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PREVALENCE AND RISK FACTORS OF CARPAL TUNNEL SYNDROME SYMPTOMS AMONG THE BEAUTY PARLOR WORKERS IN KARACHI: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: Musculoskeletal disorders (MSDs) causes various conditions affecting the musculoskeletal system, including Carpal Tunnel Syndrome (CTS). CTS, characterized by median nerve compression in the wrist's carpal tunnel, presents a global public health challenge. It exhibits varying prevalence rates across populations and professions, with notable occurrences among pregnant women, diabetic patients, and those engaged in repetitive and forceful maneuvers. Beauty parlor workers, due to the nature of their tasks, face an increased risk of CTS, originating from repetitive and forceful wrist motions, sustained wrist positions, and the use of vibrating tools. Regional variations in CTS prevalence emphasize the need for healthcare strategies.

Objectives: This study aimed to determine the prevalence and risk factors of carpal tunnel syndrome (CTS) symptoms among the beauty parlor workers in Karachi.

Methodology: One hundred and eighty-four beauty parlor workers participated in this cross sectional study. Data was collected using a standard disease specific questionnaire BCTQ. Consent was taken from all eligible participants. Data was analyzed by SPSS version 26.

Result: The result revealed that a significant proportion of participants experienced mild to moderate wrist pain 57.6%, numbness 53.8%, tingling sensations 55.4%, and weakness 47.8%. Workers faced numerous difficulties in performing their professional tasks, such as grasping small objects, holding makeup palettes, working with scissors and vibratory tools, gripping beauty tools, and opening jars and bottles

Conclusion: This study concluded high prevalence and risk factors of carpal tunnel syndrome symptoms among beauty parlor workers in Karachi. This study highlight the need to consider ergonomic solutions for those who carry heavy equipment, work with vibratory tools and perform repetitive movements.

Key words: Musculoskeletal disease, Pain, Wrist, Carpal tunnel syndrome, Prevalence

INTRODUCTION

Musculoskeletal disorders (MSDs) include a wide range of conditions affecting the muscles, tendons, bones, ligaments, and other components of the musculoskeletal system [1, 2]. One prevalent MSD that warrants attention is carpal tunnel syndrome (CTS) [3-5]. CTS is a well-documented musculoskeletal disorder characterized by the compression of the median nerve as it passes through the carpal tunnel, a narrow passageway in the wrist [6-9]. The carpal tunnel protects the median nerve and nine flexor tendons responsible for bending the fingers [10]. When the median nerve becomes compressed, it results in a combination of symptoms known collectively as CTS [7, 11]. Individuals with CTS experience distressing symptoms of pain, numbness, and tingling sensations in the thumb, index finger, middle finger, and the radial side of the ring finger [4, 10-12]. Over time, these sensations can reduce grip strength and hand function [2, 12]. In advanced cases, muscle wasting at the base of the thumb may occur [13]. Due to the rate of incidence (IR) and the disability associated with carpal tunnel syndrome (CTS), it is one of the main occupational health problem [5]. Globally, CTS affects more than 8 million individuals and is recognized as a significant health concern [3, 12]. In the general population, the prevalence of CTS typically ranges between 3% and 6% [11, 13]. However, specific clinical conditions demonstrate higher prevalence rates. For instance, CTS is found in approximately 62% of pregnant women and nearly 20% of diabetic patients [12, 13]. Notably, CTS is also associated with certain professions, with a significantly higher prevalence among workers engaged in repetitive and forceful maneuvers [13, 14]. Gender plays another significant role in predicting CTS symptoms, as females are found to be three times more prone to CTS than males [13, 15, 16]. However, various risk factors contribute to CTS development, including diabetes, obesity, rheumatoid arthritis, older age, underactive thyroid disease, smoking, and exposure to repetitive wrist movements [11, 12, 15, 17].

Certain occupations that involve repetitive wrist movements, forceful exertions, awkward wrist postures, and the use of vibrating tools are associated with an increased risk of CTS [1, 10, 11, 18]. Beauty parlor workers represent a distinctive demographic encountering particular challenges concerning Carpal Tunnel Syndrome (CTS) [6]. The beauty parlor industry demands intricate and precise hand movements, including tasks like hair cutting, styling, and nail care. These tasks have the potential to elevate the risk of CTS among workers due to the repetitive nature of their responsibilities and specific physical risk factors that are intrinsic to their profession [6, 14]. Repetitive and forceful wrist motions are common in beauty parlor tasks and the constant flexion-extension movements required for tasks, like using scissors, hair dryers, and vibrating tools can strain the arms and wrists of beauty parlor workers [1, 12, 14]. Additionally, the use of handheld tools

that vibrate or exert pressure on the wrist is prevalent in beauty parlors. These tools, while essential for various treatments, can contribute to increased pressure within the carpal tunnel and median nerve dysfunction [17]. Research conducted in various countries reveals varying rates of carpal tunnel syndrome (CTS) prevalence. For instance, studies indicate an incidence of over 18% in Kuwait, 41% in Egypt, 49% in Iran, 43% in Portugal, and a substantial 74.3% in Turkey [9]. However, there is a notable knowledge gap concerning the prevalence of CTS in Pakistan [12]. The prevalence of CTS worldwide highlights the need for focused workplace, public health, and healthcare initiatives. In order to alleviate chronic problems in everyday activities and lessen the burden on healthcare systems, measures that are tailored to varied populations are essential. The aim of this study is to investigate the prevalence and risk factors of carpal tunnel syndrome symptoms among beauty parlor workers in Karachi. This study marks just the beginning of our exploration, and future research will potentially explore the causes beyond the risk factors associated with CTS to recognize and apply suitable prevention measures for better results.

METHOD

Design

This cross-sectional study was conducted between June and December 2023, a period of seven months in beauty parlor setups in Karachi, Pakistan. The study's sample size of 184 beauty salon employees was a replication of the sample size utilized in a previous study conducted by P. Erick *et al*., which explored risk factors related to self-reported carpal tunnel syndrome. The sampling technique used for this study was convenience sampling, which made it feasible and approachable to choose participants from the intended demographic of beauty parlors.

Participants:

The participants included in this study were females aged over twenty who signed the informed consent form. Individuals who were diagnosed with rheumatoid arthritis or those with a history of wrist fractures or chronic wrist pain were excluded from this study.

Procedure

In this study, participants were approached by the research team online and in person. Participants who chose to be part of this study and were willing to fill out the survey in English were then asked to fill out a consent form at the beginning of the survey, where participants could agree to take part after understanding what the study was about. The objectives and purpose of this study were clearly described in the survey to all the potential participants. Participants were then asked to fill out demographic information and years of experience. After giving consent and demographic information, data was collected through two scales of a disease-specific questionnaire named the Boston carpal tunnel syndrome questionnaire that was modified and specifically designed by the research team for the purpose of this study. In the first scale, questions from the symptom severity scale were included, which had 11 elements. In these 11 questions, participants were asked about symptoms faced by beauty parlor workers to indicate the duration, frequency, severity, and effects of the symptoms on work and daily activities. Meanwhile, in the second scale, a series of 8 elements from the functional status scale were included, which were modified according to the common functional activities of beauty parlor workers that could be risk factors for CTS symptoms, e.g., repetitive movements, vibratory tools, working with scissors, and holding heavy devices. Participants were then instructed to choose the level of difficulty they faced while working with different tools.

Outcome measures

In this study, we used an adapted version of the disease-specific Boston carpal tunnel syndrome questionnaire, previously developed by Levine *et al*. and based on the symptom severity scale and functional status scale. BCTQ is a highly valid and reliable standardized tool. (EP Vladeva, 2020)

A symptom severity scale was employed to evaluate the severity of symptoms, while a functional status scale was utilized to determine the functional difficulties experienced by beauty parlor workers.

Ethics approval

The Ziauddin University Ethics Committee approved this study (Protocol reference **#020224RSA2**). All participants gave written informed consent before data collection began.

Data analysis

The Statistical Package for the Social Sciences (SPSS) version 26 was used to conduct statistical analysis. We calculated proportions to describe the outcome of interest (prevalence and risk factors of CTS symptoms among beauty parlor workers).

Moreover, we inquired into demographic determinants, specifically examining participants' years of experience in the beauty parlor industry. To uncover any potential associations between this demographic factor and other variables, we employed the chi-square test of association. This statistical tool allowed us to explore associations between variables, providing valuable insights into the factors influencing the prevalence and risk factors of carpal tunnel syndrome symptoms.

RESULTS

A total of 184 beauty parlor workers from Karachi participated in this study. Demographically, the majority of the participants, 90.2%, fell within the age bracket of 20–30 years, and 53.8% reported having 1–5 years of experience in the beauty parlor industry. On the Symptom Severity Scale, participants were asked a series of questions regarding their Carpal Tunnel Syndrome (CTS) symptoms. The majority of respondents reported experiencing mild nighttime hand or wrist pain (41.8%) and indicated that they were awakened by pain during the night occasionally in the past two weeks (42.9%). During the daytime, the majority reported mild hand or wrist pain (54.9%) occurring 1-2 times a day (57.6%). For the duration of daytime pain, most participants noted episodes lasting less than 10 minutes (53.3%). Additionally, the majority reported numbness (53.8%) and tingling (55.4%) sensations in their hands, with mild hand weakness (47.8%) (Figure 1). These findings highlight the prevalence of mild to moderate CTS symptoms among female beauty parlor workers (For a summarized view, please refer to Table 1).

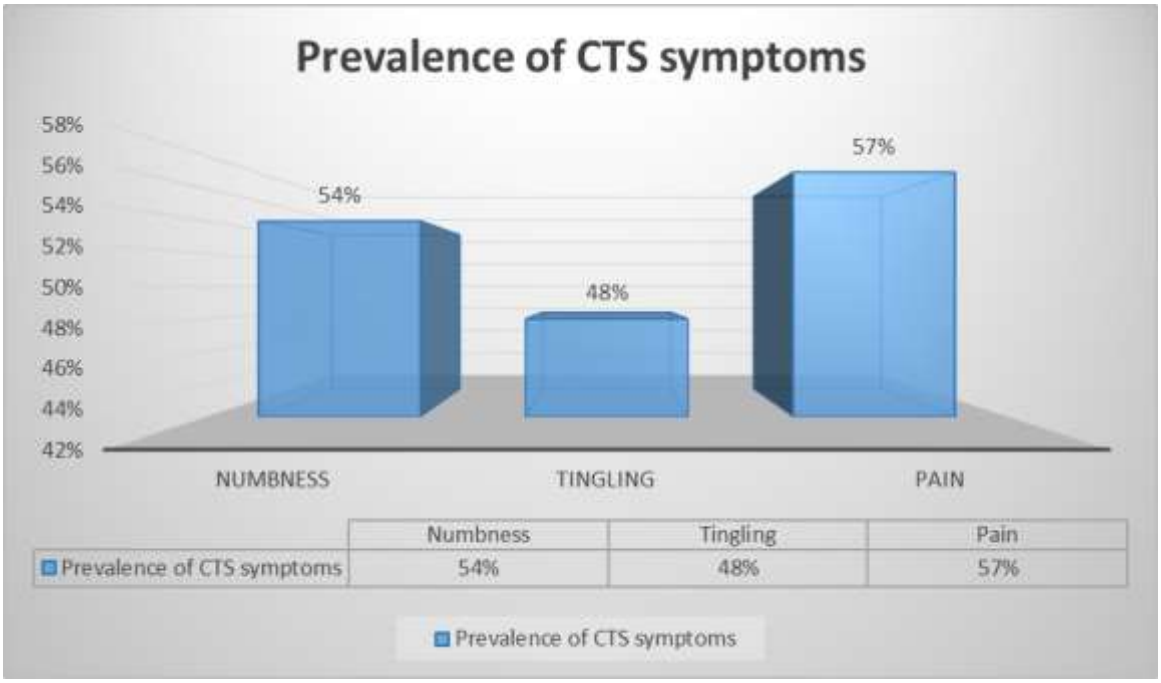

Figure 1. Prevalence of CTS Symptoms among the beauty parlor workers in Karachi.

Table 1

Symptom Severity Scale n(%)					
1- Pain in your hand or wrist during the daytime?	Normal	Mild	Moderate	Severe	Very severe
	32(17.4)	101(54.9)	40(21.7)	09(4.9)	02(1.1)
2- Severity of hand or wrist pain at night?	30(16.3)	77(41.8)	64(34.8)	12(6.5)	01(0.5)
3- How long does an episode of pain last?	Normal	< 10 minutes	10-60 min Continued	> 60 minutes	Continued
	53(28.8)	98(53.3)	21(11.4)	08(4.3)	04(2.2)
4- Numbness (loss of sensation) in your hand?	Normal	Mild	Moderate	Severe	Very severe
	47(25.5)	99(53.8)	30(16.3)	07(3.8)	01(0.5)
5- Weakness in your hand or wrist?	45(24.5)	88(47.8)	36(19.6)	12(6.5)	03(1.6)
6- Tingling sensations in your hand?	44(23.9)	102(55.4)	33(17.9)	05(2.7)	----
7- Frequency of numbness or tingling waking you up at night?	Never	Once	2 to 3 times	4 to 5 times	> 5 times
	35(19.0)	89(48.4)	48(26.1)	12(6.5)	----
8- Frequency of hand or wrist pain waking you up at night?	35(19.0)	79(42.9)	58(31.5)	10(5.4)	02(1.1)

The Functional Status Scale determined the difficulties faced by beauty parlor workers in performing various tasks. Notably, 53.3% of participants reported difficulty grasping and holding small objects, with a significant portion (51.6%) specifically encountering problems when attempting to hold makeup palettes for extended periods. Additionally, 48.4% of participants faced difficulties while working with scissors, and 46.7% experienced challenges when using vibratory tools. Furthermore, 48.9% of participants reported having difficulty gripping beauty tools, and 50.0% reported difficulty opening jars and bottles. Similarly, when questioned about performing various job tasks like hairstyling, makeup application, and nail filing, the majority (48.4%) reported "little difficulty." Moreover, people carrying heavy devices also reported mild to moderate difficulty (38.0%). For hair and skin therapies such as facials and massages, the majority (45.1%) still reported difficulty (Refer to Table 2 for a comprehensive summary.). This comprehensive data underscores the range of challenges faced by beauty parlor workers in their daily tasks. The fact that many beauty parlor workers find tasks somewhat challenging, often described as "little difficulty," is a common theme.

Table 2

Functional Status Scale n(%)					
	No Difficulty	**Little Difficulty**	**Moderate Difficulty**	**Intense Difficulty**	**Activity cannot be performed**
1- Scissors	47 (25.5)	89 (48.4)	04 (22.3)	05 (2.7)	02 (1.1)
2- Working with vibrating tools	40 (21.7)	86 (46.7)	46 (25.0)	10 (5.4)	02 (1.1)
3- Holding makeup palettes	60 (32.6)	95 (51.6)	20 (10.9)	06 (3.3)	03 (1.6)
4- Gripping of beauty tools	60 (32.6)	90 (48.9)	29 (15.8)	05 (2.7)	----
5- Opening of jars and bottles	32 (17.4)	92 (50.0)	45 (24.5)	13 (7.1)	02 (1.1)
6- Performing job tasks e.g. hairstyling, makeup, nail filing etc.	38 (20.7)	89 (48.4)	41 (22.3)	14 (7.6)	02 (1.1)
7- Carrying heavy devices	20 (10.9)	70 (38.0)	70 (38.0)	17 (9.2)	07 (3.8)
8- Hair and skin therapies (facial, massage etc.)	37 (20.1)	83 (45.1)	46 (25.0)	16 (8.7)	02 (1.1)

Risk factors of CTS symptoms among the beauty parlor workers in Karachi

This research identified risk factors among beauty parlor workers, including repetitive tasks, prolonged standing, and discomfort from vibratory tools. Also, 1–5 years of experience and belonging to the 20–30 age group correlated with reported hand and wrist pain, highlighting occupational challenges.

Prevalence of CTS symptoms among the beauty parlor workers in Karachi

This study determined a significant proportion of participants experienced mild to moderate CTS symptoms such as wrist pain (57.6%), numbness (53.8%), tingling sensations (55.4%), and weakness (47.8%).

DISCUSSION

To the best of our knowledge and awareness, this study is the first of its kind to shed light on the prevalence and risk factors of Carpal Tunnel Syndrome (CTS) symptoms among female beauty parlor workers in Karachi, Pakistan. Our study addresses a critical occupational health concern. This study predominantly revealed that approximately 76.6% of beauty parlor workers experienced mild to moderate wrist pain and CTS symptoms. These findings highlight the occupational health challenges faced by individuals in the beauty parlor industry.

Demographics and Experience

The survey revealed a significant proportion of beauticians in the study were aged between 20 and 30 years old (90.2%). This skew towards a younger age group is noteworthy as it might indicate that hand and wrist discomfort could be more prevalent in this demographic, possibly due to repetitive tasks inherent in the profession. Moreover, nearly 54% of participants reported having 1–5 years of experience; this is an important factor to consider because it could relate to the reasons behind their hand and wrist pain.

Nocturnal Discomfort

A substantial number of beauticians (41.8%) reported experiencing mild hand or wrist pain at night, while 34.8% reported moderate pain. This nocturnal discomfort is a significant concern as it can affect the quality of sleep and, consequently, work performance.

Frequency of Discomfort

The frequency of hand or wrist pain during the course of the day is also a matter of concern. Over half of the participants (57.6%) reported experiencing pain 1-2 times a day, and a significant majority (53.3%) reported that this pain lasted no more than 10 minutes. This suggests that while the discomfort may be frequent, it is often of short duration. However, we need to look deeper to understand what activities trigger these episodes.

Impact on Daily Tasks

It is noteworthy that 53.3% of participants reported experiencing little difficulty grasping and using small objects such as pluckers and brushes. This shows that, despite the reported discomfort, many beauticians are still able to perform their daily tasks effectively. However, we should consider the long-term effects of these issues on their ability to work comfortably.

Comparative Analysis

Our study aligns with a prior study conducted by Anjum H *et al*. (2022) in the same occupational group. Both studies reveal a significant prevalence of wrist pain as a shared concern among female participants. Our research highlights that many female participants experienced mild to moderate CTS symptoms, including hand and wrist pain, mirroring the other study's finding that 54.8% of beauticians reported wrist pain. Both studies identify consistent contributing factors to this pain, such as repetitive tasks and extended periods of standing. The impact of job demands and physical strain on beauty parlor workers is also evident in both investigations.

In our study, we examined the exposure to vibrations among female beauticians. We found that a significant number of participants (46.7%) faced difficulties when using vibratory tools. This suggests that there might be a potential risk associated with the use of vibrating equipment in the beauty parlor industry. In contrast, a study conducted by Tekavec *et al*. (2021) focused on carpenters who are exposed to vibrations due to their work. This study highlighted the negative health effects of vibration exposure and suggested that individuals in such occupations might be at a higher risk of developing health problems. It's important to mention that our study did not determine the exact amount of vibration exposure. However, it does raise concerns about how

vibratory tools could potentially impact the hand health of beauticians. Both our study and Tekavec *et al*.'s study emphasize the importance of considering occupational factors, like exposure to vibrations, when evaluating the risk of health issues related to the hand and wrist.

Limitation and recommendation

We used convenience sampling approach that may introduce some selection bias in this study. Resource constraints led us to embrace the cross-sectional study design, which only provides a glimpse of the participants' experiences at a single point in time, providing us with insights into their current situation. It cannot establish causation or examine changes over time. We recommend that future research incorporate objective measures such as clinical assessments, nerve conduction studies, and ergonomic evaluations to validate the data and enhance its reliability. Additionally, future research should focus on designing and implementing interventions aimed at reducing CTS symptoms and enhancing hand and wrist health among beauty parlor workers. These interventions should include an evaluation of the effectiveness of ergonomic changes, training programs, and preventive measures.

REFERENCES

1. Anjum H, Qazi W, Rehman H, Shafique MS. Frequency of Musculosketelal Problems in Beauticians of Rawalpindi and Islamabad. Pakistan Journal of Medical & Health Sciences. 2022;16(08):490-.
2. Yesuf T, Aragie H, Asmare Y. Prevalence of Carpal Tunnel Syndrome and its associated factors among patients with musculoskeletal compliant at Dilchora Referral Hospitals in Dire Dawa administration, Eastern Ethiopia, 2022. medRxiv. 2023:2023.02. 10.23285779.
3. Said HB, Kaabi K, Kerkni N, Youssef I, Mechergui N, Brahim D, et al. The Professional Future in Operated Carpal Tunnel Syndrome: A Cross-Sectional Study of Recognized Occupational Cases. La Medicina del Lavoro. 2023;114(4).
4. Bibi M, Khan B, Ahmad SR, Hassanat A, Ijaz R, Usman H. Prevalence of carpal tunnel syndrome in computer operators of Peshawar. Rehman Journal of Health Sciences. 2019;1(1):21-3.
5. Harris-Adamson C, Eisen EA, Kapellusch J, Hegmann KT, Thiese MS, Dale A-M, et al. Occupational risk factors for work disability following carpal tunnel syndrome: a pooled prospective study. Occupational and environmental medicine. 2022;79(7):442-51.
6. Bujara S. Carpal tunnel syndrome in persons performing cosmetic procedures. Aesthetic Cosmetology and Medicine. 2020;5:425-30.
7. Hayder A, Fatimah A, Asghar HMU, Maqbool S, Shad M, Zaheer B, et al. Prevalence Of Carpal Tunnel Syndrome Among Butchers In Pakistan: Carpel Tunnel Syndrome among Butchers. Pakistan BioMedical Journal. 2022:183-7.
8. Karaçorlu FN, Balgetir F, Pirinçci E, Deveci SE. The relationship between carpal tunnel syndrome, smartphone use, and addiction: A cross-sectional study. Turkish Journal of Physical Medicine and Rehabilitation. 2022;68(4):517.
9. Erick P, Benjamin K, Raditloko S, Tapera R, Mbongwe B. Risk factors for self-reported carpal tunnel syndrome among hairstylists in gaborone, botswana. International Journal of Occupational Medicine and Environmental Health. 2020;34(3):437-50.
10. Mubashra H, Mehmood M, Malik S, Zahra H, Mehmood A, Mukhtar S. Prevalence of Carpal Tunnel Syndrome among Dentists of Faisalabad. Pakistan Journal of Medical & Health Sciences. 2022;16(10):9-.
11. Genova A, Dix O, Saefan A, Thakur M, Hassan A. Carpal tunnel syndrome: a review of literature. Cureus. 2020;12(3).
12. Zubair M, Khan P, Ahmad U, Abidin SZU, Shah SU, Kazmi A. Prevalence of Carpal Tunnel Syndrome Among Dentists Working in Tertiary Care Hospitals of Peshawar, Pakistan. Annals of Jinnah Sindh Medical University. 2022;8(1):36-41.

13. Alhusain FA, Almohrij M, Althukeir F, Alshater A, Alghamdi B, Masuadi E, et al. Prevalence of carpal tunnel syndrome symptoms among dentists working in Riyadh. Annals of Saudi medicine. 2019;39(2):104-11.
14. Feng B, Chen K, Zhu X, Ip W-Y, Andersen LL, Page P, et al. Prevalence and risk factors of self-reported wrist and hand symptoms and clinically confirmed carpal tunnel syndrome among office workers in China: a cross-sectional study. BMC Public Health. 2021;21:1-10.
15. Al-Jasim A, Sarhan FM, Al-Abbasi G, Ali AB, Alaraj RS, Yasin D, et al. Risk factors associated with the reported scores on the symptoms severity and functional limitations scales of the Boston Carpal Tunnel Questionnaire: a cross-sectional study. Annals of Medicine and Surgery. 2023;85(5):1691-8.
16. Mathew AE, John T. A clinical and neurophysiological analysis of idiopathic carpal tunnel syndrome with respect to gender and occupation. Annals of Indian Academy of Neurology. 2021;24(6):865-72.
17. Roquelaure Y, Jégo S, Geoffroy-Perez B, Chazelle E, Descatha A, Evanoff B, et al. Carpal tunnel syndrome among male French farmers and agricultural workers: Is it only associated with physical exposure? Safety and health at work. 2020;11(1):33-40.
18. Lewańska M. The bilaterality of idiopathic carpal tunnel syndrome among manual workers. International Journal of Occupational Medicine and Environmental Health. 2020;33.