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Carpal tunnel syndrome symptoms and their associated factors among plastic surgeons in Saudi Arabia: a cross-sectional study

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Abstract

Background Carpal tunnel syndrome (CTS) is a common occupational risk for plastic surgeons, affecting hand functionality and overall quality of life. This study aimed to explore and determine CTS symptoms prevalence and risk factors among plastic surgeons in Saudi Arabia.

Methods This cross-sectional study utilized an online questionnaire to poll plastic surgeons in Saudi Arabia. Participants submitted sociodemographic data, clinical attributes, and completed the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ). The data were examined via descriptive statistics, bivariate correlation, and multivariable regression analysis.

Results Among the 100 surveyed surgeons, the prevalence of CTS symptoms was significant, with 43% indicating hand numbness. Key predictors of CTS symptoms comprised years of experience, a history of degenerative disc disease, and hand numbness. Predictors of increased CTS-associated functional status included surgeons with numbness in both dominant and non-dominant hands, and increased frequency of performing liposuction procedures.

Conclusion The occupational hazard of CTS among plastic surgeons in Saudi Arabia is significant, indicating the necessity for focused interventions to reduce CTS risk factors and enhance ergonomic procedures in surgical environments.

Keywords Carpal tunnel syndrome, Prevalence, Plastic surgery, Occupational injuries, Saudi Arabia

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Introduction

Carpal tunnel syndrome (CTS) is one of the most common peripheral nerve entrapment diseases. CTS is caused by median nerve compression within the carpal tunnel [1–3]. In addition to causing sensory symptoms such as pain, numbness, tingling, and weakness, it can also cause loss of grip strength and dexterity in the hand. CTS poses a significant occupational health problem with high socioeconomic burdens [4]. CTS can negatively impact quality of life, leading to functional disability, limitations in daily activities, poor sleep, decreased productivity, and job loss [5].

While work-related musculoskeletal disorders (WRMSDs) among surgeons commonly involve the neck, shoulders, and lower back, CTS warrants focused attention due to its prevalence in surgical specialties and its potentially disabling effects on manual dexterity. CTS can significantly impair fine motor control, which is critical for surgeons performing delicate procedures, and may result in functional limitations that impact both career longevity and patient safety. Unlike other musculoskeletal symptoms that may be more diffuse or posture-related, CTS is a well-defined clinical entity with clear diagnostic criteria, making it a valuable target for occupational health research and preventive interventions.

A thorough review of the literature by Cazares et al. identified 72 studies to examine the relationship between CTS and possible risk factors, e.g., age, gender, BMI, dominant hand, abdominal circumference, respiratory rate, blood pressure, and cardiac rate. According to this review, a higher BMI, female sex, and older age are associated with CTS. The prevalence of bilateral CTS was higher in older age, higher BMI, and diabetes mellitus. Age and BMI were independently associated with bilateral CTS [6].

Worldwide, there is a growing acknowledgment of work-related factors contributing to CTS; However, surgeons, in particular, face a significant risk. A previous meta-analysis has identified specific risks, stating a substantial correlation between CTS and occupational factors such as manual and repetitive force, utilization of vibratory tools, and wrist posture [7]. Yet, one study found surgeons to be at moderate risk for work-related injuries while admitting a low rate of reporting such incidents by institutions [8]. Although a recent study proposes that plastic surgeons face a higher risk of occupational injuries, these symptoms surprisingly appear early in the course of their residency [9].

The prevalence of CTS among plastic surgeons was reported at 15.1%, significantly exceeding the general population's prevalence rates by more than three times, with a demonstrated association with the number of years in practice [10].

As the majority of local studies on the prevalence of CTS have been conducted among surgeons in a broad context, specific data regarding its prevalence among plastic surgeons is lacking. According to a study done recently in Makkah, the prevalence of CTS among participating surgeons ($n = 86$) was 53.3% with physical activity playing a significant role [11]. Hence it is important to investigate CTS to improve the understanding of its prevalence, risk factors, and burden in Saudi Arabia [12].

Numerous international and local studies have estimated the prevalence of CTS among surgeons, as they are at high risk of getting CTS, especially those who spend many hours in operation rooms such as plastic surgeons. Currently, there are no studies that have been conducted in Saudi Arabia among plastic surgeons regarding exploring the prevalence of CTS symptoms. Therefore, the aim of this study is to estimate the prevalence of CTS symptoms among plastic surgeons in Saudi Arabia and determine the associated risk factors and functional status of the symptoms.

Materials and methods

Before commencement, the study was approved by the Institutional Review Board (IRB) at Princess Nourah hint Abdulrahman University, Riyadh, Saudi Arabia. IRB Log Number: 24–0086. Informed consent was obtained from all subjects involved in the study. This study was conducted in accordance with the declaration of Helsinki.

Sample and data collection

This online survey-based cross-sectional study used a convenience sampling technique, conducted from January 2024 to July 2024. The inclusion criteria were plastic surgery residents, associate consultants, and consultants in major regions of Saudi Arabia, with no restrictions on gender. All participants gave electronic informed consent. The sample size was estimated with a 5% margin of error and 95% confidence level, with a minimum of 151 participants, as calculated by EpiTools. Although the intended sample size was 151, only 100 participants completed the survey. This discrepancy was mainly due to non-responsiveness and time constraints among plastic surgeons. While this may have impacted the statistical power, significant associations were still found, and the sample is considered reasonably representative of the total number of plastic surgeons in the country.

Study survey

All data were obtained and managed using Google Forms electronic tool. The questionnaire was administered in English, the primary language of medical training and clinical practice among plastic surgeons in Saudi Arabia. Therefore, all participants were considered proficient in understanding the instrument. The study instrument had

three sections. (1) Sociodemographic data and potential CTS risk factors: Age, gender, nationality, residency, marital status, training level, monthly income, years of experience, workplace, dominant hand, clinical hours per week, height and weight, regular exercise, hand pain or numbness, known medical condition, and estimated number of liposuctions performed monthly. (2) The Boston Carpal Tunnel Syndrome Questionnaire (BCTQ): The BCTQ is a validated and reliable instrument for assessing CTS-related symptoms and functional limitations, with high internal consistency and reproducibility across diverse populations [13]. The questionnaire consists of two subscales: an 11-item Symptom Specific Scale (SSS) assessing the severity of pain, numbness, tingling, hand and wrist weakness, and nocturnal symptoms and an 8-item Functional Status Scale (FSS) assessing the patient's ability to perform activities of daily living. It was developed in 1993 by Levine et al. [13]

Storey et al. [14] suggested that each scale of the BCTQ can be summed and divided into five categories: the severity of the symptoms (asymptomatic 11, mild 12–22, moderate 23–33, severe 34–44, and very severe 45–55) and functional limitations (asymptomatic 8, mild 9–16, moderate 17–24, severe 25–32, and very severe 33–40). Both scales are rated from 1 to 5, where higher scores indicate greater symptom severity or greater functional impairment. The study's instrument can be accessed through the supplementary file.

Statistical analysis

The mean and standard deviation were used to summarize continuous variables, while categorical variables were described using frequencies and percentages. The assumption of normality for metric variables was evaluated using the Kolmogorov-Smirnov test and histogram analysis. Additionally, collinearity and multicollinearity among metric variables were assessed using the Variance Inflation Factor (VIF) and Tolerance (Ti) indices. The Bivariate Spearman's (rho) test was applied to assess the correlations among continuous variables. Additionally, Cronbach's alpha was used to assess the internal consistency of the BCT questionnaire. To account for overdispersion in the analyzed outcomes, a Generalized Multivariable Linear Regression (Gamma) Analysis was applied to assess the surgeon's perceived CTS symptoms and functional status scores. The association between predictor variables and outcomes was expressed as Risk Rates (RR) with corresponding 95% confidence intervals. A significance level (α) of 0.05 was applied. No missing data were present in the final dataset. Therefore, a complete case analysis was conducted, and no imputation or listwise deletion was needed. Statistical analyses were conducted using a licensed version of IBM SPSS Statistics, Version 29.

Results

Out of 234 plastic surgeons working and living in Saudi Arabia, 100 completed the survey, resulting in a response rate of 42.7%. Table 1 displays the surgeons' sociodemographic characteristics, as well as factors related to their profession. The majority of participants (79%) were male, while 21% were female. The mean age was 37.91 ± 9.28 years. Additionally, 64% of the respondents were ever married. The physicians had a mean height of 171.3 ± 7.46 cm and a mean weight of 76.88 ± 16.3 kg. Their average body mass index (BMI) is 26.14 (SD = 4.93). Among them, 49% had a normal BMI (18–24.9), while 40% were categorized as overweight (BMI 25–29.9), and 11% were categorized as obese (BMI ≥ 30). Additionally, the majority of the surgeons were Saudi nationals, whereas expatriate physicians constituted a smaller proportion of the respondents. Respondents indicate their place of residence, with findings revealing that 16% reside in provinces outside the central region, while 84% reside within the central region, including Riyadh, the capital of Saudi Arabia. Physicians' training levels are as follows: 11% are plastic surgery junior residents (R1–R3), 14% are senior residents (R4–R6), 26% are specialists, and 49% are consultants. Regarding employment sectors, 49% work in government hospitals, 18% in private hospitals, and 33% in both. Additionally, physicians' weekly working hours vary, with 14% working 10–16 h, 13% working 17–20 h, 20% working 21–40 h, and the majority (53%) exceeding 40 h per week.

Table 2 presents the descriptive analysis of plastic surgeons' lifestyle habits, medical history, plastic surgery-related conditions, and dexterity. The findings indicate that 10% of physicians are left-handed, while 90% are right-handed. Regarding monthly exercise frequency, 29% do not exercise, 16% exercise once per month, 36% exercise 2–3 times per week, 16% exercise 4–6 times per week, and 3% exercise daily. The analysis indicates that 43% of physicians experience hand numbness, with 3% reporting numbness in the non-dominant hand, 16% in the dominant hand, and 24% in both hands. Additionally, 30% of physicians have comorbid conditions, distributed as follows: 63.3% report neck pain, 10% have degenerative disc disease, 16.7% are females with a history of pregnancy, 10% have hypertension, and 4% have other comorbidities, including osteoarthritis, transient ischemic attack (TIA), gout, and rheumatoid arthritis. Plastic surgery physicians were surveyed regarding the main focus of their work. The results show that 52% primarily conduct aesthetic surgeries, 29% focus on hand surgeries, and 4% specialize in burn surgeries. Additionally, 7% perform general plastic surgery, while 8% specialize in other areas such as microsurgery and pediatric plastic surgery. The majority of physicians report performing liposuction surgeries, with the frequency of weekly

Table 1 Descriptive analysis of plastic surgeons' sociodemographic characteristics, working and professional factors, $N = 100$

Variable	Frequency (*N*)	Percentage (%)
Gender		
Female	21	21
Male	79	79
Age (years), mean (SD)	37.91	9.28
Age group		
24–34 years	42	42
35–45 years	38	38
>=46 years	20	20
Marital state		
Never married	36	36
Ever married	64	64
Body Height (cm), mean (SD)		171.30 (7.46)
Body Weight (Kg), mean (SD)		76.88 (16.3)
Body Mass Index (BMI) score, mean (SD)		26.14 (4.93)
Body Mass Index (BMI) level		
Normal	49	49
Overweight	40	40
Obese	11	11
Nationality		
Non-Saudi	12	12
Saudi	88	88
Place of residence		
Other provinces	16	16
Central region provinces	84	84
Physicians Training Level		
Resident R1- R3	11	11
Resident R4-R6	14	14
Specialist	26	26
Consultant	49	49
Clinical experience (years)		
1–5 years	28	28
6–10 years	31	31
11–15 years	24	24
16–20 years	10	10
>=21 years	7	7
Working sector		
Governmental Hospital	49	49
Private Hospital	18	18
Private and Governmental hospitals	33	33
Weekly working hours		
10–16 h	14	14
17–20 h	13	13
21–40 h	20	20
> 40 h	53	53
Monthly income		
< 20,000 SAR/m	16	16
20,000–30,000 SAR/m	34	34
30,000–50,000 SAR	16	16
> 50,000 SAR/m	34	34

Table 2 Descriptive analysis of plastic surgeon's lifestyle habits, medical history and plastic surgery conditions and dexterity

Variable	Frequency (*n*)	Percentage (%)
Dominant hand		
Left hand	10	10
Right hand	90	90
Monthly exercise level		
Never	29	29
Once per month	16	16
2–3 times/week	36	36
4–6 times/week	16	16
Daily	3	3
Do you have a hand numbness		
No	57	57
Yes	43	43
Which hand is affected		
Not affected	57	57
Non dominant hand	3	3
Dominant hand	16	16
Both	24	24
Do you have any comorbidity		
No	70	70
Yes	30	30
Which type of comorbidity		
Neck pains	19	63.3
Degenerative disc disease	3	10
Previous Pregnancy	5	16.7
Hypertension	3	10
Diabetes Mellitus	3	10
Others	4	13.3
Bulk of work		
Aesthetic surgery	52	52
Hand surgery	29	29
Burn surgery	4	4
General plastics	7	7
Other (micro, pediatric)	8	8
Do you perform liposuction for your patients?		
No	43	43
Yes	57	57
Do you use power-assisted liposuction machine in your practice?		
No	34	34
Yes	66	66

liposuction procedures shown in Fig. 1. The findings also indicate that most physicians use power-assisted liposuction machines in their practice.

The Internal consistency analysis of the 19-item BCTQ demonstrates that the questionnaire was read and understood equally and reliably, with Cronbach's alpha = 0.914. Table 3 shows the descriptive analysis of physicians' self-assessed experiences with various CTS symptoms, as measured by the BCTQ subscale. The most frequently reported symptom is nocturnal hand pain, followed by daytime wrist pain, prolonged episodes of wrist pain during the day, and hand numbness. The least frequently reported CTS symptoms include difficulty grasping small objects, hand or wrist weakness, nocturnal awakenings due to hand tingling, and waking at night due to hand pain within the past two weeks.

Table 4 displays the descriptive analysis of physicians' self-assessed functional status scores using the BCTQ subscale. The most commonly reported functional difficulty is opening jars, followed by difficulty in holding a book while reading, carrying grocery bags, gripping a telephone handle, and writing. The least frequently experienced CTS-related functional difficulties reported by physicians include difficulties with household chores, buttoning clothing, and bathing and dressing themselves.

Plastic surgeons reported a moderate level of CTS symptoms, with a mean score of 13.58 out of 55, and low CTS-associated dysfunction, with a mean score of 8.57 out of 40 *(*Table 5*)*. A significant positive correlation was found between self-rated CTS symptoms and functional status ($r = 0.672$, $p < 0.001$), indicating that higher CTS symptoms were associated with greater functional difficulties, as shown in Supplementary Table 1.

To examine factors associated with CTS symptoms, a multivariable Generalized Linear Model (GLM) regression with a Gamma distribution was applied (Table 6). Gender, age, and dominant hand preference did not significantly correlate with CTS symptoms ($p > 0.05$). However, plastic surgeons with degenerative disc disease had 23% higher CTS symptoms ($p = 0.014$). Surgeons with bilateral or dominant hand numbness reported significantly greater symptoms ($p < 0.001$). Liposuction performance and power-assisted suction use were not significantly associated with CTS symptoms ($p > 0.05$). Surgeons with 16 or more years of experience had 19% higher CTS symptom scores ($p = 0.001$). Non-significant variables were excluded through iterative modelling.

A separate regression analysis assessed predictors of the CTS Functional status (FUNC) score (Table 7). No significant association was found with gender ($p = 0.172$), but age showed an inverse relationship, with each additional year decreasing the FUNC score by 4.4% ($p = 0.012$). Physicians with bilateral (RR = 1.068, $p = 0.030$), dominant (RR = 1.138, $p < 0.001$), or non-dominant (RR = 1.168, $p = 0.039$) hand numbness had significantly higher FUNC scores. Surgeons who frequently perform liposuction had a 6.5% higher FUNC score than those not performing liposuction ($p = 0.039$), though power-assisted suction use was not significant ($p = 0.779$). Degenerative disc disease was associated with a 44% increase in FUNC scores ($p = 0.030$), and neck pain correlated with a 9.1% higher FUNC score ($p = 0.010$). Specialists and consultants had 13.4% lower FUNC scores compared to residents ($p = 0.030$).

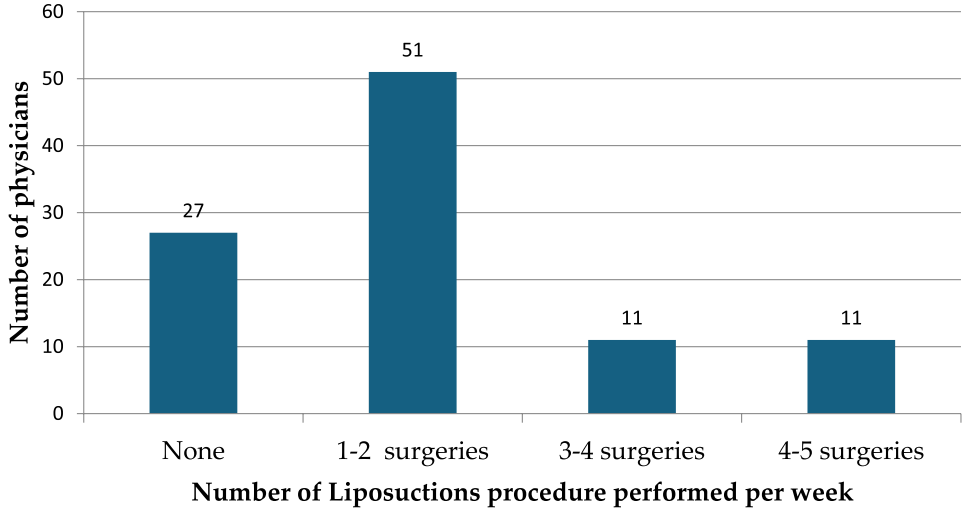

Fig. 1 Number of liposuction procedures performed per week

Table 3 Descriptive analysis of plastic surgeons experienced CTS symptoms

	Mean (SD)-Intensity	Rank
1- How severe is the hand or wrist pain that you have at night?	1.38 (0.63)	1
2- How often did hand or wrist pain wake you up during a typical night in the past two weeks?	1.18 (0.48)	8
3- Do you typically have pain in your hand or wrist during the daytime?	1.33 (0.60)	2
4- How often do you have hand or wrist pain during daytime?	1.23 (0.45)	7
5- How long on average does an episode of pain last during the daytime?	1.31 (0.56)	3
6- Do you have numbness (loss of sensation) in your hand?	1.30 (0.58)	4
7- Do you have weakness in your hand or wrist?	1.10 (0.30)	10
8- Do you have tingling sensations in your hand?	1.26 (0.54)	6
9- How severe is numbness (loss of sensation) or tingling at night?	1.27 (0.58)	5
10- How often did hand numbness or tingling wake you up during a typical night during the past two weeks?	1.18 (0.54)	9
11- Do you have difficulty with the grasping and use of small objects such as keys or pens?	1.04 (0.20)	11

Table 4 Descriptive analysis of physicians' self-assessed functional status scores using the BCTQ subscale

	Mean (SD)-Intensity	Rank
Part 2 of 2: Functional status scale (8 items) [Writing]	1.06 (0.28)	5
Part 2 of 2: Functional status scale (8 items) [Buttoning of clothes]	1.04 (0.24)	7
Part 2 of 2: Functional status scale (8 items) [Holding a book while reading]	1.10 (0.35)	2
Part 2 of 2: Functional status scale (8 items) [Gripping of a telephone handle]	1.08 (0.31)	4
Part 2 of 2: Functional status scale (8 items) [Opening of jars]	1.13 (0.39)	1
Part 2 of 2: Functional status scale (8 items) [Household chores]	1.03 (0.22)	8
Part 2 of 2: Functional status scale (8 items) [Carrying of grocery basket]	1.09 (0.35)	3
Part 2 of 2: Functional status scale (8 items) [Bathing and dressing]	1.05 (0.26)	6

Table 5 Descriptive analysis of plastic surgeons overall perceived CTS symptom severity scale and functional status scale of BCTQ

BCTQ sub-scales	Mean	SD
CTS Symptoms Score (SSS) (11–55 Points)	13.58	3.8
CTS Functional status (FUNCs) scale (8–40 Points)	8.57	1.84

SSS Symptoms severity scale, *FUNCs* Functional status scale, *CTS* Carpal tunnel syndrome, *BCTQ* Boston carpal tunnel questionnaire

Discussion

CTS is a work-related musculoskeletal condition resulting from repetitive movement. The present study assessed the prevalence and risk factors of CTS symptoms among plastic surgeons in Saudi Arabia. Identifying the risk factors of CTS can provide the basis for its prevention and management.

The findings of the present study add to the growing body of evidence highlighting the burden of work-related musculoskeletal disorders, particularly CTS, among surgical professionals. The rising incidence of work-related

Table 6 Multivariable generalized linear regression analysis (Gamma) of plastic surgeons mean experienced CTS symptoms score

Parameter	Multivariable adjusted Risk Rate	95% CI for RR		
		Lower	Upper	*p*-value
(Intercept)	12.817	10.666	15.401	< 0.001
Gender = male vs. female	0.982	0.917	1.052	0.606
Age (years)	0.996	0.992	1.001	0.095
Dominant Hand = Right-handed	0.955	0.871	1.046	0.317
Positive history of degenerative disc displacement	1.230	1.042	1.451	0.014
Affected hand numbness = both hands	1.469	1.375	1.570	< 0.001
Affected hand numbness = Dominant hand	1.412	1.302	1.531	< 0.001
Affected hand numbness = Non-dominant hand	1.628	1.382	1.918	< 0.001
Performs Liposuction regularly	1.020	0.958	1.086	0.535
Use of power assisted liposuction machine in your practice	1.031	0.968	1.098	0.345
Clinical Experience years > = 16 years	1.190	1.075	1.317	0.001

Dependent Variable: Carpal Tunnel Syndrome (CTSs) Score (11–55, Points). Estimator: Maximum Likelihood with Gama link

Table 7 Multivariable generalized linear regression analysis (Gamma) of plastic surgeons mean CTS functional status (FUNC) score

Parameter	Multivariable adjusted Risk Rate	95% CI for RR		
		Lower	Upper	*p*-value
(Intercept)	7.326	6.241	8.600	0.000
Gender = Male	0.956	0.896	1.020	0.172
Age (years).	1.004	1.001	1.008	0.012
Dominant Hand = Right	0.945	0.872	1.023	0.163
Affected hand numbness = both hands	1.068	1.006	1.133	0.030
Affected hand numbness = Dominant hand	1.138	1.060	1.221	< 0.001
Affected hand numbness = non-dominant hand	1.168	1.008	1.354	0.039
Performs Liposuction regularly	1.065	1.003	1.131	0.039
Use of power assisted liposuction machine in your practice = Yes	1.008	0.952	1.068	0.779
Positive history of Degenerative disc disease	1.440	1.241	1.670	< 0.001
Positive history of Neck pains	1.091	1.021	1.165	0.010
Training Level = Consultant/Specialist	0.866	0.801	0.936	< 0.001

Dependent Variable: Mean self-rated Carpal Tunnel Syndrome Functional status (FUNCs) Score (8–40 Points). Estimator: Maximum Likelihood with Gamma link

musculoskeletal disorders among surgeons has been referred to as "an impending epidemic," reflecting the occupational toll of modern surgical practice [15]. A previous systematic review reported a 9% prevalence of CTS among physicians, which is notably lower than the 43% rate of self-reported hand numbness, a key symptom assessed using the BCTQ in our study [16].

This discrepancy may be attributed to the focus of our research on plastic surgeons, a subgroup potentially at higher risk due to the fine, repetitive, and prolonged manual tasks required in their procedures. Moreover, differences in methodology, such as reliance on self-reported symptoms using BCTQ in our study versus physician-diagnosed CTS in the meta-analysis, may account for this variation.

Regional data provide a more comparable context. For instance, a study conducted in Makkah hospitals found that 53.5% of surgeons reported CTS symptoms, a figure slightly higher than our 43% prevalence [11]. The difference could reflect variations in surgical subspecialties, workload, or ergonomic practices. Similarly, the much higher prevalence of general musculoskeletal complaints (95.23%) among Saudi surgeons in another local study underscores the broader occupational strain faced by surgical staff in the region, although that study lacked specific focus on CTS [17]. In an international survey of 865 plastic surgeons across Norway, Canada, and the United States, 78.3% reported work-related musculoskeletal symptoms, particularly in the neck, shoulders, and back, highlighting the widespread burden of occupational strain within the specialty [18]. While that study did not isolate CTS, it emphasized contributing factors like prolonged surgery duration and physical exertion, which overlap with CTS pathophysiology.

Interestingly, our study aligns with the findings of a local study on dentists regarding risk factors, such as female gender and high BMI, although our focus on plastic surgeons highlights additional procedural risks, particularly liposuction [19]. The association between liposuction and elevated CTS symptom scores reinforces the hypothesis that procedures requiring sustained, repetitive hand motions increase CTS risk, a finding also echoed in studies of other high-repetition professions [20].

Consistent with earlier research, our study found that longer years of clinical experience and comorbid conditions such as degenerative disc disease were significantly associated with higher CTS scores [21, 22]. This supports the notion that cumulative occupational exposure and pre-existing musculoskeletal issues may exacerbate CTS risk. Additionally, the observed correlation between bilateral or dominant hand numbness and symptom severity is in line with previous literature that links numbness to clinical progression of CTS [23].

Based on these comparisons with the literature, the present study further examined specific risk factors contributing to CTS symptoms among plastic surgeons.

In determining the primary risk factors associated with CTS among plastic surgeons, our study reveals that surgeons with a history of degenerative disc disease report CTS symptom scores that are, on average, 23% higher than those of surgeons without such a history. In line with this finding, a previous study identified a link between musculoskeletal conditions and CTS, suggesting that degenerative disc disease may exacerbate CTS symptoms [21].

Furthermore, surgeons experiencing bilateral hand numbness or dominant hand numbness reported significantly greater CTS symptoms compared to those without hand numbness complaints. This finding is corroborated by earlier literature, which states that hand numbness correlates strongly with the severity of the condition [23].

Additionally, surgeons with 16 or more years of clinical experience reported a 19% higher mean self-rated CTS symptom score compared to those with fewer years of experience. This concurs with prior research, which demonstrated that longer years of experience could contribute to the development of CTS [22].

The present study found a significant association between liposuction procedures and increased CTS symptoms, as evidenced by higher mean CTS Functional Status (FUNC) scores in plastic surgeons performing liposuction. This finding aligns with previous research demonstrating a strong link between repetitive hand movements and the development of CTS [20]. Liposuction, with its demanding physical requirements involving sustained hand movements and forceful gripping, likely contributes to the repetitive strain experienced by plastic surgeons, increasing their risk of developing CTS symptoms. These findings underscore the importance of implementing ergonomic interventions and promoting healthy work practices, such as regular breaks, proper hand positioning, and the use of ergonomic tools, to alleviate the risk of CTS among plastic surgeons involved in liposuction procedures. A prospective study should evaluate long-term follow-up assessments among surgical physicians, and other studies should be designed as cohort studies to compare results.

The study faced several limitations. The research involved plastic surgeons where the overall count of plastic surgeons is limited in Saudi Arabia, and it did not include follow-up assessments. Additionally, the dependence on self-reported data regarding symptoms and diagnoses of CTS may result in inaccuracies due to recall bias. Furthermore, using an online questionnaire may impact the study sample's representativeness. Furthermore, this survey-based study did not allow for clinical diagnostic differentiation, even though participants were asked to report comorbidities like degenerative disc disease and neck pain that could mimic CTS. Therefore, it is impossible to rule out the possibility that symptoms could be misclassified as a result of overlapping conditions like peripheral neuropathy or cervical radiculopathy. Moreover, the observed prevalence of hand numbness (43%) in our sample is based on self-reported symptoms, without objective clinical testing or specification of the timing relative to work activities. This approach may capture transient or mild symptoms and potentially overestimates the true burden of work-related CTS. Future studies should differentiate between symptoms experienced during occupational tasks versus outside of work, and, where feasible, incorporate clinical assessments. Convenience sampling was used, which introduces a risk of selection bias and may limit the generalizability of the findings. Additionally, non-response bias may have influenced the findings, particularly the prevalence estimate. It is possible that individuals with more pronounced symptoms or stronger experiences related to CTS were more likely to participate in the study, potentially leading to an overestimation of the prevalence. Moreover, the geographic concentration of participants from Riyadh may further limit the generalizability of the findings to other regions in Saudi Arabia.

Conclusion

In conclusion, this study found a high prevalence of CTS symptoms among plastic surgeons in Saudi Arabia. Surgeons experiencing numbness in both dominant and non-dominant hands and those performing liposuction procedures more frequently were more likely to report CTS-related functional impairment. These findings underscore the occupational burden of CTS in surgical practice, highlighting the physical demands and repetitive motions inherent in plastic surgery as key risk factors. Early identification and the implementation of effective ergonomic and preventative strategies are crucial to reducing the impact of CTS on surgeons' performance and well-being. Future research should explore targeted interventions to mitigate CTS risk, assess ergonomic improvements in surgical environments, and evaluate the long-term outcomes of such measures on surgeons' quality of life and professional sustainability.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12891-025-08958-5.

Supplementary Material 1.

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Authors' contributions

Author Contributions: Conceptualization, K.A. and A.H.; methodology, A.Z. and K.A.; software, G.A.; validation, A.H., H.A. and K.A.; formal analysis, K.A.; investigation, H.A., K.A and E.A; resources, N.A.; data curation, E.A.; writing—original draft preparation, E.A., G.A, and N.A; writing—review and editing, K.A., A.H. and A.Z.; visualization, H.A.; supervision, A.H.; project administration, K.A and H.A.; funding acquisition, H.A.

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Data availability

Availability of data and materialData are available upon request from the corresponding author, Dr. Haya Alotaibi.

Declarations

Ethics approval and consent to participate

The study was deemed approved by the Institutional Review Board (IRB) at Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia. IRB Log Number: 24–0086. Informed consent was obtained from all subjects involved in the study. This study was conducted in accordance with the declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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