Carpal tunnel syndrome (CTS) is triggered by compression of the median nerve as it travels through the wrist’s carpal tunnel. Sensory and frequently motor symptoms and indications in the peripheral distribution of the median nerve characterize illness. CTS is also more likely to occur if you work in certain occupations such as Related with clerical and administrative work on Computer [1]. Compression of the median nerve at the wrist causes this common condition that compromises hand function [2]. The carpal tunnel is produced by the several bones in the wrist as well as the transverse carpal ligament, which serves as the roof of the carpal tunnel. The carpal tunnel contains the median nerve and nine tendons [3]. CTS is caused by inflammation and development of the median nerve inflammation in tendons in because of expansion and thickness of the transverse carpal ligament. The presence of a mass lesion can be a tumor or cysts within the carpal tunnel. It can be a combination of many other factors and pathologies [4]. Whatever the exact cause, pressure on the median nerve and dysfunction are the end results [5]. Research studies have associated computer professionals to overall population of various occupational
categories did not account occupational risk factors in their estimates [6, 7]. Thus, office workers who use computers infrequently or not at all are a more acceptable comparison group than the overall population or multiple occupational groupings [8]. According to the findings of this meta-analysis, excessive computer use can be an occupational risk factor for CTS [9]. There is a need for more prospective research among office workers with reliably measured keyboard and mouse use, as well as CTS symptoms or indicators confirmed by a nerve conduction study [10]. The carpal tunnel can be constricted and irritated by a wrist fracture, as well as the swelling and inflammation caused by rheumatoid arthritis [11]. CTS is a condition that can be caused by a variety of factors. A combination of risk factors is most likely to blame for the illness’s start [12]. CTS prevalence in the general US population is assessed to be 3.72 percent, reflecting a larger pool of afflicted people than previously thought [13]. The carpus has a concave bony structure on its flexor face, which is covered by the flexor retinaculum [14]. The bony carpus forms the carpal tunnel’s floor and walls, with the stiffness of the retinaculum functioning as its roof. The flexor retinaculum is connected to the scaphoid tubercle, trapezium ridge, and ulnar side of the hamate and pisiform hooks by the transverse carpal ligament [15, 16]. Certain occupational groups have higher prevalence rates of CTS [17]. The provocative test known as Phalen’s Maneuver is utilized in the identification of carpal tunnel syndrome. This is sometimes referred to a flexion test for wrist [18]. The Phalen’s test is a stimulating test that can be used to diagnose Carpel Tunnel Syndrome. When the median nerve is crushed or constricted at the wrist, this happens [19]. The discomfort is usually at its worst at night. The patient rests her contracted elbows on the table, enabling her wrists to reach their full range of motion. The patient is instructed to press the dorsal surfaces of her hands together for half a minute. The median nerve will be compressed amongst the transverse carpal ligament and the forward edge of the distal end of the radius in this posture which is increasing the pressure in the carpal tunnel [20]. Computer work contact was linked to an increase of Carpal tunnel syndrome. Ergonomic considerations are critical in ensuring proper hand positioning while working on a computer.

This study explained the Occupational factor in occurrence of Carpel Tunnel syndrome. It will also help the computer users to get awareness as primordial prevention and early symptomatic management in patients for early cure.

M E T H O D S

It is a descriptive cross sectional study conducted from October 2021 to January 2022 among computer users (of clerical staff) aged between 20-50 years at five Private colleges in Lahore city. The participants fulfilling the inclusion criteria i.e. (using computer for more than 6 hours a day, having co-operative attitude, were not taking any analgesics and had no associated co-morbidities) were enrolled whereas participants having non-co-operative attitude, using computer for less than 6 hours a day, were taking regular analgesics and having other comorbidities for example recent fracture or surgery, pregnancy and infectious diseases were excluded. 200 participants were enrolled in the study via simple convenient sampling method. The sample size was calculated using formula of adjusted sample size:

\[
N = \frac{S}{1+(S-1)/Population}
\]

where, \( S = \) sample size for infinite population, \( Z = \) Z score, \( P = \) population proportion (Assumed as 50\% or 0.5) with 95\% confidence interval.

A written permission was obtained from Concerned Departments and ethical considerations were considered. A specially designed questionnaire was given among the participants to obtain demographic data and information regarding Phalen’s test of CTS. Data were entered and analyzed in SPSS version 21.0 and Descriptive statistics were applied for frequencies and percentages.

R E S U L T S

The study was conducted to evaluate the frequency of CTS among computer users of operating computer for more than 6 hours a day, having co-operative attitude, were not taking any analgesics and had no associated co-morbidities. A total of 200 participants were included and considered for Phalen’s Test which is a stimulating test that can be used to diagnose CTS once the median nerve is crushed or constricted at the wrist. The patients were instructed to press the dorsal surfaces of their hands together for 30-60 seconds. The frequency and percentages were calculated showing participants positive with Phalen’s Test.

Demographic data such as age was distributed in three groups 20–30, 31–40, 41–50 as mentioned in table 1.

**Table 1:** Frequency Distribution regarding Age Groups

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Frequency (%)</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>92 (46.0)</td>
<td>46.0</td>
<td>46.0</td>
</tr>
<tr>
<td>31-40</td>
<td>63 (31.5)</td>
<td>31.5</td>
<td>77.5</td>
</tr>
<tr>
<td>41-50</td>
<td>46 (22.5)</td>
<td>22.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>200 (100.0)</td>
<td>100.0</td>
<td>-</td>
</tr>
</tbody>
</table>

The age has a significant role in CTS as the age increases it increased with age and showing CTS-positive via Phalen’s Test mentioned in table 2 and for those who had negative, Phalen’s Test was resulted as negative.
In this study computer workers with other people
Carpel Tunnel Syndrome in a meta-analysis of six studies.
Computer/typewriter usage was inversely linked with
meta-analysis was to see if computer use causes CTS.
Shiri
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movements requiring high precision are reportedly known
spasm and work induced headache. The ne wrist
resulted in low back ache, cervical muscles
linked to CTS, but interconnection could not be
repetitive manual items or specific wrist postures were
and found that occupation responsibilities involving highly
neurological illnesses in the previous two decades. Computer typists have a job that demands only repetitive
use of wrist joint along with constant sitting posture that in
addition to CTS results in low back ache, cervical muscles
spasm and work induced headache. The fine wrist
movements requiring high precision are reportedly known as the sole source of overuse syndrome i.e., CTS. In a Study
by Shiri et al., published a meta-analysis in 2015 has
described the use of computer in CTS [9]. The goal of his
meta-analysis was to see if computer use causes CTS.
Computer/typewriter usage was inversely linked with
Carpel Tunnel Syndrome in a meta-analysis of six studies.
In this study computer workers with other people
belonging different occupations were compared. This Meta-Analysis had similar Results with the current study in
which 29 Participants had Positive Phalen's test showing positive CTS out of 200 participants doing Computer Related work. Another study by Lee et al., published in 2019
explains that CTS remains a complaint that affects people of all ages and genders. His Study Results are related with
the current study showing that Males are more prone to Develop CTS because of more occupational exposure and
work load [8]. A Recent study by Feng et al., published in
2021 A cross-sectional surveys of 969 respondents
considered from 17 to 49 years from 30 offices was
undertaken in a Chinese metropolitan city [13]. Clinically proven CTS patients were evaluated based on symptomatic
responders' histories, skin sensory testing, Phalen's test
and Tinel Sign. CTS was shown to be prevalent in 9.6% of
people in his study. Wrist and hand symptoms were shown
to be prevalent in 22 and 15% of people, respectively. Young
office workers in China have a high frequency of work-
related clinically validated CTS symptoms and increases
with age, which is similar to the current study. Working in
discomfort on a regular basis is linked to clinically verified
CTS. Wrist and hand discomfort are linked to prolonged
computer use and no breaks at work.

**DISCUSSION**
CTS is a common complaint among computer users, and it
is triggered by severe pressure on the median nerve during
repeated wrist movements and a persistent stress-
inducing wrist posture, such as the extended wrist
position. The international discussion over the link
between CTS and occupational tasks are still ongoing.
Occupational Safety and Health Administration (OSHA)
guidelines and regulations on cumulative trauma disorders
had been enacted. Repetitive tasks, force, posture, and
vibration have all been identified as occupational risk
factors. The National Institute for Occupational Safety and
Health (NIOSH) directed a review of available scientific data
and found that occupation responsibilities involving highly
repetitive manual items or specific wrist postures were
linked to incidents of CTS, but interconnection could not be
established[21]. Increased work load, lack of rest intervals,
lack of postural awareness, and adoption to unhealthy and
sedentary lifestyles have all been linked to job-related
neuromuscular illnesses in the previous two decades. Computer typists have a job that demands only repetitive
use of wrist joint along with constant sitting posture that in
addition to CTS results in low back ache, cervical muscles
spasm and work induced headache. The fine wrist
movements requiring high precision are reportedly known as the sole source of overuse syndrome i.e., CTS. In a Study
by Shiri et al., published a meta-analysis in 2015 has
described the use of computer in CTS [9]. The goal of his
meta-analysis was to see if computer use causes CTS.
Computer/typewriter usage was inversely linked with
Carpel Tunnel Syndrome in a meta-analysis of six studies.
In this study computer workers with other people

**Table 2: Cross Tabulation of Age with CTS**

<table>
<thead>
<tr>
<th>Age Groups of Computer Users</th>
<th>Carpel Tunnel Syndrome</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>Positive with CTS N (%)</td>
<td>91(45.5)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>5(2.5)</td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>Positive with CTS N (%)</td>
<td>52(26)</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>10(5)</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>Positive with CTS N (%)</td>
<td>28(14)</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>14(7)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Positive with CTS N (%)</td>
<td>171(85.5)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>29(14.5)</td>
<td></td>
</tr>
</tbody>
</table>

Out of 200, 80 were females and remaining 120 were male
and among both populations, males had higher frequency
of CTS as mentioned in Table 3.

**Table 3: Cross Tabulation of Gender with CTS**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Carpel Tunnel Syndrome</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Positive with CTS N (%)</td>
<td>72(36)</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>8(4)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>Positive with CTS N (%)</td>
<td>99(49.5)</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>21(10.5)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Positive with CTS N (%)</td>
<td>171(85.5)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Negative with CTS N (%)</td>
<td>29(14.5)</td>
<td></td>
</tr>
</tbody>
</table>

**CONCLUSIONS**
It is concluded that CTS is more prevalent among computer
users in maximum age groups. CTS are related with an
occupational factor in terms of computer usage. It is
common in males because of excess workload and job
duties. Wrist and hand discomfort are linked to prolonged
work on computer having no breaks. There are no
confirmed ways for preventing carpal tunnel syndrome;
nevertheless, frequent breaks can help reduce tension on
your hands. Gentle stretching and bending hands and
wrists periodically and maintaining good posture could be
beneficial.

**Authors Contribution**
Conceptualization: TAF
Methodology: AB, NF
Formal analysis: NJ, MJ
Writing-review and editing: TAF

All authors have read and agreed to the published version of
the manuscript.

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The authors declare no conflict of interest.

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