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FUNCTIONAL STATUS OF PATIENTS WITH CARPAL TUNNEL SYNDROME

Mazen Oudat, Mohammad Al-Mughrabi, Bara'ah Al-Shagoor, Sinan Al-Ghamaz, Osama Al-Jaloudy, Shadia Al-Deka

Royal Medical Services, Jordan

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ABSTRACT:

Carpal tunnel syndrome (CTS) is the most commonly observed form of peripheral nerve alterations. The objective of this study is to study risk factors associated with Boston carpal tunnel syndrome among patients with this syndrome and in neurology outpatients treated at Royal Medical Services. A retrospective study was conducted on a total of 94 patients to collect data from the profiles of patients who have CTS. The Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) was used to collect data from patients. This questionnaire involves two scales: a severity scale composed of 11 questions, with each question worth 5 points, and a functional status scale comprising 8 items, each rated within 5 points. The total score would be computed out of 55. Demographic variables, including age and gender, were also included. Frequency and percentages were used to describe categorical variables, whereas mean and standard deviation were used to describe continuous variables. One-Way ANOVA test was used to investigate the relationship between BCTQ and study variables. Significance was considered at $P \leq 0.05$. The study findings showed that females were more likely to develop CTS than males. CTS was mainly experienced in bilateral hands. The severity level was moderate among study participants, and the degree of symptoms varied from mild to very severe. Moderate symptoms were more frequent (33%), and very severe symptoms were the least frequent (16%). Functional status scale variables were moderate. Age and weight were independent risk factors for CTS. All functional status scale variables were significantly associated with CTS. Taken together, BCTQ score variables and functional status variables were moderate.

KEYWORDS: carpal tunnel syndrome, functional status scale, neuropathy, age, gender

Corresponding Author: Mazen Oudat
E-mail: dr.mazenodat@gmail.com,
Mobile No: +962 7 7232 1883

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INTRODUCTION

Carpal tunnel syndrome (CTS), the most widespread form of peripheral nerve entrapment, impacts many individuals worldwide. Approximately 90% of all neuropathy diseases are caused by carpal tunnel syndrome (CTS) (1). Research indicates that the prevalence of this condition may impact up to 10% of the population, equivalent to 50 out of every 1000 individuals in affluent countries, thus highlighting its extensive incidence. The standardized incidence rate of CTS was determined to be 276 cases per 100,000 individuals, but the average annual observed incidence rate was 329 cases. Although the diagnosis has revealed the occurrence of CTS in people of all ages, it is more commonly found in people passing through their middle years of life. The age bracket of individuals between forty and sixty years old is the most susceptible demographic (2). Individuals who are obese have a predominant prevalence and risk of undergoing CT tests that are twice as high as those who are not obese. Furthermore, based on a 3:1 ratio, females have a higher likelihood of suffering from carpal tunnel syndrome (CTS) compared to males (Shiri et al., 2015). CTS is more prevalent in women aged 45 to 54 years, whereas men are more likely to experience it between the ages of 75 and 84 years (2).

Frequent orthopaedic ailments, such as carpal tunnel syndrome, may cause hand discomfort and numbness in the radial area, in addition to distressing symptoms during the night (3). These manifestations may have a substantial impact on the patient's occupational and functional capacities when the dominant hand is affected (4). Patients consult orthopaedic care frequently because of the co-occurrence of pain and functional limitations caused by the disease (2). In most cases, conservative treatment approaches are initially employed; however, in cases where these fail to yield favourable results, surgical intervention may be advised (5). Carpal tunnel release surgery is often executed on a daily basis under the administration of a local anaesthetic (6).

Carpal tunnel syndrome (CTS), which affects millions of people around the world, is the most common peripheral nerve entrapment condition (7). Almost 90% of all neuropathy problems are caused by CTS (1). Studies show that up to 10% of the population can be impacted by CTS, and 50 out of every 1000 people in rich countries suffer from CTS, which depicts a very high prevalence ratio. The normal annual rate of CTS is 276 cases per 100,000 people, and the crude annual rate is 329 cases per 100,000 people (7).

Although the condition can impact people of all ages, those in their middle years are more likely to be diagnosed with it (1). People in the age range of forty to sixty years are most vulnerable to CTS (2). Overweight patients have a twofold increase in both the risk and the number of CT scans. Additionally, the likelihood of developing carpal tunnel syndrome (CTS) is three times higher in females than in males (8). Carpal tunnel syndrome (CTS) exhibits a higher occurrence rate in women aged 45 to 54, while in men, it is more prevalent among men aged 75 to 84 (2).

The carpal tunnel is crossed by the median nerve as it travels from the elbow to the hand and through the wrist. Compression or irritation of this nerve can result in the onset of carpal tunnel syndrome. Carpal tunnel syndrome (CTS) causes discomfort, tingling, and weakness in your hand, wrist, and fingers, specifically affecting your thumb, index, middle, and ring fingers. The intensity of the symptoms can vary among individuals, with activities involving repeated hand movements or hand-holding during the nighttime worsening the disease (9). Activities requiring precise control of small muscles, such as writing, typing, and manipulating objects, may be negatively affected when an individual is diagnosed with carpal tunnel syndrome (CTS). The impact of CTS on hand functioning and balance can vary depending on the severity of the condition. As the disease advances, a chronic injury occurs, leading to a decrease in grip strength, muscular wasting, and interference with social and occupational abilities. Resultantly, it decreases the overall well-being of individuals, which impairs their capacity to participate in everyday tasks (9).

Several variables may potentially contribute to Carpal Tunnel Syndrome (CTS), such as repetitive hand movements, health issues, and wrist anatomy. Women who are pregnant and suffer from either arthritis, diabetes, excessive blood pressure, or obesity are at a higher risk of developing carpal

tunnel syndrome (10). Besides leading a sedentary lifestyle and having a high body mass index (BMI), the chance of CTS incidence may also be heightened by smoking, excessive sodium consumption, and a lack of exercise. Certain physical features of the wrist may increase the probability of developing carpal tunnel syndrome (CTS). A wrist fracture can lead to irritation of the median nerve and narrowing of the carpal tunnel. This can also happen in instances of oedema and discomfort caused by arthritis. Individuals with narrower carpal tunnels or skeletal features that compress the tunnel may also be at a higher risk of developing carpal tunnel syndrome (CTS) (11).

Study objectives:

The present study aims to study risk factors associated with Boston carpal tunnel syndrome among patients with this syndrome and the neurology outpatients treated at Royal Medical Services.

Subjects and Methods

A retrospective study design was conducted to collect data from files of patients who were diagnosed with carpal tunnel syndrome at King Husain Medical Centre from June 2022 to November 2023. The study sample included a total of 94 patients. A working Excel sheet was used to collect data from patient files. The data included some variables, such as age and gender. Other disease-related variables were also included, such as affected hand and nerve conduction severity. A questionnaire based on the Boston Carpal Tunnel Syndrome scale was used to assess the clinical status of the patients, and the resultant data were analysed using SPSS version 21. Descriptive statistics were used to describe the variables. Categorical variables were described in frequencies and percentages. Continuous variables were described using the means and standard deviations. The relationship between variables was assessed using One-way ANOVA. Significance was considered at $\alpha \leq 0.05$.

Results:

General characteristics of participants

Table 1 reflects patients' demographic and health-related information, encompassing gender, age, physical characteristics, and conditions that are linked to carpal tunnel syndrome (CTS).There are 16 male participants, constituting 17% of the total population, and 78 female participants, constituting 83% of the total population. The mean age of the participants is 54.26± 12.078 years. The mean weight of the participants is 76.34± 11.02 kilograms. The mean height of the participants is 164.14±7.26 centimetres. The mean waist circumference of the participants is 19.97± 2.65 centimetres. The data for CTS in hands showed that CTS in bilateral hands was reported in 53 participants (56.45%), in right hands, it was reported in 26 participants (27.7%),and in left hands, it was observed in 15 participants (16.5%). Regarding the family history of CTS, none of the participants reported having a family history of CTS.

Table 1: General characteristics of participants

Variable	Description
Gender (N, %):	
- Male	16 (17%)
- Female	78 (83%)
Age (M±SD) years	**54.26±12.078**
Weight (M±SD) Kg	**76.34±11.02**
Height (M±SD) cm	**164.14±7.26**
Wrist circumferences (M±SD) cm	**19.97±2.65**
CTS – hands (N, %):	
- **Bilateral hands**	53 (56.45%)
- **Right hand**	26 (27.7%)
- **Left hand**	15 (165)
Family history of CTS (N, %):	
- **Yes**	0 (0%)
- **No**	94 (100%)

Frequency of diseases among patients with CTS

Table 2 demonstrates the frequency and percentage of various diseases and conditions among the participants. Diabetes mellitus (DM) was reported in about 21% of participants. One participant (1.1%) had hypothyroidism, and none of the patients had Systemic Lupus Erythematosus (SLE) or gout. A recent pregnancy was reported by 1 participant (1.1%). The use of the oral contraceptive pill (OCP) was not reported by any participant. Nerve conduction severity was reported as per the following pattern: bi moderate: 4 participants (4.3%), bi very mild: 1 participant (1.1%), bi mild: 3 participants (3.2%), bi severe: 4 participants (4.3%), bi very severe: 7 participants (7.4%), mild: 11 participants (11.7%), moderate: 20 participants (21.3%), moderate to severe: 2 participants (2.1%), RT moderate, LF severe: 2 participants (2.1%), RT normal, LF moderate: 1 participant (1.1%), RT normal, LF mild to moderate: 1 participant (1.1%), RT severe, LF moderate: 3 participants (3.2%), RT severe, LF moderate to severe: 1 participant (1.1%), RT severe, LF mild: 2 participants (2.1%), RT severe, LF normal: 1 participant (1.1%), RT very mild, LF normal: 1 participant (1.1%), RT very severe, LF severe: 2 participants (2.1%), RT mild, LF moderate: 2 participants (2.1%), RT mild, LF severe: 1 participant (1.1%), RT mild, LF very severe: 1 participant (1.1%), RT mild, LF normal: 3 participants (3.2%), RT moderate, LF mild: 2 participants (2.1%), RT moderate, LF normal: 1 participant (1.1%), RT moderate to severe, LF normal: 1 participant (1.1%), RT severe, LF very severe: 2 participants (2.1%), RT very severe, LF mild: 3 participants (3.2%), RT very severe, LF moderate: 3 participants (3.2%), RT very severe, LF normal: 2 participants (2.1%), severe: 2 participants (2.1%), very mild: 1 participant (1.1%), and very severe: 3 participants (3.2%).

Table 2: Frequency of diseases among patients with CTS

Disease	Frequency (N)	Percentage (%)
DM:		
- Yes	20	21.3%
- No	74	78.7%
Hypothyroidism:		
- Yes	1	1.1%
- No	93	98.9%
SLE:		
- Yes	0	0%
- No	94	100%
Gout:		
- Yes	0	0%
- No	94	100%
Recent pregnancy:		
- **Yes**	1	1.1%
- **No**	93	98.9%
OCPs use:		
- Yes	0	0%
- No	94	100%
Nerve conduction severity:		
- Bi moderate	4	4.3%
- Bi very mild	1	1.1%
- Bi mild	3	3.2%
- Bi severe	4	4.3%
- Bi very severe	7	7.4%
- Mild	11	11.7%
- Moderate	20	21.3%
- **Moderate to severe**	2	2.1%
- **RT moderate, LF severe**	2	2.1%
- **RT normal, LF moderate**	1	1.1%

- **RT normal, LF mild to moderate**	1	1.1%
- **RT severe, LF moderate**	3	3.2%
- **RT severe, LF moderate to severe**	1	1.1%
- **RT severe, LF mild**	2	2.1%
- **RT severe, LF normal**	1	1.1%
- **RT very mild, LF normal**	1	1.1%
- **RT very severe, LF severe**	2	2.1%
- **RT mild, LF moderate**	2	2.1%
- **RT mild, LF severe**	1	1.1%
- **RT mild, LF very severe**	2	2.1%
- **RT mild, LF normal**	1	1.1%
- **RT moderate, LF mild**	3	3.2%
- **RT moderate, LF normal**	2	2.1%
- **RT moderate to severe, LF normal**	1	1.1%
- **RT severe, LF very severe**	1	1.15%
- **RT very severe, LF mild**	2	2.1%
- **RT very severe, LF moderate**	3	3.2%
- **RT very severe, LF normal**	3	3.2%
- **Severe**	2	2.1%
- **Very mild**	2	2.1%
- **Very severe**	3	3.2%

The levels of BCTQ variables

Table 3 presents data on various variables related to hand and wrist pain, numbness, tingling, weakness, and difficulty in performing daily activities. The variables are measured using the Boston Carpal Tunnel Questionnaire (BCTQ). Here's a breakdown of the items:

1. **How severe is the hand or wrist pain that you have at night?** On average, respondents rated the severity of their nighttime hand or wrist pain as 3.05±1.44.
2. **How often did hand or wrist pain wake you up during a typical night in the past two weeks?** Respondents reported being awakened by hand or wrist pain during the night at an average frequency of 2.74± 1.46.
3. **Do you typically have pain in your hand or wrist during the daytime?** The average rating for daytime hand or wrist pain was 2.80±1.40.
4. **How often do you have hand or wrist pain during the daytime?** On average, respondents reported experiencing hand or wrist pain during the daytime, with a mean of 2.92±1.38.
5. **How long, on average, does an episode of pain last during the daytime?** The average duration of pain episodes during the daytime was reported as 2.95± 1.37.
6. **Do you have numbness (loss of sensation) in your hands?** Respondents rated the presence of hand numbness with an average score of 2.99±1.39.
7. **Do you have a weakness in your hand or wrist?** The average rating for hand or wrist weakness was 2.33±1.26.
8. **Do you have tingling sensations in your hand?** Respondents reported tingling sensations in their hands, with an average score of 3.07±1.31.
9. **How severe is numbness (loss of sensation) or tingling at night?** The severity of numbness or tingling at night was rated with an average score of 3.13±1.30.
10. **How often did hand numbness or tingling wake you up during a typical night during the past two weeks?** Respondents

reported being awakened by hand numbness or tingling during the night with an average frequency of 2.90±39.

11. **Do you have difficulty grasping and using small objects such as keys or pens?** The average rating for difficulty in grasping and using small objects was 2.20± 1.12. Nonetheless, the mean of all questions was 2.83±0.30

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Table 3: The levels of BCTQ variables

Item	M	SD
How severe is the hand or wrist pain that you have at night?	3.05	1.44
How often did hand or wrist pain wake you up during a typical night in the past two weeks?	**2.74**	**1.46**
Do you typically have pain in your hand or wrist during the daytime?	**2.80**	**1.40**
How often do you have hand or wrist pain during daytime?	**2.92**	**1.38**
How long on average does an episode of pain last during the daytime?	**2.95**	**1.37**
Do you have numbness (loss of sensation) in your hand?	**2.99**	**1.39**
Do you have weakness in your hand or wrist?	**2.33**	**1.26**
Do you have tingling sensations in your hand?	**3.07**	**1.31**
How severe is numbness (loss of sensation) or tingling at night?	**3.13**	**1.30**
How often did hand numbness or tingling wake you up during a typical night during the past two weeks?	**2.90**	**1.39**
Do you have difficulty with the grasping and use of small objects such as keys or pens?	**2.20**	**1.12**
Total	**2.83**	**0.30**

Severity degree of CTS symptoms

Table 4 represents the severity degree of Carpal Tunnel Syndrome (CTS) symptoms, categorising them into four levels: mild, moderate, severe, and very severe. Mild symptoms were observed in approximately 28% of cases, moderate symptoms were reported in 33% of cases, severe symptoms were reported in about 23% of the total, and very severe symptoms were reported in 16% of the participants.

Table 4: Severity degree of CTS symptoms

Symptom degree	Frequency (N)	Percentage (%)
Mild symptoms	**26**	**27.6%**
Moderate symptoms	**31**	**33%**
Severe symptoms	**22**	**23.4%**
Very severe symptoms	**15**	**16%**
Total	**94**	**100%**

Functional status scale

Table 5 outlines the Functional Status Scale, indicating the mean (M) and standard deviation (SD) for each item.

1. **Writing**: The mean score for this item is 2.47±1.50.
2. **The buttoning of clothes**: The mean score is 2.33±1.43.
3. **Holding a book while reading**: The mean score is 2.43± 1.57.
4. **Gripping a telephone handle**: The mean score is 2.56±1.57.
5. **Opening of jars**: The mean score is 2.40± 1.60.
6. **Household chores**: The mean score is 2.64±1.55.
7. **Carrying a grocery basket**: The mean score is 2.52±1.54.

8. **Bathing and dressing**: The mean score is 2.07± 1.36.

Additionally, the table provides a total score, calculated as the mean of all items, with a mean of 2.43± 0.17.

Table 5: Functional status scale

Item	M	SD
Writing	**2.47**	**1.50**
Buttoning of clothes	**2.33**	**1.43**
Holding a book while reading	**2.43**	**1.57**
Gripping of a telephone handle	**2.56**	**1.57**
Opening of jars	**2.40**	**1.60**
Household chores	**2.64**	**1.55**
Carrying of grocery basket	**2.52**	**1.54**
Bathing and dressing	**2.07**	**1.36**
Total	**2.43**	**0.17**

The relationship between BCTS and study variables

Table 6 shows the relationship between BCTS and study variables using the One-Way ANOVA test. There were no statistical differences regarding gender (p = 0.977). The data showed significant differences in terms of age (p = 0.011). There were significant differences in the means of the groups categorised on the basis of weight (p = 0.028). There is no statistically significant difference in the means of the groups based on height (p = 0.028). There is no statistically significant difference in the means of the groups based on CTS in hands (p = 0.610). No statistically significant difference is observed in the means of the groups based on DM (p = 0.882). There is no statistically significant difference in the means of the groups based on hypothyroidism (p = 0.996). There is no statistically significant difference in the means of the groups based on recent pregnancy (p = 0.904). There is no statistically significant difference in the means of the groups based on waist circumferences (p = 0.888). There is a statistically significant difference in the means of the groups based on writing (p = 0.006). There is a statistically significant difference in the means of the groups based on buttoning clothes (p<0.001). There is a statistically significant difference in the means of the groups based on holding a book while reading (p = 0.015). There is a statistically significant difference in the means of the groups based on gripping a telephone handle (p = 0.000). There is a statistically significant difference in the means of the groups based on the opening of jars (p = 0.000). There is a statistically significant difference in the means of the groups based on household chores (p = 0.000). There is a statistically significant difference in the means of the groups based on the carrying of grocery baskets (p = 0.000). There is a statistically significant difference in the means of the groups based on bathing and dressing (p = 0.000).

Table 6: The relationship between BPTS and study variables

Variable		Sum of Squares	df	Mean Square	F	Sig.
Gender	Between Groups	3.721	39	.095	.539	.977
	Within Groups	9.556	54	.177		
	Total	13.277	93			
Age	Between Groups	7962.817	39	204.175	1.968	.011
	Within Groups	5603.056	54	103.760		
	Total	13565.872	93			
weight	Between Groups	6295.782	39	161.430	1.762	.028
	Within Groups	4764.772	52	91.630		

	Total	11060.554	91			
height	Between Groups	1725.441	39	44.242	.750	.825
	Within Groups	3067.722	52	58.995		
	Total	4793.163	91			
CTS_hand	Between Groups	20.949	39	.537	.915	.610
	Within Groups	31.689	54	.587		
	Total	52.638	93			
	Within Groups	.000	54	.000		
	Total	.000	93			
DM	Between Groups	5.261	39	.135	.695	.882
	Within Groups	10.483	54	.194		
	Total	15.745	93			
Hypothyroidism	Between Groups	.239	39	.006	.442	.996
	Within Groups	.750	54	.014		
	Total	.989	93			
recent_pregnancy	Between Groups	.323	39	.008	.670	.904
	Within Groups	.667	54	.012		
	Total	.989	93			
Wrist_circumferenc e	Between Groups	217.565	39	5.579	.689	.888
	Within Groups	437.339	54	8.099		
	Total	654.904	93			
writing	Between Groups	123.565	38	3.252	2.137	.006
	Within Groups	79.117	52	1.521		
	Total	202.681	90			
Buttoning_clothes	Between Groups	148.318	38	3.903	5.671	.000
	Within Groups	35.792	52	.688		
	Total	184.110	90			
Holding a book while reading	Between Groups	133.207	39	3.416	1.886	.015
	Within Groups	97.772	54	1.811		
	Total	230.979	93			
Gripping of a telephone handle	Between Groups	172.006	38	4.526	4.788	.000
	Within Groups	48.217	51	.945		
	Total	220.222	89			
Opening of jars	Between Groups	167.075	38	4.397	3.535	.000
	Within Groups	64.683	52	1.244		
	Total	231.758	90			
Household chores	Between Groups	157.361	37	4.253	3.934	.000
	Within Groups	55.133	51	1.081		
	Total	212.494	88			
Carrying of grocery basket	Between Groups	168.775	38	4.441	5.026	.000
	Within Groups	45.950	52	.884		
	Total	214.725	90			
Bathing and dressing	Between Groups	115.088	38	3.029	3.118	.000
	Within Groups	50.517	52	.971		
	Total	165.604	90			

DISCUSSION:

Multiple studies have provided evidence that the incidence of CTS is greater among women as compared to males. The results of the investigation indicate that this pattern is consistent with the gender distribution. The proportion of male participants is marginally lower than in specific research inquiries (12, 13), which recorded a range of 20% to 30%. Based on empirical investigations, individuals diagnosed with CTS typically fall within the age bracket of forty-eight to fifty-nine years old (2, 12). The findings include the height, weight, and girth measurements of the individuals. Although they may not always be explicitly associated with the frequency of CTS, these offer a comprehensive overview of the participants. Nevertheless, due to variations in body types based on height, weight, and abdominal circumference (14, 15), the incidence of CTS may differ among different demographic groups. Bilateral CTS is more prevalent than

unilateral CTS. Our finding is consistent with the results of studies (16, 17), indicating that CTS typically impacts both hands. There was no indication of familial history in the CTS case, according to the data. Multiple studies (18, 19) have identified this result as being especially significant among individuals with a familial predisposition to CTS. However, the omission of family history may be justified due to the study's restricted sample size. An estimated 21% of the participants suffered from DM. This finding is consistent with previous research (12, 20) showing that DM can induce CTS. The results suggested that a mere 1.1% of the participants exhibited symptoms consistent with hypothyroidism. Individuals diagnosed with hyperthyroidism exhibited a greater propensity for developing CTS in comparison to participants in other studies (21, 22). No cases of gout or systemic lupus erythematosus (SLE) were identified among the participants during this inquiry. Previous research (23, 24) found a correlation between CTS and both gout and SLE; however, the results of this study contradicted those findings. In the absence of particular circumstances, the sample size or the specific demographic or regional characteristics of the study participants may be held responsible for this. Merely 1% of those diagnosed with CTS had previously been expectant. This assertion lacks logic, as previous research (25) has established the prevalence of CTS among expectant women. Considering the study sample's age range and gender distribution, this number does not appear to be notably excessive. As per the data, no occurrence of CTS was identified in the sample population utilising OCP. An adverse effect of OCP use, according to Yedla et al. (26), was the development of CTS symptoms in a subset of the participants. The observed variation in nerve conduction intensity suggests that the participants are affected by a broad spectrum of neuropathies, each to a different extent impacting in a distinct manner. This implies that nerve injury affects a diverse population, potentially resulting from various aetiologies such as diabetes, inflammatory disorders, or other complications (27). The symptoms exhibited by individuals with this condition, including pain, numbness, tingling, fatigue, and challenges in performing routine activities, are quantified through the utilisation of the Boston Carpal Tunnel Questionnaire (BCTQ) data (28).

Nighttime Hand or Wrist Discomfort: The participants' average intensity level (3.05±1.44) indicates that they experience a moderate degree of discomfort while sleeping. Nighttime Pain Frequency: It is evident that a considerable number of individuals endure this discomfort, as respondents indicated that they experience hand or wrist pain approximately every two weeks.

Weakness in the hand or forearm throughout the day: Based on the mean assessment (2.80±1.40), the intensity of pain during the day is comparatively lower than that experienced at night.

An average of 2.92±1.38 individuals reported experiencing pain during the day, which is approximately equivalent to the frequency of pain reported at night. The mean duration of daytime painful episodes is 2.95±1.37 hours, suggesting that these episodes are generally of an extended nature. A moderate level of hand paralysis was reported by the largest proportion of participants (2.99±1.39). Hand or wrist weakness is indicated by the mean score of 2.33±1.26, suggesting that the affected individuals may have mild to moderate degrees of weakness in these areas. The participants indicated experiencing a moderate degree of sensation (3.07±1.31).

Nighttime worsening numbness or tingling: This sensation of numbness or tingling received a moderate rating of 3.13±1.30. The respondents indicated that experiencing numbness or sensation during the night awoke them with a moderate frequency (2.00%±0.39). Challenges or obstacles in acquiring and employing participants indicated that they encountered challenges while grasping and applying minuscule objects, with a mean score of 2.20±1.12, suggesting that this impairment is comparatively less severe in nature than the other symptoms that were assessed. The average score of 2.83±0.30 across all items suggests that the participants, on the whole, experienced hand and wrist symptoms at a moderate level. The degree of intensity is ascertained, and empirical investigations have identified fluctuations in intensity. Sarhan et al. (29) state that the Boston Carpal Tunnel Syndrome Questionnaire may be used to diagnose the condition and evaluate the intensity of symptoms.

The frequency of severe symptoms among the participants and the degree of severity of symptoms associated with Carpal Tunnel Syndrome (CTS) are detailed in Table 4. In 28% of instances, mild

symptoms are the least severe manifestations of CTS. Slightly more than one-third of the participants reported experiencing mild symptoms, such as intermittent tingling or stiffness in their digits, which do not affect their daily functioning substantially. The presence of a diverse range of individuals experiencing minor symptoms may vary depending on the study group. According to a study by Vladeva et al. (30), 16% of the participants exhibited signs of weakness, with younger age groups being the most significantly impacted.

Moderate symptoms were reported by one-third of those who experienced these symptoms, which indicates that they were more severe than mild. A considerable number of the participants were in evident pain, as nearly one-third of the cases exhibited moderate symptoms. Interruption or numbness that occurs more frequently and complicates daily activities are examples of moderate symptoms.

Severity Levels of Moderate: Potential variations may arise depending on the health status of the subjects (31). Severe symptoms were reported by nearly 25% of the participants, suggesting that a considerable proportion of the sample is encountering difficulties due to CTS. This finding suggests that CTS has a substantial impact on the individuals who were surveyed. Symptoms such as persistent pain, stiffness, fatigue, and sensitivity may serve as indicators of more severe conditions that may render the patient incapable of performing daily activities (31) if left untreated.

Severe symptoms (16 percent): Individuals falling within this category exhibit the most severe symptoms of CTS. Although the proportion is smaller in comparison to other severity levels, it remains a substantial sum. The chief severe symptoms, according to Forcelini et al. (31), may include persistent agonizing pain, profound fatigue, numbness, and substantial impairments in hand functionality and daily functioning.

The Functional Status Scale (FSS), as documented by Bhatt et al. (32) and Paiva et al. (33), offers valuable insights into the proficiency with which individuals can carry out diverse occupational tasks.

The composition: Based on the mean score of 2.47±1.50, a significant proportion of the participants categorised this task as "moderate difficulty" to "a little difficulty." (34). This may be an indication of dexterity or handling difficulties.

According to the mean score of 2.33±1.43, buttoning garments are perceived by individuals as being approximately on par with the difficulty of writing. This may be an indication of compromised balance or finger strength (35).

Taking up a book to read: The mean score of 2.43±1.57 suggests that the level of difficulty is moderate. One potential cause could be challenges associated with hand stability or grasping strength (36).

Assembling a telephone handle: The mean score for this exercise is 2.56, which is marginally above average and suggests that participants perceive it to be approximately equivalent to physically reading a book. Potentially significant factors in this regard are hand-eye coordination and grip strength (37).

Opening a jar: The average score for this task is 2.40, which is comparable to the difficulty of holding a book while reading. This may suggest that the flexibility or strength of the joints is inferior to their potential (38).

Household responsibilities: According to the mean score of 2.64, some individuals find this task marginally more challenging than others. There may be multiple components at play, such as stamina, equilibrium, and muscularity (38). The average difficulty rating for carrying supermarket containers is 2.52, which is similar to that of other manual labour duties. This behaviour could potentially signify an impairment in grip strength or stability during object raising (38). In contrast to other activities, bathing and dressing receive the lowest average score (2.07), suggesting that individuals perceive them as comparatively uncomplicated. Conversely, the level of difficulty remains within the spectrum of "moderate difficulty" to "a little difficulty," indicating potential challenges related to motor coordination or coordination (38). Overall, the Functional Status Scale score of 2.43±0.17 suggests that individuals face moderate difficulties in performing the tasks assessed by the scale.

The aforementioned results illustrate the correlation that exists between various research variables and the Boston Carpal Tunnel Syndrome Questionnaire (BCTS).

Given that there was no statistically significant difference between the sexes ($p = 0.977$), gender had

no bearing on BCTS scores in the present study. This result is consistent with a previous study that found no significant disparities between the sexes in terms of carpal tunnel syndrome symptoms. Nevertheless, divergent outcomes have been reported in other studies (Gruber et al., 30); thus, the demographic and diagnostic criteria of the study sample might have influenced this result 40).

Age-related significant changes ($p = 0.011$) indicate that the BCTS scores of individuals alter as they age. Age has also been found to be associated with the symptoms of carpal tunnel syndrome, according to previous research. Symptoms often deteriorate with age as a result of degenerative changes in the wrist, among other contributing factors (41).

Weight: Differences in the statistical significance of the proportions at the 0.028 level suggest that the incidence of carpal tunnel syndrome may vary to different degrees among individuals of different weights. This result aligns with previous research that has established obesity as a unique risk factor for CTS (42).

Operational duties: Writing, buttoning clothing, grasping a phone handle, holding a book while reading, opening jars, cleaning, carrying shopping baskets, taking a shower, and getting dressed were among the few functional tasks in which significant differences were observed. A correlation between difficulties with the functioning of the hand while performing daily duties and BCTS scores is demonstrated by these results. The objective of BCTS, as stated by Aalaie et al. (43) and Malakootian et al. (44), is to quantify the functional impairment induced by carpal tunnel syndrome, which has been accomplished.

Conclusion: The present study showed that CTS was experienced by females more than males, and CTS incidences were more likely to affect bilateral hands. The severity levels of BCTS were moderate, whereas the functional status scale also showed moderate difficulties. Nonetheless, age and weight remained independent risk factors for CTS.

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