negative correlation effect of BMI on conduction velocity with "r" value -0.17 which was also non-significant.

Table 1: Descriptive analysis of various parameters of the study Participents

Parameters	Mean	SD
Age	19.65	0.43
Height (Meters)	1.7	0.5
BMI (kg/m^2)	20.34	1.44
Nerve conduction velocity (meter/sec)	57.98	2.43

Table 2: Corelation of Nerve Conduction Velocity with height and BMI among study participants

Parameters	R value	P value
Height (Meters)	-0.26	0.65
BMI (kg/m^2)	-0.17	0.09

Statistically significance at pd"0.05
Test applied: Karl Pearson correlation Co-efficient

Discussion

The study was conducted to know the effect of height and BMI on nerve conduction velocity in right hand in 55 women during their secretory phase of menstrual cycle. Median motor nerve conduction velocity was calculated. There is reasonably negative correlation effect with height on motor nerve conduction velocity which is not significant. A

negative correlation between distal fiber diameter and height may preeminent clarify decreased conduction velocity. Distal axonal tapering in the nerves elucidates the effect. Still Campbell proposed that a decrease in diameter happens unexpectedly at a specified space from the cell body [15]. In mature rabbit nerves, Williams found that peripheral motor axon diameter was about half that of ventral spinal nerve root fibers and, regardless of an enhance in myelin sheath thickness, there was an in general decrease in total fiber diameter [16]. Height-related dawdling of nerve conduction velocity was pragmatic in this study [17]. Clinical acknowledgment of this height outcome is significant, or else an individual with gently slowed peripheral nerve conduction velocity solely related to large build may be tagged as abnormal.

Even with BMI, similar consequence has been observed. There is minor negative correlation effect of BMI on conduction velocity which is not noteworthy which might be owing to thicker subcutaneous tissue in the person with elevated BMI. As the adipose tissue in epineurium may be connected to some extent to amount of body Fat, it is rational that the amount of such fat may influence the nerve conduction. Our observations are in harmony with Awang MS et al who showed slowing of conduction velocity (CV) with rising BMI in median motor nerve [18].

Despite the fact that the height and BMI influences the median motor nerve conduction velocity, results found in the current study were not statistically significant. These two factors should be measured while diagnosing pathological conditions, or else normal folks may be diagnosed as abnormal and they will be on pointless medication.

Conclusion

Through escalating height and BMI, nerve conduction velocity is diminishes which was found to be not significant statistically. So this incident should be measured for proportional studies and diagnosing pathological conditions. The above two biological factors be required to be taken into contemplation as understanding nerve conduction studies.

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