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The Correlation Between Chronic Neck Pain and Hand Grip Strength in Information Technology Professionals in Pune, Maharashtra

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Abstract

Background and Objective of Study: Neck pain is among the most prevalent musculoskeletal issues globally, impacting 42% to 67% of young adults. Neck pain is a common complaint among individuals who work extensively with computers. Prolonged periods of computer use can lead to significant strain on the body's muscles, particularly those in the neck, resulting in discomfort and pain in that area. Neck pain was found to be prevalent in 68.6% of population of IT professionals and out of them 34.6 % having chronic neck pain. IT professionals use their hand for typing and grasping mouse for prolonged period. So, hand grip strength must be good enough to perform work effectively and accurately. The current study intended to find correlation of neck pain as measured by Numerical Pain Rating Scale (NPRS) with grip strength measured by hand held dynamometer in kilogram.

Material & methods: 84 IT professionals working in different companies were selected for the study using purposive sampling. Readings were taken for neck pain and hand grip strength.
Result & Discussion: Results of the study showed the significant negative correlation between neck pain and hand grip strength(r-0.714). Based on this result it can be concluded that IT Professionals with chronic neck pain had reduced grip strength. Additionally chronic neck pain may lead to physical inactivity and disuse, further lowering muscle strength.

Keywords*: chronic neck pain, numerical pain rating scale (NPRS), hand grip strength, hand held dynamometer.*

1. Introduction:

Neck pain is characterized as an ache or discomfort located in the area extending from the base of the skull down to the third thoracic vertebra and between the middle edges of the shoulder blades. [1,2,]

Neck pain is chronic when it persists for more than three months. [1,3,4] Neck Pain is Non-specific when it originates from a vague, hard-to-identify musculoskeletal source rather than a distinct medical condition. [5,6] Neck pain is particularly common among computer workers. The prolonged nature of their work leads to significant tension in the neck's musculature, which directly causes pain in that area.[7] The forward-flexed posture of the neck during computer works places additional strain on the upper fibres of the trapezius muscle. This heightened muscle activity is directly linked to the development of work-related neck pain. The problem is highly prevalent among IT professionals, with studies indicating that 68.6% experience neck pain, and for 34.6% of those individuals, the condition is chronic. [8] Hand grip

strength is a measure of the static force the hand can generate, typically quantified by squeezing a device called a dynamometer. This measurement is widely used to assess the functional ability of the hand. In addition, it often serves as an indicator of the strength of the entire upper arm. [9] Since the work of IT professionals involves prolonged periods of typing and mouse use, sufficient hand grip strength is essential for them to perform their jobs effectively and accurately. For individuals with work related musculoskeletal disorders of the upper extremity, reduced grip strength often limits their daily activities.[10] This decrease in strength is influenced by a combination of both physical and psychological factors. Therefore, the objective of this study was to investigate the correlation between chronic neck pain and hand grip strength among Information Technology (IT) professionals.

2. Material and Methodology:

Study Design: Cross sectional Co relational study Design. 84 IT Professionals 65 males and 19 females in different IT Companies in Pune were selected for study.

Sampling Technique:

Purposive sampling Inclusion Criteria

Chronic Neck Pain (>3 months) Non-specific neck pain
Both Male and Female IT professionals In profession for at least 1 year Working Hrs -6 - 8hrs
Age- 25 – 35year
Willing to participate

Exclusion criteria

Recent History of fracture of upper limb, neck Recent Surgery of neck, upper limb
Carpel Tunnel Syndrome
Deformities in elbow or hand Dequervain’s syndrome Person doing strength training

Intervention

The inclusion and exclusion criteria were used to assess participants for eligibility, after which written consent was obtained and the details of the procedure were explained to all individuals selected for the study. Once the patient had been carefully evaluated, pain was rated using the Numerical Pain Rating scale (NPRS)where a score of 0 indicated no pain and a score of 10 represented the highest level of pain imaginable. [11,12,13]

Measurement of Grip Strength

The hydraulic hand-held dynamometer was used for measuring hand grip strength. The participant sat upright in a sturdy chair without armrests, keeping the shoulder relaxed, the elbow bent at a right angle and close to the body, and the forearm and wrist straight. Each person was asked to squeeze the grip

device with as much force as possible. Following a single practice round, grip strength was measured three times, with 15 to 45 seconds of rest in between each trial. The highest grip strength value from the three trials was considered the maximum grip strength.[14]

3. Observations and Results:

The study was done on 84 IT professionals. A correlation analysis was performed to examine the relationships between Numerical Pain Rating Scale (NPRS) scores and grip strength. The statistical analysis was conducted using IBM SPSS version 31 software. Descriptive statistics including mean, standard deviation, and p-values were calculated to summarize the data and

determine significance. The demographic data for Age, weight, height, BMI, NPRS Score, Grip Strength is summarized is Table 1. Karl Pearson test was used to find correlation between NPRS and Grip Strength (Table 2 and Fig1).

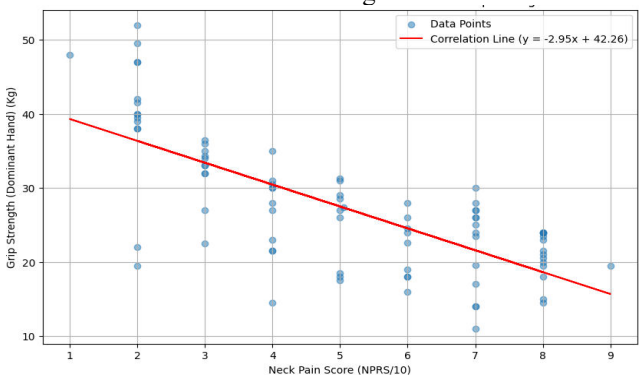
Table 1: Demographic data for participants

Variables	Mean	Standard Deviation
Age	27.32	2.20
Height (m^2)	2.65	0.22
Weight (Kg)	62.54	11.71
BMI	23.10	3.30
NPRS	5.05	2.21
Grip Strength	26.65	9.22

Table 2: Correlation between NPRS & Hand Grip Strength

Variables	r-value	p-value
NPRS and Hand Grip Strength	-0.714	<0.001

Fig 1: Correlation between NPRS & Hand Grip strength



4. Discussion:

The following study was done to assess the correlation between chronic neck pain and hand grip strength by using NPRS and hand-held dynamometer respectively in IT professionals. In this study total 84 subjects were included both males and females in the age group of 25 to 35 years. The mean & SD value for neck pain on NPRS was 5.05±2.21 and grip strength was 26.65±9.22. The purpose of our study is to correlate between Chronic Neck Pain and hand grip strength in Information Technology professionals in Pune, Maharashtra. The result of our study indicated significant negative correlation between NPRS & Grip Strength. These findings are consistent with previous research. For example, Ramdati and Soni (2019) observed a similar negative correlation in dentists. Other studies have noted that chronic pain can lead to disuse of the affected limb, resulting in muscle atrophy and reduced strength, sometimes by as much as 20–30%. It's believed that degenerative changes associated with

conditions like spondylosis can impair nerve function and blood flow, which in turn affects muscle activation in the hands.[14]

According to Van Wilgen CP and his colleagues, individuals with chronic pain frequently tend to favour their unaffected limbs, leading to a lack of use in the painful one. This avoidance, over time, can result in physical consequences such as muscle deterioration, a condition known as atrophy. [10] Furthermore, this disuse can impair muscle function, causing issues with coordination and reducing the force of muscle contractions. Consequently, it is not uncommon for those suffering from chronic pain to see a 20-30% loss of muscle strength in the limb that is in pain. The study's conclusions are supported by the work of Michael et al., who also observed a significant decrease in grip strength in both hands of patients with spondylosis compared to a control group.

They proposed that the degenerative process associated with spondylosis leads to increased pressure within the body's tissues. This elevated pressure can impede the speed of nerve signals while also reducing the supply of blood and oxygen. Consequently, the nervous system's ability to properly activate the muscles in the hand is compromised. In contrast to our findings, the research conducted by Eman Samir Fayez on dentists showed a positive correlation between neck pain and grip strength. Fayez suggested that this unexpected relationship could be explained by sensory hyper-excitability. [1] These results align with the existing body of research, which indicates that pain in the musculoskeletal system, particularly in the neck area, can have an impact on the function and performance of the arms and hands. Furthermore, long-term pain often results in physical inactivity and disuse of the affected areas, which contributes to a reduction in muscle strength. The strong negative correlation found in this study (with r-values exceeding –0.7) implies that hand grip strength could serve as a useful functional measure for the severity of neck pain. This conclusion is reinforced by the previously cited studies, which also establish a connection between chronic neck pain and hand grip strength. Therefore, the evidence suggests that neck pain can negatively affect a person's grip strength.

Limitations

The overall posture during the work and the physical activity not considered.

Number of female participants in the study were relatively limited.

Future Scope

Further interventional studies can be conducted to target both neck pain reduction and grip-strengthening exercises, which may help clarify whether improving one variable can beneficially influence the other. Further investigation-based study can be done to understand the mechanisms connecting persistent neck pain with weakened grip.

5. Conclusion:

This Study concludes that there is a negative correlation between chronic neck pain and hand grip strength in IT Professionals.

6. Footnotes:

- **Conflict of Interest***:* None
- **Data Availability Statement**: The data that support the findings of this study are available from the authors, upon reasonable request.
- **Acknowledgement**: None
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- **Author's Contribution**: All author contributed equally

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