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EXAMINING THE PREVALENCE AND ELECTROPHYSIOLOGICAL ASSESSMENT OF SYMPTOMATIC AND ASYMPTOMATIC CARPAL TUNNEL SYNDROME IN STUDENTS AT UKA TARASDIAGA UNIVERSITY BY OBSERVATION

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ABSTRACT
INTRODUCTION: The most prevalent compressive neuropathy affecting the upper extremities is carpal tunnel syndrome. There are several causes contributing to the etiology of this illness, including systemic, occupational, and anatomical aspects.

AIMS AND OBJECTIVES: In order to determine if nerve conduction velocity may be used as a diagnostic tool in cases of both symptomatic and asymptomatic carpal tunnel syndrome, as well as to investigate the connection that exists between BMI and the diagnosis of carpal tunnel syndrome.

METHODOLOGY: A total of thirty individuals, mostly employed at Uka Tarsadia University, participated in the nerve-conduction investigation. The Boston Questionnaire and Nerve Conduction Velocity were employed as measurement tools for outcomes.

RESULTS: Nerve conduction research studies have been undertaken on a total of 29 recipients. The research study employed the Mann-Whitney U test, and the test's descriptive data indicates that there is no discernible difference between the symptomatic and asymptomatic NCS. As a result, the results of that research did not demonstrate a meaningful link between carpal tunnel syndrome and BMI. There was no discernible difference in NCS between the symptomatic and asymptomatic groups, which is according to the discoveries of nerve conduction due diligence.

CONCLUSION: This study's findings did not demonstrate a strong link between carpal tunnel syndrome and BMI. There was no discernible difference in NCS between the symptomatic and asymptomatic groups, according to the results of nerve conduction investigations.

KEYWORDS: BMI, Boston questionnaire, carpal tunnel syndrome, Nerve conduction study

Introduction:

Carpal tunnel syndrome is a common form of compressive neuropathy affecting the upper limbs. The patient experiences pain, weakness, and paraesthesia in the hand and digits as a consequence of compression of the median nerve. The origin of this condition has been due to a multitude of causes, including anatomical, occupational, and systemic factors. Electro diagnostic testing implies the diagnosis, which is based on the patient's healthcare history and physical examination. [1]

The compression and traction activities come together in entrapment neuropathy. Disorders in the intramural microcirculation, lesions in the myelin sheath and the axon, and changes in the supporting connective tissues can all result from nerve compression and traction. A peripheral nerve can get trapped when it passes through an anatomical compartment that is too frequently tight, leading to malfunction or injury to the nerve both inside and outside of the site of compression. The most common form of this is median nerve entrapment at the wrist in the carpal tunnel. Plenty of pathophysiologic pathways have been suggested to be combined in CTS by the literature these days under acceptance for publication. The increased tension between the tunnel, deteriorate to the median nerve's microcirculation, compression technology of the nerve's tissue of connective tissue, and hypertrophy of the synovial membrane are the interacting methodologies. [2]

Subjects' repetitive movements and increased tension have a connection to this. For example, in 1998, observations from Europe showed more than 60% of upper limb muscular disorders identified as work-related have been cases of CTS. Cancer incidence rates can also apply to different industries and professions inside the economy. For example, the marine foods processing this industry reports that 73% of people who work there have CTS. The varied views on the prevalence levels of CTS draw attention to the challenged nature of circumstances may thus making it an important topic that has to be controlled effective. [3]

The little finger is covered by the ulnar nerve, patients might get pain, tingling, and numbness over the entirety of their fingers. However, systematic questioning is going to demonstrate that this is rarely the case. Sometimes, however, if the ulna nerve is affected right away, all five fingers may end up being diagnosed.

This weakness and difficulties in the burdened hand, which frequently gets worse by exercise or employment, are fewer common symptoms. Additionally, patients may report elbow, shoulder, or even forearm pain. Some patients may only ever have shoulder discomfort as their presenting grieve; they cannot demonstrate objective signs of sensory errors above the wrist. [4]

The body mass index calculation procedure is a body mass index. The calculation involves dividing the squared height in the measurement by the weight in kilos. Even if BMI is an incorrect measure, it is unable to differentiate between overweight caused by above lean mass and overweight caused by extra fatty mass. [5]

Boston Questionnaire (Carpal Tunnel Disability Assessment from Brigham and Women's Hospital) Patients in carpal tunnel syndrome can self-administer the Boston Questionnaire, which grades their level of functionality and symptom severity (Levine et al., 1993). There are eleven questions on the symptom severity scale and eight items on the functional status scale. Every

question is rated on a range of 1 to 5, where 1 denotes no symptoms and 5 signals severe symptoms. The severity, frequency, kind, and length of time among the symptoms will be assessed using the symptom severity scale. The knock-on effect of carpal tunnel syndrome on ordinary activities is evaluated using the functional status scale. [6]

Guillain-Bare syndrome, ulnar neuropathy, carpal tunnel syndrome, peripheral neuropathy, along with other prevalent medical conditions can all be identified using NCV investigations. Moreover, its positive effects reach beyond diagnostic significance and may also be utilized in the formulation of treatment plans. Because they are automatically affordable, peripheral nerves, such as the ulnar and median nerves in the upper extremities, have been frequently utilized for NCV. A generation occurs through the stimulation of these neural pathways with a low-velocity electric current applied by electrodes spaced out on the skin of nerve impulses. The motor NCV (MNCV) and compound muscle action potential (CMAP) are then measured for these impulses, distant to the stimulation location. It's interesting to note that the diameter and myelination of the nerve fiber under examination, as well as other physiological factors including age, height, gender, and temperature, all have an impact on NCV. Previous research has shown that as people age and get taller, there is a noticeable decrease of conduction velocities and sensory latencies.

As a result, the study will measure the NCV in the median nerve in the local population's normal, healthy individuals and assess the effects of anthropometric variables like age, gender, and height on it as well as their relationships. The following the elements made up the nerve conduction studies (NCS): (a) motor NCS (motor NCS), (b) sensory NCS, (c) F-wave investigation and (d) H-reflex study. [7]

Materials and Method

Source of Data - IT and Computer Institute of Uka Tarsadia University.

Study Design - To assess both symptomatic and asymptomatic carpal tunnel syndrome, an observational electro diagnostic investigation was conducted.

Sample Size - There will be thirty years old subject matter investigated in everything.

Study Population - Students Enrolled in College.

Sampling Method - Convenient sampling.

Inclusion Criterion - Age 18 to 24 years

Gender: Male and Female, BMI < 30 Employees who have worked with computers or laptops for more than six months. Employees who use a laptop or computer for more over two hours a day. Those who were working with their wrists extended. Those who are able to comprehend and carry out instructions. **Exclusion Criterion -** Any neurological problems, any upper limb surgery performed within the last six months, any upper limb injuries, and outcome measures.

Boston Questionnaire - Three types of nerve conduction velocity machines are available: Motor, sensory, and nerve conduction velocity and latency.

Procedure of the study - With approval from the institutional ethics committee of the Shrimad Rajchandra College of Physiotherapy, the study entitled "A study of prevalence and electrophysiological evaluation in Symptomatic and asymptomatic carpal tunnel syndrome

among Uka Tarsadia University students" was started. A total of 29 subjects who met all inclusion criteria were included in the study.

Written consent was being obtained from the participant, who met the inclusion criteria, and they were being told about the study. The course was offered by Uka Tarsadia University's IT and Computer Institutes.

We evaluated each subject's weight and height in centimetres using a wall-mounted height gauge after calculating each person's BMI on a weighing scale. Following the measurement of their height in meters and weight in kilograms, the following formula was used to determine their BMI. Weight (kg) / height (m2) equals BMI.

First, a functional scale and severity assessment for carpel tunnel syndrome were administered to the chosen individuals. Nerve conduction investigations were conducted on people who were determined to be symptomatic; moreover, participants who were found to be asymptomatic were also chosen for these research. As a result, symptomatic and asymptomatic groups were established. Those with symptoms who were given a CTS diagnosis.

Subjects without symptoms who appeared to be at risk of developing CTS as a result of years of exposure to causative variables were chosen. Regarding subject categorization, CTS was defined as proven electrophysiological defects as follows, together with numbness, tingling, burning, or pain in at least one digit—the index, middle, or ring finger.

Before they could participate, a set of questions were asked of each subject to ensure their eligibility. Only college-bound individuals were to be included, and all subjects had to be between the ages of 18 and 24. The highest age restriction was chosen because people over 50 have been observed to exhibit abnormalities in sensory and motor nerve transmission, which would jeopardize the study's findings. Subjects were excluded if they had ever undergone successful or unsuccessful surgery to treat CTS, if their motor deficits as indicated by the electrophysiological findings classified their CTS as moderate or severe, or if their self-reported history of neurological disorders, heart disease, lung disease, or diabetes indicated they had any of these conditions.

Protocol

Following the provision of written informed permission, individuals were invited to complete a demographic survey. The Boston Carpal Tunnel Questionnaire, which includes the functional status scale (FSS) and the symptom severity scale (SSS), was then given to the patient to complete.

Boston Surveys

The purpose of the individuals' completed questionnaire, the 11-item Boston Carpal Tunnel Questionnaire, was to get descriptive demographic data.

Eight questions on the challenges a person faces doing daily tasks like writing, putting on clothes, or opening jars make up the second section of the measure. Each portion has a score that is recorded, and these two were rated independently. The questions are all ranked from 1 to 5, where 1 is the least severe or none at all, and 5 is the most severe. That is, an individual's overall score out of five on the SSS denotes the intensity of their symptoms, and an individual's overall score out of five on the FSS shows how difficult it is for them to complete these daily chores.It is a suitable tool for research or auditing because of these contents. This scale distinguished between CTS cases and control individuals.

Procedure for NCS: Skin Preparation:

Using a water swab, the skin regions where the ground, recording, and stimulating electrodes were positioned were cleansed. The wrist and forearm were uncovered, and the individuals were positioned with their palm facing up. In nerve conduction experiments, the nerve was stimulated at the place where it is more superficial using tiny electrical impulses, and the responses were recorded. The electrical impulses are sent and detected by the surface electrodes. There are no long-term negative consequences from the test, and it is safe and well tolerated with very little pain. The majority of patient's report feeling a "tingling" or "taping" sensation as the result. Topical cream application should be avoided by the patient since it may increase resistance to the administered current, necessitating higher electrical stimulation levels. Warming the limbs may be necessary in chilly conditions because chilled peripheries (below 32 degrees Celsius) slow down nerve conduction velocity.

Placement of Electrodes:

Sensory nerve conduction:

The median nerve's orthodromic, mid-palmar-wrist mixed nerve latencies were ascertained by administering supramaximal palm stimulation using a hand-held bipolar stimulation device.

Median nerve latencies were recorded using ring electrodes placed on index fingers, with the anode angled toward the web between the index and middle finger. An orthodromic electrical impulse travels in the same direction as normal physiologic conduction, such as when a motor nerve electrical impulse is transmitted toward the muscle and away from the spine or a sensory impulse travels towards the spine. In this instance, sensory nerve conduction was measured using a ring electrode.

The ground electrode was applied to the hand's dorsum; it should ideally be positioned between the stimulating and recording electrodes, however it can be applied close to the cathode as well. Anode is positioned on the middle phalanx, and cathode is on the proximal. Approximately 10–12 cm proximal to the cathode in the wrist's center, directly over the median nerve proximal to the distal wrist crease, stimulation was applied. Given enough time, stimulation approaches the supramaximal level.

The point at which an increase in stimulus no longer causes the waveform's amplitude to grow is known as the supramaximal level.

Data Analysis and Result

The purpose of this study was to examine the frequency of carpal tunnel syndrome in obese people as well as the electrophysiological evaluation of cases that were symptomatic or asymptomatic. There were 29 patients in all with BMIs under 30. The Boston questionnaire was used to evaluate subjects for carpal tunnel syndrome. Four of these patients had symptoms, whereas the remaining twenty-five did not. They also completed experiments on the nerve conduction of the median nerve.

The primary goal of the research was to determine whether nerve conduction studies varied or stayed the same in the two groups. The results were deemed significant when the p-value was less than 0.05. The subsequent statistical analysis was completed: -

Analysis was done on descriptive statistics like mean and standard deviation. Since the data was not normally distributed, the Mann Whitney test was applied. The median nerve latency 1

at the wrist and elbow, latency 2 at the wrist and elbow, the motor nerve's wrist and elbow velocities, and the sensory nerve's latency1, latency2, and velocity were all averaged. With the SPSS program, data analysis was carried out (version 20.0).

Table: 1: Age distribution in 105 individuals

	Mean	SD	N
BMI	15.4	3.240317	29
AGE	20	0.693034	29

The BMI mean and standard deviation (SD) as well as the individuals' ages are shown in the above table.

Table: 2 Carpal tunnel syndromes among obese individuals

Total	29
Symptomatic	4
Asymptomatic	25
Percentage	13. 79 =symptomatic 86.21=asymptomatic

Figure: 1 Asymptomatic and symptomatic distribution

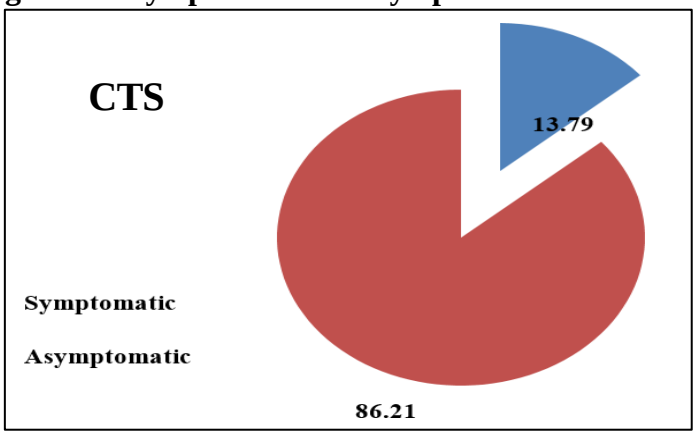

Table: 3. Motor nerve latency-1 for wrist and elbow

Ranks

Group	N	Mean Rank	Sum of Ranks	Sign
Sys - Latency 1 of Wrist, as total	425	1.25	5	0.9492 not significant
	294	6.68	167.2	
As Total, Latency 1 of Elbow, as total	25	4.58	18.33	0.27572 not significant
		3.39	84.81	
Total	29			

It does not show any difference. Significance level is mentioned.

Table: 4. Motor nerve latency-2 for wrist and elbow

Group	N	Mean Rank	Sum of Ranks	Sign
Sys - Latency 2 of Wrist, as total	425	40	160	1.0 not significant
	294	36.97	924.38	
As Total, Latency 2 of Elbow, as total	25	40	160	0.4715 not significant
	2	26.71	667.94	
Total	29			

Table: 5. MNCV for wrist and elbow

Group	N	Mean Rank	Sum of Ranks	Sign
MNCV - Latency 2 of Wrist, as total	425	3.87	155	0.5486 not significant
	294	5.89	147.26	
As Total, MNCV Latency 2 of Elbow, as total	25	3.87	155	0.5486 not significant
		5.89	47.26	
Total	29			

Table: 6. Sensory nerve latency-1

Group	N	Mean Rank	Sum of Ranks	Sign
SNCV - Latency 1 of Wrist, as total	425	3.87	15.5	0.5486 not significant
		5.89	147.26	
Total	29			

Table: 7. Sensory nerve latency-2

Group	N	Mean Rank	Sum of Ranks	Sign
SNCV - Latency 1 of Wrist, as total	425	6.55	26.21	0.3662 not significant
	29	9.23	23.95	
Total	29			

Table: 8. Sensory nerve conduction velocity

Group	N	Mean Rank	Sum of Ranks	Sign
SNC – Velocity Latency 1 of Wrist, as total	425	8.72	34.91	0.2005 not significant
		9.23	230.95	
Total	29			

Discussion

This study examined the frequency of carpal tunnel syndrome in people with BMIs under 30, as well as the electrophysiological evaluation of both symptomatic and asymptomatic patients.

Just 4 out of the 29 persons who completed the questionnaire for the first section of the study—which examined the prevalence of carpal tunnel syndrome—were exhibiting symptoms.

According to the study's findings, 13.79% of participants had positive or symptomatic CTS results, whereas 86.21% of participants were asymptomatic.

Similar research was conducted by Deepanairet al., who examined how obesity affected distal

motor and sensory delay and found no correlation between BMI and DML or DSL. Even among obese members of the military services, carpal tunnel syndrome is rare. This may be because their hands and bodies are often exercised, leading to greater hand muscle tone.

In the second section of the investigation, motor nerve velocity, sensory nerve latency 1, latency 2, and velocity were employed in addition to median nerve motor latency 1 and latency 2 for the wrist and elbow.

Using the same test for motor nerve conduction velocity for the wrist, the symptomatic group's mean score was 87, while the asymptomatic group's score was 5.89. The total of ranks for the symptomatic group was 15.5, while the asymptomatic group's score was 147.26.

The same test for sensory nerve conduction parameters was used in this study as well. The test for sensory nerve conduction latency 1 was completed in both groups, and the results show that the mean for the symptomatic group was 3.87 and the mean for the asymptomatic group was 5.89. The sum of ranks for the symptomatic group is 15.5, while the asymptomatic group's sum is 147.26. The two groups had a test for sensory nerve conduction latency 2, which revealed a mean score of 6.55 for the symptomatic group and a mean score of 9.23 for the asymptomatic group. The total of rankings for the symptomatic group was 26.21, while the asymptomatic group's score was 230.95. The results were identical for both groups.

A sensory nerve conduction velocity test was performed on both groups, and the results reveal that the mean for the symptomatic group was 8.72, while the mean for the asymptomatic group was 9.23. The total of rankings for the symptomatic group is 34.91, while the sum for the asymptomatic group is 230.95. Therefore, there was no discernible difference between the groups. Since the mean rank of the symptomatic and asymptomatic groups was the same, the sensory components were likewise the same for both groups.

Here, the means of all the data were same in the symptomatic and asymptomatic groups, indicating that the velocities of the motor and sensory nerve conduction tests, as well as latency1 and latency2, were also identical in both groups.

In a population-based study, Atroshi et al. examined the diagnostic qualities of NCS for carpal tunnel syndrome by mailing a questionnaire to 3,000 randomly selected participants. 2,466 people responded to the mail, of which 125 were chosen at random and 262 were symptomatic (had tingling or numbness in their radial fingers). Responders who were asymptomatic or symptomatic were subjected to clinical and electrophysiological testing. Examiners who were blinded then conducted nerve conduction tests on both sick and asymptomatic individuals. The findings revealed that there was no discernible variation in the diagnostic precision of wrist-palm sensory conduction velocity, wrist-palm/forearm sensory conduction velocity ratio, digit-wrist sensory latency, and median nerve distal motor latency.

According to a research by Smith et al., it is not fair to entirely exclude NCS as a "unnecessary luxury" and that they cannot be deemed crucial for evaluating the results of CTS. Clinicians must weigh the advantages of NCS in objectively demonstrating nerve dysfunction against its drawbacks when evaluating patient outcomes. It is advised for scientific reasons to integrate clinical questionnaires and NCS in a systematic manner to cover the range of CTS indications and symptoms.

Conclusion

The aim of the research was to examine the frequency of carpal tunnel syndrome in people

with a body mass index (BMI<30) and the electrophysiological evaluation of both symptomatic and asymptomatic cases.

This study's findings did not demonstrate a strong link between carpal tunnel syndrome and BMI. There was no discernible difference in NCS between the symptomatic and asymptomatic groups, according to the results of nerve conduction investigations.

Declarations

Conflict of interest

The authors confirm that there are no conflicts of interest regarding the study of this paper.

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