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COMPARATIVE ANALYSIS OF CONDUCTION VELOCITY OF ULNAR NERVE AROUND ELBOW JOINT IN PHYSIOLOGICALLY NORMAL SUBJECTS OF DIFFERENT AGE GROUPS

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ABSTRACT

It is widely accepted that nerve conduction study (NCS) parameters changes with age, particularly in median nerve across carpal tunnel .These changes occurs at a greater rate in median than in ulnar nerve. Subclinical micro trauma to the median nerve through the carpal tunnel over several decades may account for the more pronounced influence on the median nerve compared with ulnar nerve at wrist. It is therefore possible that the conduction velocity of ulnar nerve across elbow may also change differently with advancing age.

A prospective study of motor nerve conduction velocity across elbow were performed in170 healthy human subjects of both sexes. It was observed that motor conduction velocity of ulnar nerve in different age groups was almost same. The difference between the different age group was not statistically significant. The present study on ulnar nerve shows non linear changes in nerve conduction velocity across elbow with age

Key words: conduction velocity, ulna nerve, Nerve conduction studies (NCS)

INTRODUCTION

Nerve conduction studies (NCS) are frequently performed to evaluate peripheral nerve disease. The median, ulnar and radial nerves are the three most commonly tested nerves in the upper limb. Numerous studies have been published regarding normative data for these nerves. Temperature control and standardized technique along with consideration for age, height, finger circumference, and instrumentation is imperative for appropriate interpretation of electrodiagnostic studies. It is widely accepted that nerve conduction study (NCS) parameters changes with age [1,2,3,4,5,6,7]. As a result many electrodiagnostic laboratories have tables of normative values that are divided by age groups. The concepts suggests that normal nerve functioning in a normal individual changes with aging. Many studies have attempted to quantify how NCS values change with age. It is known that motor conduction velocity changes with age and this change is much more pronounced at the point where nerves are physiologically compromised due to tight compartment or repeated trauma[7,8,9]. This has been particularly shown in relation to median nerve conduction at wrist where conduction velocity drops faster than its counterpart ulnar nerve in similar area. The segment of ulnar nerve behind elbow is subject to repeated trauma because of its superficial location and because of its tight compartment through which it passes. Similarly it is known that the sensory action potential amplitude (SNAP) reduces with age, this is particularly well established in case of sural nerve, whether similar phenomenon is true for ulnar sensory action potential amplitude(SNAP) is not well established and more so no such data is available from central India. There are number of published studies suggesting a linear decline in conduction velocity and amplitude with increasing age for most peripheral nerves[10,11,12]. Non linear effects of age on conduction calculated for the first to eight decades. They showed no changes in the mean velocity through out the second to fifth decades with significantly lower values in the six to eight decades[4,13,14]. There seems to be a general impression that motor nerve conduction velocity falls off rather significantly with increasing age[11,15]. it was shown that there is a significant and substantial decline in values of sensory nerve conduction velocity with increasing age in men[9]. This diminution of sensory nerve conduction velocity appears to be of greater order than that in values of motor conduction velocity as related to increasing age[10,16]. Ulnar sensory conduction and amplitude decreased more rapidly after the

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age of 55 years them before but attributed this to greater incidence of subclinical damage at the cubital sulcus in older subjects [1,7]. There is functional relation ship between age related morphological and physiological changes at the level of the motor unit (mu). It is well established that older humans are weaker than younger people, exhibit reduced force control, and have slower neuromuscular contractile properties and decrease in MU discharge rate [17]. There is loss of myelinated and un myelinated nerve fibers in elderly subjects and several abnormalities involving such as demyelination, remyelination and myelin balloon figures. Aging also affects functional and electrophysiological properties of the peripheral nervous system, including decline in nerve conduction velocity, muscle strength, sensory discrimination, autonomic responses and endocrinal blood flow[18]. Aging is a process that is often accompanied by physiological changes. These physiological changes include slowing in muscle contractility, alteration in muscle metabolism and neuromuscular junction and reduction is nerve conduction velocity (NCV). Age has been widely accepted to have an influence on nerve velocity. Because of that many laboratories have produced normative nerve conduction velocity values which have been depicted according to different age group. Many investigation have attempted to study the association of aging and nerve parameters, both motor and sensory.

MATERIAL AND METHOD

The number of subjects taken for the study was 170 (340 ulnar nerve) between 20-70 years of age. The subjects included for the study were members of staff of this institutes (SAIMS), students and healthy relatives of patients accompanying them and they volunteered for the study. only completely healthy subjects were included for the study that was confirmed with the help of standard questionnaire, the detailed history (both general and medical). consent was obtained before the procedure though the study was totally non invasive. Study protocol was approved by SAIMS ethical committee and scientific committee. The nerve conduction studies were performed using the machine Viking Quest EMG and Master copy software 48.0.

EXPREIMENTAL PROTOCOL

170 subjects divided into 5 groups of 10 years of interval as [20-29 years}, {30-39 years}, {40-49 years}, {50-59 years}, {60-70 years}. Parameters recorded are age(years),Height(cm),weight(kg), Motor conduction velocity of ulnar nerve across elbow.

RECORDING PROCEDURE

Ulnar Motor nerve conduction velocity measurements were performed on the right and left hands around elbow following standard procedures. To assure adequate contact, skin was cleaned with the spirit and electrode gel was used / between the electrodes and the skin. Electrical pulses of 0.1-o.5 ms duration were delivered by the stimulator of the electromyography. A temperature probe was used to record surface skin temperatures. Skin temp were recorded before each study at the touch pad of the mid palm & kept constant at 252C.All studies were performed in both upper limb of each subjects. The ground electrode was placed on the dorsum of the hand. All studies were performed with the subjects lying comfortable in the supine position. Standardized techniques were used to obtain and record action potentials.

STATISTICAL ANALYSIS

The mean and standard deviation for each dependent and independent variables were calculated. Correlation co-efficient was calculated to observe the correlation between MCV of ulnar nerve across elbow with age. There after Z test was done to compare the difference between different age group parameters.

RESULT

Table 1 : Showing distribution of subjects according to age

Age Groups	Subjects	Ulnar nerves
20 to 29 Years.	33	60 (66)
30 to 39 Years	31	59 (62)
40 to 49 Years	25	48 (50)
50 to 59 Years	29	55 (58)
60 to 70 Years	30	58 (60)

The number of ulnar nerves mentioned in parenthesis are the actual expected numbers to be included in the result. But due to technical reasons, recorded numbers were less than the actual numbers as mentioned in the table.

Table 2 : Showing mean and standard deviation of motor Nerve Conduction Velocities across elbow			
Age Groups	**Subjects**	**ulnar nerves**	**Motor NCV M/Sec**
20 to 29 Years.	33	60	68.24 ± 11.23
30 to 39 Years	31	59	68.96 ± 11.04
40 to 49 Years	25	48	75.06 ± 13.12
50 to 59 Years	29	55	73.34 ± 12.44
60 to 70 Years	30	58	75.66 ± 11.94

It is depicted from the table that there is no statistical difference in motor conduction velocity with increasing age

Table 3 : Showing r value for motor conduction velocity across elbow in different age group				
Age Group	**Subjects**	**Ulnar Nerve**	**Motor NCV M/SEC**	**R**
20 to 29 Years.	33	60	68.24	0.05
30 to 39 Years	31	59	68.96	0.02
40 to 49 years	25	48	75.06	0.83***
50 to 59 years	29	55	73.34	0.017
60 to 70 years	30	58	75.66	0.05

Motor conduction velocity shows insignificant correlation in all the age groups except in age group 40-49 years (p 0.0001)

DISCUSSION

In this study, motor conduction velocity across elbow was found to be similar in different age groups, indicating that there is no change in velocity with age. Earlier reports have shown that muscle fibers density exhibits a strikingly parabolic relationship with age [11]. & loss of motor neuron with age obeys quadratic rather than linear relationship[19]. Segmental demyelination and axonal degeneration occurs in normal human peripheral nerve to a greater extent in older subject [20] giving the broad impression that these changes are non linear with respect to age. Our data is also showing nonlinear, non significant changes with age in motor conduction velocity, which is consistent with the reported studies. Similar studies have also reported [4,7,9,15,20,21,22]shown slight decline of conduction velocity with age which appear to be unimportant clinically. There was a declining trend, but it was not linearly correlated with age of the subjects[7,9,22].

CONCLUSION

In the present study motor conduction velocity of ulnar nerve in different age groups was almost same. The difference between the different age group was not statistically significant.

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