

Prevalence of carpal tunnel syndrome in computer operators of Peshawar

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ABSTRACT

Introduction: Carpal tunnel syndrome is the most common peripheral neuropathy. It is a complex of symptoms resulting from compression of median nerve at the carpal tunnel. Symptoms of the median nerve compression include tingling, numbness and pain on the palmer surface of the index, middle or radial half of ring finger, often associated with weakness of hand grip. There seems scarcity of data on the prevalence of carpal tunnel syndrome in computer operators in our province and therefore, this survey was designed to determine prevalence of carpal tunnel syndrome in Peshawar which is capital of our province.

Material & Method: This was a cross-sectional survey conducted on 247 computer operators working in Peshawar city. A standard data collection tool, Boston Questionnaire, was utilized for data collection. Sample size was calculated using sample calculator (Epi Info) keeping 95% Confidence Interval. Data was collected from the eligible candidates in district Peshawar on the set inclusion criteria. Written consents were taken from all eligible candidates. Data was entered and analyzed by SPSS version 20.

Results: A total population of 247 computer operators (223 males, 24 females) were included in the study. The study was conducted in three different institutes of Peshawar namely; Rehman Medical Institute, Khyber Medical University and Federal Bureau of Revenue situated in Peshawar. The mean age of study population was 39.4 years where 9.3% were female and 90.7% were males. Physical examination of the included population showed 15.5% prevalence of carpal tunnel syndrome among computer operators in Peshawar. However, carpal compression test revealed positive result in 15% participants and carpal compression with wrist flexion was positive in 16.6% of the participants.

Conclusion: The study concluded that the prevalence of Carpal Tunnel Syndrome among computer operators in Peshawar is 15.5% which is very much in lieu with other studies conducted elsewhere.

Keywords: Carpal tunnel syndrome, computer operators, Khyber Pakhtunkhwa.

The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed substantially to the planning of research, questionnaire design, data collection, data analysis and write-up of the article as part of a student research team at Rehman College of Rehabilitation Sciences. The research work was supervised by Dr. Bilal Khan (PT) Assistant Professor Peshawar.

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INTRODUCTION

The computer revolution has proved to be a blessing for the human kind in the form faster communication, speed work done, facilitation in data interpretation, however, it has a dark side in the form of cyber bullying and security threats (1). Computer operators exist everywhere in a modern society and are found everywhere including academics settings, clinical places and industries (2). Due to an important role of computers operators in different industries, they are more prone to develop musculoskeletal disorders and occupational health related problems. A research survey on repetitive strain injuries suggested a strong correlation between repetitive strain injuries and its direct effect on quality and quantity of work satisfaction, and absenteeism (3). Carpal Tunnel syndrome (CTS) is one of the most common repetitive strain injuries and has been associated with computer use.

CTS is a compression neuropathy of median nerve in the carpal tunnel (4) and its symptoms of included pain, numbness and tingling on the volar surface of the index, middle and half of the ring finger(5). CTS is one of the commonest musculoskeletal disorders that has been reported in professional computer users (6). Apart from the latter profession, CTS has been associated with Diabetes Mellitus, Rheumatoid arthritis, Acromegaly, Hypothyroidism,

history of wrist injury, cervical radiculopathy, pregnancy and tenosynovitis (7, 8). The incidence of CTS has been reported to be high among those working with vibrating machinery and office workers especially typist, clerks and trauma due to repetitive hand motion in persons whose work necessitate repeated and forceful finger and wrist flexion and extension (6, 9). The posture of extended wrists while typing on a computer key board seems to be predisposing factor for CTS (10). During use of mouse for a compute, wrist extension and ulnar deviation ranges from 230 to 300 and -3.20 to 5.20, respectively, making computer user vulnerable to developing CTS. Wrist position in keyboard worker (entering of data) electro-goniometer measurement showed wrist extension of 140 and 200 at the 50 and 90 percentiles, respectively. Thomsen et al. reported in a survey on 379 computer users that the wrist extension remained 24.30 during keyboard use and 230 during computer mouse use. Mean ulnar deviation was observed 5.00 during keyboard use and 1.00 during mouse use. The association was statistically significant for participants reporting more than 20h/w of mouse use with the risk almost tripled(4).

Based on both clinical signs and symptoms and nerve conduction tests, the overall prevalence of CTS was reported 3.0-5.8% among

women and 0.6-2.1% among men in general population(11). The prevalence of CTS in Indian general population ranges from 3-6% and in computer operators it was estimated to be 13.1 % (6). The prevalence of CTS in UK was reported 7% of the general population and in USA prevalence was reported 3.72%. In China the prevalence of CTS was reported 16.7% in computer operators(10).

Like many other countries of the world, the number of computer users has seen an increased in Pakistan and many industries where computer was not regarded an essential part, have digitalize majority of their activities. Computer related health issues have been documented in other countries of the world such as USA, UK, India and China, and similar health related problems are expected in our country. According the researchers' knowledge limited data is available on the topic in our province and therefore, this cross-sectional survey was designed estimate prevalence of CTS in computer users.

MATERIALS & METHODS

A cross-sectional survey was conducted and data was collected from computer operators who met the inclusion criteria. Both male and female population whose work involved using of computer were included in this survey. This study was conducted from September 2017 to December 2017 at Rehman medical institute (RMI), Khyber Medical University (KMU) and Federal Board of Revenue (FBR). Two stages cluster sampling was used. Peshawar was divided in the clusters of universities, government offices and hospitals. In the second stage from that clusters list we randomly selected one institute from each group. Using sample size calculator (EPI Info), the sample size was 247 where data was collected from 24 females and 223 males. The criteria for inclusion in the study was experience for continues period of at least 6 month exposure to typing and computer work i.e. used mouse and key board and working for at least 20 hours per week. Individuals who were known cases of Rheumatoid Arthritis, acromegaly and pregnant women were excluded from the study. Standard Boston questionnaire were used and two physical tests for diagnosis of carpal tunnel syndrome was performed during data collection.

These physical tests were carpal compression test which has sensitivity of 87% and specificity of 90 % (12) and carpal compression test with the wrist in flexion which have sensitivity of 82% and specificity of 99% (13). After the performance of physical test the, Boston questionnaire were filled from the individuals. Different variables i.e. carpal compression test, carpal compression with wrist flexion test and Boston questionnaire variables i.e. sensation of paraesthesia, numbness, tingling, night symptoms, day time symptoms and severity of symptoms (mild, moderate, severe and continues) were analyzed using SPSS version 20.

RESULTS

A total of 247 participants with mean age 39.4 years, 9.3% females and 90.7% males were included in this survey. Majority of the participants (57.9%) were from FBR followed by RMI (23.5%) and then by KMU (18.6%). The physical assessment results showed 15.8% prevalence of carpal tunnel syndrome amongst computer operators included in this survey. Carpal compression test revealed the positive result in 15.5% participants and carpal compression with wrist flexion revealed 16.6% prevalence of CTS in the population.

Subjective measuring BOSTON revealed 17.8% of the participants with wrist pain at night. Typically, wrist/hand pain in participants was recorded 15% at daytime. Numbness was found in 17% of the participants and 17.4% complained weakness in hand/wrist. Tingling

Table 1. Table showing symptoms severity of Boston questionnaire

| # | Question | Slight | Medium | Severe | Very severe |
|---|--|--------|--------|--------|-------------|
| 1 | Severity of hand/wrist pain at night | 8.70% | 7.70% | 1.60% | - |
| 2 | Pain in hand/wrist at day time | 6.50% | 8.90% | 1.60% | 0.80% |
| 3 | Numbness sensation | 5.70% | 8.10% | 3.20% | - |
| 4 | Weakness in hand/wrist | 8.10% | 6.90% | 2.40% | - |
| 5 | Tingling in hand/wrist | 7.70% | 5.30% | 3.20% | - |
| 6 | Severity of numbness/tingling at night | 8.10% | 6.50% | 1.20% | 0.40% |

Table 2: Table showing sleep pattern disturbance due to CTS

| # | Frequency | Waking up in past 2 weeks due to hand/wrist pain | Waking up in past 2 weeks due to numbness/tingling |
|---|-------------------|--|--|
| 1 | Once | 4.50% | 5.30% |
| 2 | 2 - 3 times | 9.30% | 8.90% |
| 3 | 4 - 5 times | 1.60% | 1.20% |
| 4 | More than 5 times | 0.40% | 0.80% |

Table 3: Difficulty with grasping and use of small objects

| # | Picking and grasping small objects | Percentage |
|---|------------------------------------|------------|
| 1 | Without difficulty | 86.60% |
| 2 | Little difficulty | 8.90% |
| 3 | Moderate difficulty | 3.60% |
| 4 | Very difficulty | 0.80% |

sensation was reported 16.2%. On the whole 16.2% subjects reported numbness and tingling sensations at night. In grasping and use of small objects such as keys or pen, 13.3% of the participants reported difficulty. Detail description of the above symptoms severity is given in table number 1-3.

Regarding function status, 19% of the participants reported difficulty in writing, 10.1% in buttoning 14.6% in holding a book while reading, 14.2% while gripping the telephone handle, 12.5% in opening jars, 12.1% during household chores, 13% in carrying grocery baskets, and 8.5% during bathing and dressing. Evaluation of the BOSTON questionnaire for the severity of symptoms showed that on the whole 13.4% were moderate cases and 3.2% were severe cases. Functional status scale revealed moderate and severe limitations in 16.2% and 1% cases respectively.

DISCUSSION

The prevalence of CTS amongst the computer operators based on the signs and symptoms and physical examination tests is estimated

15.5%. CTS carry 10% lifetime risk and an overall prevalence of 2-3% has been reported. CTS are frequently bilateral and in the dominant hand is typically more often and more severely affected, especially in idiopathic case (14). Among computer professionals CTS is considered an important health care issue with the prevalence of 15.5% compared to the general population which has been reported 2-3% (6). Authority which is responsible for health care should be aware of this issue and necessitate identifying risk factors in computer professionals and explore its preventive measures. Computer operator who are exposed to computer work for many years and working for longer hours per day are more prone to develop CTS. Higher the exposure to computer works, higher the chances of developing CTS. Compared to general population computer operators who are working as system administrators having greater work load and stress, constantly involved with repetitive work of fingers and wrist such as typing and use of mouse without mouse pad are more prone to develop CTS.

It has been observed that reducing duration of working hours and use of proper mouse pad and keeping wrist in neutral position while working on keyboard and mouse probably reduce the risk of developing CTS. Studies done in other countries i.e. USA, UK, China and India also reported the correlation of working hours and wrist position with developing CTS. In a study done by Ali et al. it was reported that longer the duration of working hours and increasing the years of exposure to computer work is a major risk for developing CTS (6).

Based on clinical signs and symptoms and nerve conduction tests, the overall prevalence of CTS has been reported 3.0-5.8% amongst women and 0.6-2.1% amongst men in general population(11). The prevalence of CTS in Indian general population ranges from 3-6% and in computer operators it is estimated to be 13.1% (6). The prevalence of CTS in UK was 7% in the general population and in the USA the prevalence is estimated 3.72%. The prevalence of CTS among computer operators in UK are 3.5% and in USA it is estimated to be 16.7%. In China, the prevalence is 16.7% in computer operators (10).

Similar findings were observed in our survey and the physical assessment showed 15.8% prevalence of carpal tunnel syndrome amongst computer operators included in this survey. Carpal compression test revealed the positive result in 15.5% participants and carpal compression with wrist flexion revealed 16.6% prevalence of CTS in the population.

CTS are more prevalent among those candidates who were using the mouse without mouse pads and keyboard for the longer duration of time. During the use of keyboard there are more repetitive movements of the fingers which are also a risk factor for the development of CTS. The other risk factor for the CTS is the extended position of the wrist while using a keyboard. Chin et al. reported that the wrist angle in extension for more than 200 has potential to cause CTS in computer professionals.

CTS is the most common occupational musculoskeletal disorder and is one of the most common reason for lost work time, limited working days, reducing working capability, surgery and rehabilitation. Reducing the frequency and intensity of exposure to forceful repetitive work, decreasing the duration of work, reducing the extreme wrist posture and by using proper mouse pads and limiting the use of vibrating apparatus is expected in reduction of the incidence and severity of CTS in working populations (10). For reduction the risk of CTS, we suggest the best wrist position for mouse use and a keyboard is to keep the wrist in neutral position and use proper mouse pad to avoid any extended wrist position.

CONCLUSION

From our study results we concluded that CTS is more prevalent in computer operators who are working for many hours and using keyboard and mouse for longer duration of time with their wrist in extended position for prolong period of time.

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