Original Article :

Awareness and Perception Towards Carpal Tunnel Syndrome by Citizens of Saudi Arabia.

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Abstract

Background and Aims:
Little is known about the current level of knowledge of the public in Saudi Arabia about carpal tunnel syndrome. Therefore, the aim of the current study is to assess the level of awareness and knowledge about carpal tunnel syndrome among residents of Riyadh City, Saudi Arabia.

Methods:
An electronic questionnaire was used to target the population that lives in Riyadh, Saudi Arabia. We collected data from October 2022 to December 2022. We stored the data in an Excel datasheet and exported it to SPSS (IBM) for further analysis upon completion of the data collection.

Results:
In the current study, arthritis was the most known cause of carpal tunnel syndrome among the participants (56.3%). Still, one-third of the sample reported that they did not know if those were symptoms of carpal tunnel syndrome. Furthermore, the results indicated that 63.9% of the participants reported that carpal tunnel syndrome affects their writing. In general, 38.8% of the participants had previously heard of CTS, and its prevalence among them was 15.7%. The results of our study showed that males, older populations, non-Saudis, those with higher incomes, and some occupations were associated with a greater level of CTS awareness and prevalence.

Conclusions:
The current study found a similar prevalence of CTS in the public population in the Riyadh region to previous studies, but it also significantly revealed a low awareness level.

Keywords:
Carpal Tunnel Syndrome, public awareness, prevalence, CTS, neurosurgery, plastic and reconstructive surgery, orthopedics.

Introduction

The carpel tunnel is a narrow space on the palmer side of the hand surrounded by ligaments and bones that contains nine tendons and a nerve named the median nerve, which is one of the five divisions of the brachial plexus[1]. The median nerve is responsible for motor innervation of the flexor muscles of the forearm and most intrinsic muscles of the hand[1]. Carpal Tunnel Syndrome is a medical illness caused by pressure and irritation of the median nerve, which leads to various clinical symptoms including numbness, tingling, and weakness[2]. There is no specific cause of CTS; however, many factors contribute to the development of the disease. Frequent and repetitive movements with the hands, such as typing or using a keyboard, are considered a major risk factor for CTS. Arthropathies like arthritis, osteoarthritis, or rheumatoid arthritis can be associated with such patients. Pregnancy, menopause, thyroid imbalances, and diabetes mellitus are hormonal and metabolic conditions that can lead to CTS[3]. In 1994, a paper studying the prevalence of positive family history in carpal tunnel syndrome found that 110 of 421 men and women confirmed with carpal tunnel syndrome had at least one relative with symptoms or surgery for CTS[4]. Diagnosing carpal tunnel syndrome includes obtaining an accurate history of the patient, performing a physical examination that includes sensory and motor evaluation, performing a nerve conduction study, and performing electromyography (EMG) with the following American Academy of Neurology, American Association of Neuromuscular and Electrodiagnostic Medicine, and American Academy of Physical Medicine and Rehabilitation guidelines[5]. Surgical and non-surgical treatments are both options to treat CTS. While surgical decompression is considered the definitive treatment for CTS, constructive treatments like physical therapy, bracing, steroid injections, and alternative medicine can decrease the progression of CTS without surgical treatment[6]. Knowing all that, CTS is considered the most common entrapment neuropathy that inflicts 3–6 percent of adults worldwide[7]. Females are three times more likely to be diagnosed with CTS than males, and this can be attributed to their hormonal changes that affect fluid retention and their small anatomical carpel tunnel space[8]. Knowledge of the public population about the causes, risk factors, symptoms, and preventive measures against carpel tunneling would help in reducing the prevalence of this condition in our country. The current level of public knowledge in Saudi Arabia regarding carpal tunnel syndrome remains

largely unknown. Therefore, the aim of the current study is to assess the level of awareness and knowledge about carpal tunnel syndrome among residents of Riyadh City, Saudi Arabia.

Methodology

We conducted an observational, cross-sectional survey among residents of Riyadh, Saudi Arabia, using an electronic questionnaire. The sample desired for this study was 385 as assessed by the Roasoft system; however, we were able to collect more than the required number of participants, which is 789. The inclusion criteria for the study were all adults older than 18 years old, both Saudi and non-Saudi residents, and those who live in the Riyadh region of Saudi Arabia. The study excluded participants under the age of 18, those residing outside the Riyadh region, and those employed in the health care sector, including doctors, nurses, and health educators. A non-probability convenience sampling technique was used to collect the study sample.

We used an electronic questionnaire to target the population in Riyadh, Saudi Arabia. The data collection period ran from October 2022 to December 2022. There were 3 sections and 20 questions in total, with different question types, such as choosing the right answer and checking all that apply. The first section is mainly concerned with securing participants' consent to participate and checking for eligibility to enroll in the study and their demographics by asking the participants' age, gender, level of education, marital status, and income. The second section will assess participants' knowledge of CTS causes, symptoms, risk factors, and treatment options. Finally, participants were asked if they agreed that more guidelines should be published regarding CTS risk factors, symptoms, etc. Upon completion of the questionnaire, the participants were given access to two websites that offer a comprehensive explanation of Carpel Tunnel Syndrome in both Arabic and English (appendices 1 and 2) and were asked if they think they have this condition.

Project Number 385/2022 received ethical approval from the Institutional Review Board (IRB) of Imam Mohammad Ibn Saud Islamic University Riyadh. Before answering the questionnaire, each participant signed a consent form to declare their willingness to participate in the study and fully understand the research objectives. Furthermore, all participants were informed that the anonymity of their identities is guaranteed and that their responses will be used for research purposes only.

After collecting the data, we stored it in an Excel datasheet and exported it to SPSS

(IBM) for further analysis. We used percentage and frequency to describe the categorical variables. We used the T and chi-squared tests to examine the relationship between variables. All statements were considered significant if the p value was lower than 0.05.

Results

In the current study, we were able to collect data from 789 participants who responded to our questionnaire. 33.6 percent of the participants were between the ages of 18 and 26, 67.3 percent were female, and 87.3 percent were Saudi Arabian. Considering the level of education, we found that 35.9% of the participants reported having a bachelor's degree, while 29.2% were university students and 20.2% were students at high schools. Moreover, 43.3 percent of the participants reported having a monthly income of less than 5,000 Saudi Riyals (SR), and 28.9 percent of them were still students at the time of the study. Considering the marital status of the participants, 46.4% reported being single, 44.4% reported being married, 6.8% were divorced, and 2.4% were widowed (Table 1).

Table 1: Demographic factors of the participants (N = 789)

		Count	Column N %
Age	18-26	265	33.6%
	27-36	181	22.9%
	37-46	150	19.0%
	47-56	140	17.7%
	older than 56	53	6.7%
Gender	Male	258	32.7%
	Female	531	67.3%
Nationality	Saudi	689	87.3%
	Non-Saudi	100	12.7%
Level of education	Non-learner	8	1.0%
	High school	159	20.2%
	University student	230	29.2%
	Bachelor's degree	283	35.9%
	Master's degree	63	8.0%
	doctor's degree	46	5.8%
Monthly income	< 5000 SR	342	43.3%
	5000-10000	159	20.2%
	10000-15000	108	13.7%
	15000-20000	88	11.2%
	20000-30000	57	7.2%
	>30000	35	4.4%
Profession	Unemployed	178	22.6%

		Count	Column N %
Profession	Student	228	28.9%
	Teaching	139	17.6%
	Trader	62	7.9%
	Office work	182	23.1%
Marital status	Single	366	46.4%
	Married	350	44.4%
	Divorced	54	6.8%
	Widow	19	2.4%

Arthritis was the most known cause of carpal tunnel syndrome among the participants, and 56.3% of the participants believed that arthritis was a cause of carpal tunnel syndrome. In addition, other causes known by participants included repeated physical activities (reported by 52.7 percent of the participants) and trauma (reported by 49.8 percent of the participants), while fracture or dislocation of the wrist was the least reported cause of carpal tunnel syndrome (37.3 percent). Moreover, it was found that for all causes, at least one-third of the participants reported that they did not know if these were causes of carpal tunnel syndrome. Among the participants, pain was the most reported symptom of carpal tunnel syndrome, reported by 62.5%, followed by decreased hand grip (57%), numbness and tingling in the thumb (56.7%), and muscle waste in the hand (53.5%). Still, one-third of the sample reported that they did not know if those were symptoms of carpal tunnel syndrome (Table 2).

In addition, the results showed that

Table 2: Knowledge of the participants considering causes and symptoms of carpal tunnel syndrome

		No		Yes		I do not know	
		Count	Row N %	Count	Row N %	Count	Row N %
Causes of Carpal Tunnel Syndrome	Trauma	105	13.3%	393	49.8%	291	36.9%
	Repeated physical activities (using computer and taping)	123	15.6%	416	52.7%	250	31.7%
	Wrist fracture or dislocation	194	24.6%	294	37.3%	301	38.1%
	Arthritis	99	12.5%	444	56.3%	246	31.2%
	Wrist bone tumor	145	18.4%	328	41.6%	316	40.1%
Symptoms of Carpal Tunnel Syndrome	Pain in the wrist	76	9.6%	493	62.5%	220	27.9%
	Numbness and tingling in thumb	110	13.9%	447	56.7%	232	29.4%
	Muscle waste in the hand	122	15.5%	422	53.5%	245	31.1%
	Decreased hand grip	99	12.5%	450	57.0%	240	30.4%
	Symptoms at night and morning	131	16.6%	322	40.8%	336	42.6%

most of the participants reported that writing is affected by carpal tunnel syndrome (63.9%), followed by holding a book or smartphone (55.5%), carrying a grocery basket (54.1%), and opening jars (52.0%) (Figure 1).

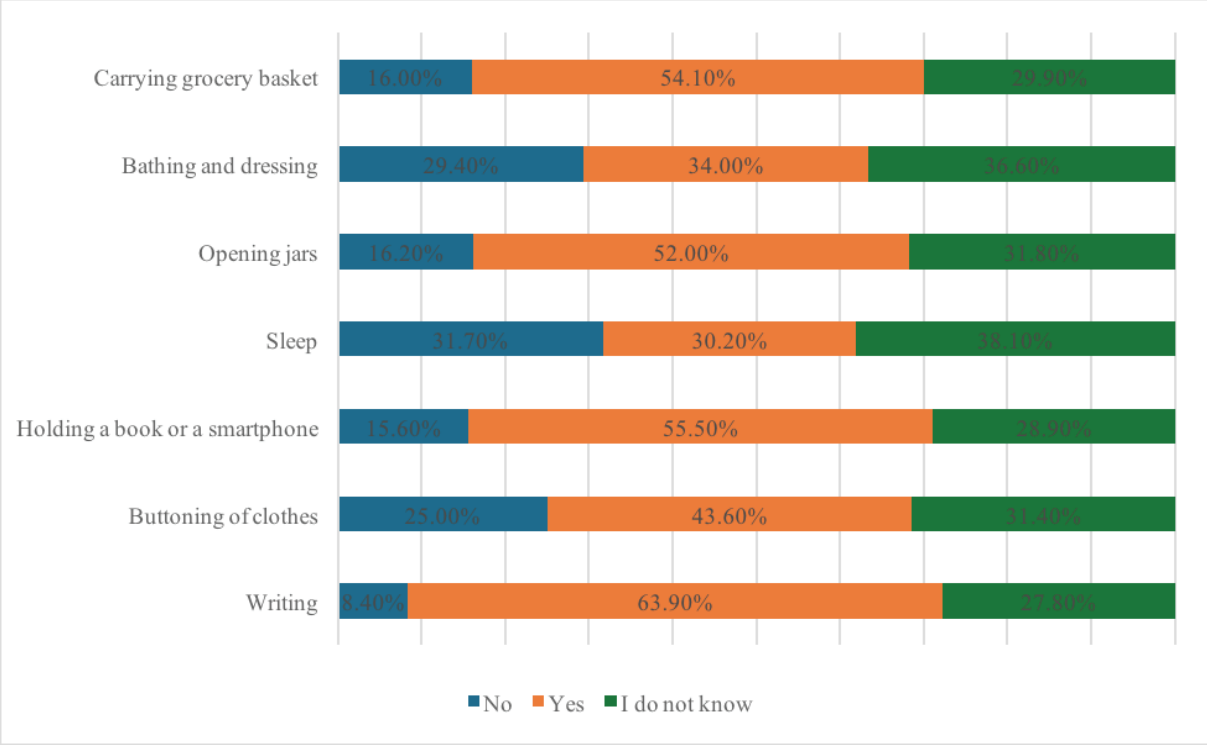


Figure: Participants affected by carpal tunnel syndrome

Moreover, it was found that most of the participants reported that stretching and strengthening exercises (62.6%) and alternating between both hands (61.6%) are considered preventive measures for the prevention of carpal tunnel syndrome, followed by avoiding repetitive hand movements (50.7%). In addition, we found that at least one-third of the participants reported that they did not know the risk factors of carpal tunnel syndrome, where rheumatoid arthritis was the main reported risk factor (59.5%). Moreover, 31.8% of the participants reported that surgical intervention is the main treatment for CTS, while 53.2% reported that they did not know (Table 3).

Table 3: The knowledge of the participants toward preventive measures, risk factors and treatment

		No		Yes		I do not know	
		Count	Row N %	Count	Row N %	Count	Row N %
Preventive measures	Avoid repetitive hand movement.	146	18.5%	400	50.7%	243	30.8%
	Keeping the wrist straight while sleeping	177	22.4%	316	40.1%	296	37.5%
	Wearing a splint while sleeping	155	19.6%	344	43.6%	290	36.8%

		No		Yes		I do not know	
		Count	Row N %	Count	Row N %	Count	Row N %
	Stretching and strengthening exercises	83	10.5%	494	62.6%	212	26.9%
	Alternating between both hands	77	9.8%	486	61.6%	226	28.6%
Risk factors for Carpal tunnel syndrome	Diabetes mellitus	216	27.4%	252	31.9%	321	40.7%
	Thyroid disorders	239	30.3%	198	25.1%	352	44.6%
	rheumatoid arthritis	93	11.8%	468	59.3%	228	28.9%
	Obesity	176	22.3%	295	37.4%	318	40.3%
	Pregnancy	251	31.8%	193	24.5%	345	43.7%
Treatment options	Surgical intervention is the main treatment of CTS.	118	15.0%	251	31.8%	420	53.2%

Overall, 38.8% of the participants had prior knowledge of CTS. The main sources of knowledge are social media (43.5%) and family or friends (34.4%). In the current study, 15.7 percent of the patients reported having CTS, while 5.3 percent of the students believed they had it. In addition, 92.8 percent of the participants thought that there should be more awareness in society about CTS (Table 4).

Table 4: The Prevalence awareness of the participants toward CTS

		Count	Column N %
Have you ever heard of Carpal Tunnel Syndrome	No	483	61.2%
	Yes	306	38.8%
Source	Social media	156	43.5%
	Family or friends	123	34.4%
	Work	50	14.0%
	Courses and schools	29	8.1%
Were you diagnosed with Carpal Tunnel Syndrome ?	No	665	84.3%
	Yes	124	15.7%
Do you have any of these conditions ?	No	589	74.7%
	Diabetes mellitus	54	6.8%
	Thyroid disorders	50	6.3%
	Hypertension	48	6.1%
	Rheumatoid arthritis	32	4.1%
	Other	16	2.0%
Do you think there should be more awareness in the society regarding Carpal Tunnel Syndrome ?	No	57	7.2%
	Yes	732	92.8%
Do you think you have Carpal Tunnel Syndrome ?	No	457	57.9%
	Yes	42	5.3%
	I don’t know	166	21.0%
	I had Carpal Tunnel Syndrome before	124	15.7%

The results shown in Table 5 showed that age is significantly associated with both awareness and prevalence of CTS, with older participants, particularly those

over the age of 36, having significantly higher awareness and prevalence of CTS than younger participants (P = 0.001 and 0.000, respectively). In addition, it was found that the prevalence of CTS was significantly higher among males (23.3%) compared to females (12.1%), which was associated with a higher awareness rate among males (55% vs. 39.9%, P = 0.000). Furthermore, non-Saudi residents had a significantly higher prevalence and awareness of CTS (33.0% vs. 13.2%, P = 0.000, and 54% vs. 36.5%, P = 0.000, respectively). Moreover, we discovered a continuous increase in the prevalence of CTS with increasing monthly income, reaching 45.7% among those earning more than 30000 Saudi Riyals per month (P = 0.000), as well as an increase in the awareness rate (P = 0.017). The prevalence of CTS was the highest among traders and the unemployed (41.9%), followed by teachers (16.5%) and office workers (13.7%) (P = 0.000), while awareness was the highest among traders (58.1%) and students (41.2%) (P = 0.006). Finally, it was found that the prevalence of CTS was lowest among singles, while the highest prevalence was between widows (P = 0.000) (Table 5).

Table 5: The association between demographic factors and awareness and prevalence of CTS

		Have you ever heard of Carpal Tunnel Syndrome					Were you diagnosed with Carpal Tunnel Syndrome?				
		No		Yes		P-value	No		Yes		P-value
		N	N %	N	N %		N	N %	N	N %	
Age	18-26	164	61.9%	101	38.1%	0.001*	240	90.6%	25	9.4%	0.000*
	27-36	128	70.7%	53	29.3%		168	92.8%	13	7.2%	
	37-46	89	59.3%	61	40.7%		123	82.0%	27	18.0%	
	47-56	76	54.3%	64	45.7%		104	74.3%	36	25.7%	
	older than 56	26	49.1%	27	50.9%		30	56.6%	23	43.4%	
Gender	Male	116	45.0%	142	55.0%	0.000*	198	76.7%	60	23.3%	0.000*
	Female	367	69.1%	164	30.9%		467	87.9%	64	12.1%	
Nationality	Saudi	437	63.4%	252	36.6%	0.000*	598	86.8%	91	13.2%	0.000*
	Non-Saudi	46	46.0%	54	54.0%		67	67.0%	33	33.0%	
Monthly income	< 5000 SR	211	61.7%	131	38.3%	0.017*	301	88.0%	41	12.0%	0.000*
	5000-10000	108	67.9%	51	32.1%		145	91.2%	14	8.8%	
	10000-15000	71	65.7%	37	34.3%		91	84.3%	17	15.7%	
	15000-20000	51	58.0%	37	42.0%		68	77.3%	20	22.7%	
	20000-30000	26	45.6%	31	54.4%		41	71.9%	16	28.1%	
	>30000	16	45.7%	19	54.3%		19	54.3%	16	45.7%	
Profession	Unemployed	110	61.8%	68	38.2%	0.006*	147	82.6%	31	17.4%	0.000*
	Student	134	58.8%	94	41.2%		209	91.7%	19	8.3%	
	Teaching	89	64.0%	50	36.0%		116	83.5%	23	16.5%	

		Have you ever heard of Carpal Tunnel Syndrome					Were you diagnosed with Carpal Tunnel Syndrome?				
		No		Yes		P-value	No		Yes		P-value
		N	N %	N	N %		N	N %	N	N %	
Profession	Trader	26	41.9%	36	58.1%	0.006*	36	58.1%	26	41.9%	0.000*
	Office work	124	68.1%	58	31.9%		157	86.3%	25	13.7%	
Marital status	Single	223	60.9%	143	39.1%	0.000*	330	90.2%	36	9.8%	0.000*
	Married	234	66.9%	116	33.1%		299	85.4%	51	14.6%	
	Divorced	22	40.7%	32	59.3%		29	53.7%	25	46.3%	
	Widow	4	21.1%	15	78.9%		7	36.8%	12	63.2%	

Discussion

The carpal tunnel is the "pathway" in the wrist that nerves pass through. When this pathway is restricted, it puts pressure on the central nerves. The median nerve is one of the major nerves in the hand[9,10]. Carpal tunnel syndrome involves repetitive activities. in the hand and wrist[11]. Carpal tunnel syndrome results from increased pressure in the carpal tunnel and increased ischemia, or median nerve compression, which causes tingling and numbness in the fingers, burning sensations, and difficult finger movements. In the current study, we aimed to assess the awareness of CTS among the public population in the Riyadh region, in addition to their awareness towards CTS.

In general, we found that 61.2% of the participants in the current study reported that they had never heard of CTS before, indicating low awareness among most of the residents. A previous study among the adult population in Saudi Arabia's Al-Jouf region found that 67.9% of participants had never heard of CTS[12]. Moreover, another study conducted in India showed that only 27.5% of the participants had heard about CTS before, while 76.5 percent of them were unaware of its symptoms[13]. Moreover, in the current study, more than half of the participants correctly identified arthritis as a cause of CTS (56.3%), as well as other causes such as repeated physical activities and trauma. This is similar to the results of a previous study, which showed that most of the participants could identify that rheumatoid arthritis is a cause of CTS[14]. However, another study in the Majmaah region of Saudi Arabia revealed that 33.8 percent of participants attributed CTS to trauma, with repeated physical activity coming in second at 29.1 percent, wrist fracture at 21.4%, and arthritis at 9.5 percent15. Furthermore, the authors found an association between the incidence of CTS and repeated physical activity. The authors of a 2021 case-control study sought to establish a correlation between smartphone use and the onset of CTS. The study re-

ported that smartphone use for more than two hours per day was associated with the development of carpal tunnel syndrome, while using both hands increased the risk[16]. Among patients with CTS, numbness, tingling, and pain that increased at night were the main complaints, as were weakness and clumsiness[17-19]. In the current study, 62.5 percent of participants reported pain as a symptom of carpal tunnel syndrome, followed by decreased hand grip (57 percent) and numbness.

The symptoms include tingling in the thumb (56.7 percent), and muscle waste in the hand (53.5 percent). In a previous study conducted in the Majmaah region, the authors showed that most of the participants believed that the main symptom was pain in the wrist (30%) and believed trauma was the most common cause (33.8%)[15]. In another study, the authors showed that both Indian and Malaysian participants thought that the main symptom was tingling and numbness[14].

In addition, the results of the current study showed that most of the participants reported that writing is affected by carpal tunnel syndrome (63.9%), followed by holding a book or smartphone (55.5%), carrying grocery baskets (54.1%), and opening jars (52.0%). The impact of CTS on the writing ability and holding of different items is associated with a reduction in grip strength and hand function because of the painful feeling associated with CTS[18-20]. In another study, the authors showed that most of the participants reported that CTS affected job performance, social life, and sleep[14]. In addition, in another study, a majority of the participants thought that Carpal Tunnel Syndrome could affect patient sleep (79.01%), while 84.97% of them believed it affected job performance and 70.4% believed it affected the patient's social life[15]. Moreover, it was found in the current study that most of the participants reported that stretching and strengthening exercises (62.6%) and alternating between both hands (61.6%) are considered preventive measures for the prevention of carpal tunnel syndrome. Minimizing the stress on the wrist was the main preventive measure reported by dentists in a previous study[14].

In light of the prevalence of CTS, our study's results revealed that 15.7% of the participants had received a diagnosis. In a previous cross-sectional study among dentists in the Riyadh region, the authors reported that the prevalence of CTS was 30.5 percent[21]. Furthermore, the authors of another study reported a 14 percent prevalence of CTS in the general population[15]. Our study found that males, older populations, non-Saudis, those with higher incomes, and some occupations were associated with a higher risk of developing CTS.

This is in disagreement with the results of other studies, including the UK General Practice Research Database in 2000, which reported that the prevalence of CTS was 88 per 100,000 in males, while in women, the incidence was 193 per 100,00018. Moreover, another study in the Riyadh region showed that female, obese, left-handed dentists had a greater risk of having carpal tunnel syndrome by 38%, 43%, and 63%, respectively[21]. In addition, another study showed that 84.2 percent of patients with CTS were female, Saudi (93%), and 45 years old or younger (84.7 percent)[22]. However, another study among diabetic patients revealed a significantly higher prevalence of CTS among male patients, with age not significantly influencing this finding[23].

Conclusion

In conclusion, our study brings to light the significant issue of Carpal Tunnel Syndrome (CTS) within the Riyadh region, highlighting not only its prevalence but also the concerning lack of awareness about the condition among the general populace. This finding signals a critical need for immediate, targeted actions aimed at enhancing public knowledge and understanding of CTS. Addressing this gap is critical for developing effective strategies to combat the syndrome and its impact on the community's health and well-being.

To tackle the awareness deficit, a foundational step involves incorporating comprehensive information on CTS into the educational curriculum. This initiative will educate the younger generation on the disorder's causes, symptoms, and available treatment options, fostering a proactive attitude towards health maintenance. Additionally, by introducing this knowledge early on, we can cultivate a culture of preventative health care, ultimately aiming to decrease the incidence rates of CTS in the future.

Expanding the scope of awareness efforts and hosting simulation events in various environments, such as workplaces, educational institutions, and community centers, can serve as an effective method to raise awareness about CTS. These interactive workshops, which simulate the experiences and challenges faced by those with CTS, offer participants a valuable, hands-on understanding of the condition's real-world impacts. Such engaging experiences are likely to leave a lasting impression, encouraging individuals to adopt ergonomic practices and preventative measures to safeguard their hand and wrist health.

Furthermore, we should leverage the power of social media and digital platforms to spread knowledge about CTS. Through

engaging and educational content such as infographics, videos, and articles, enhancing public understanding of CTS. Collaborating with healthcare professionals and influencers can help ensure that accurate and relatable information circulates widely, promoting preventive practices across diverse communities. Concurrently, ongoing research into the risk factors and impacts of CTS is vital, enabling the development of tailored prevention and treatment strategies that could significantly mitigate the syndrome's effects on individuals and society at large. In essence, a multifaceted approach encompassing education, community involvement, and research is crucial to address the challenges posed by CTS, paving the way for healthier communities in Riyadh and beyond.

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