

Carpal tunnel syndrome in pregnancy – you need to ask!

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INTRODUCTION Carpal tunnel syndrome (CTS) is a common pregnancy complication. However, it is often overlooked by medical practitioners and patients alike. This study aimed to describe CTS in relation to pregnancy and assess how significant the disease was among pregnant women.

METHODS In a prospective cross-sectional study, 333 respondents were randomly selected from among pregnant women attending the primary care maternal health clinic in a university hospital. CTS was diagnosed clinically based on patient history and physical examination. The severity of CTS was assessed using the Boston Carpal Tunnel Questionnaire. Symptomatic respondents were asked whether they had mentioned their problems to doctors and received appropriate treatment.

RESULTS 82 (24.6%) pregnant women presented with symptoms of CTS, a majority of whom were ethnic Malays (Malay 87.8%; non-Malay 12.2%). The risk for developing CTS during the third trimester of pregnancy was found to be two-fold among Malay women compared to patients of other ethnicities (odds ratio 2.262; 95% confidence interval 1.10–4.46; $p = 0.024$). The commonest complaint was daytime numbness (76.8%). The severity of CTS among patients was predominantly mild (80.5%), and the symptoms were severe enough to affect hand function in approximately one-third (34.1%) of the group. However, only 25.6% of symptomatic patients mentioned their problems to their doctors, and of these, 9.5% received treatment.

CONCLUSION CTS is prevalent in the third trimester of pregnancy, especially among Malay women, in whom the risk of developing the syndrome is two-fold. Yet, this troublesome complication of pregnancy appears to be under-recognised, with most patients not being treated appropriately.

Keywords: Caesarean section, maternal morbidity, perinatal morbidity
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INTRODUCTION

Carpal tunnel syndrome (CTS) is a common problem in pregnancy. Various theories, including morphological factors,⁽¹⁾ hormonal changes⁽²⁾ and fluid retention,^(3,4) have been suggested as contributing factors of CTS in pregnancy. CTS occurs most frequently during the third trimester of pregnancy and a majority of women have symptoms that are severe enough to affect hand function and sleep,⁽⁵⁾ indicating that quality of life is significantly affected in these patients.

Despite the relationship between pregnancy and CTS being well established and well known among medical practitioners, untreated pregnant women with CTS symptoms are a common sight in obstetrics clinics. For instance, Voitk et al reported that only 46% of symptomatic women mentioned their hand symptoms to doctors, and of these, only 35% were treated.⁽⁵⁾ A retrospective study by Stolp-Smith et al found that less than 1% of pregnant women were clinically diagnosed with CTS, and that most attending physicians did not diagnose their patients with CTS if the symptoms were not severe or troublesome, or if the patients did not volunteer hand symptoms as their chief complaint.⁽⁶⁾

There is limited literature describing the proportion of pregnant women with CTS who have been disregarded by their

physicians and discharged home without any treatment. The purpose of this study was to highlight CTS in pregnant women, which often tends to be overlooked by attending physicians, thus resulting in under-diagnosis and under-treatment.

METHODS

A prospective cross-sectional study was carried out on randomly selected pregnant women attending routine antenatal checks at a primary care maternal health clinic in a university hospital from February 2011 to May 2011. Ethical approval was obtained from the institutional ethics committee prior to conducting the study. All pregnant women who were in the third trimester of pregnancy (≥ 28 weeks of amenorrhoea) and clinically diagnosed with CTS were included. Patients with diabetes mellitus, gestational diabetes mellitus, eclampsia, preeclampsia, thyroid disorders, arthropathies, trauma to the hand or wrist, and prior history of CTS (such as recurrence, symptoms before the third trimester of pregnancy or a CTS diagnosis before pregnancy) were excluded. Consent was obtained from patients before recruitment into the study.

Each respondent was interviewed initially and asked to fill out a questionnaire on demography, obstetrical history and risk factors of CTS with the assistance of trained interviewers. Patients

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Table 1. Clinical findings among patients with carpal tunnel syndrome (n = 82).

Finding	No. (%)
Symptom	
Pain during daytime	20 (24.4)
Pain at night	20 (24.4)
Numbness or tingling at night	59 (72.0)
Numbness or tingling during daytime	63 (76.8)
Awakened at night by pain	14 (17.1)
Awakened by numbness or tingling	27 (32.9)
Symptoms relieved by shaking of hands	43 (52.4)
Physical examination	
Muscle atrophy (thenar)	2 (2.4)
2PD (median and ulnar)	9 (11.0)
APB power	7 (8.5)
Provocative tests	
Durkan's test	37 (45.1)
Phalen's sign	40 (48.8)

2PD: two-point discrimination; APB: abductor pollicis brevis

who met the inclusion criteria were then screened for CTS using the six-item Carpal Tunnel Syndrome Symptoms Scale (CTS-6).⁽⁷⁾ The CTS-6 comprises symptoms such as pain, numbness/tingling, time when symptoms occur and interference with sleep. The scale was further refined by the introduction of an additional item – whether shaking of the hand relieved hand symptoms – that is often described in orthopaedic literature as a classical CTS symptom.

Respondents who also underwent a series of physical examinations to confirm the diagnosis of CTS were examined for thenar eminence wasting, movements of the wrist and fingers, sensation by two-point discrimination, power of the abductor pollicis brevis, and the Durkan's test and Phalen's sign. Patients were also examined for other polyneuropathies, such as higher, cervical and multiple compressions. These women were excluded from the study. Patients who were clinically diagnosed with CTS were required to answer the Boston Carpal Tunnel Questionnaire (BCTQ)⁽⁸⁾ to assess the severity of disease. This questionnaire was used, as some patients may be able to cope well functionally in spite of having severe symptoms. The questionnaire assesses disease severity in terms of two measures – symptom severity (SYMPT) and functional status (FUNCT). Respondents who had hand symptoms were further queried on whether they had mentioned the problems to their doctors and received any appropriate treatment.

Standard descriptive statistical methods were used to estimate the frequency (in percentage) of all qualitative variables. Continuous variables of skewed distribution (such as age, gravidity and parity) were expressed as median and interquartile range (IQR). The chi-square test, Fisher's exact test and Yates' continuity for correction were used to determine relationships among categorical variables (such as ethnicity, mentioned/not mentioned, treated/not treated, symptom severity, functional severity and diagnosis of CTS). The Mann-Whitney U test was used to determine the associations of the continuous variables of skewed distribution with the prevalence of CTS. The symptom and functional severity scores from the BCTQ were summed into

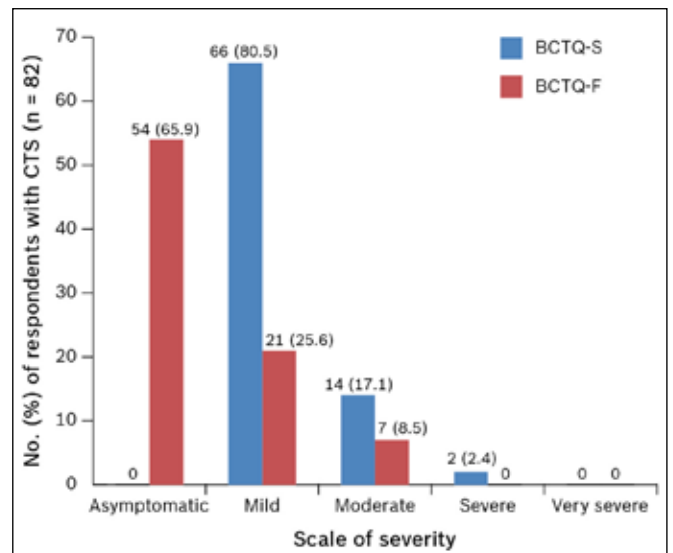


Fig. 1 Graph shows the symptom (BCTQ-S) and functionality (BCTQ-F) severity scores in respondents with carpal tunnel syndrome (CTS) based on the Boston Carpal Tunnel Questionnaire (BCTQ).

grouped totals as specified by Storey et al.⁽⁹⁾ The odds ratios (ORs) and 95% confidence intervals (95% CIs) were then calculated for associations that were found to be significant. A p-value < 0.05 was considered statistically significant. The Statistical Package for the Social Sciences for Windows (SPSS Inc, Chicago, IL, USA) was used to carry out the analyses. As no similar previous local studies could be found, the most up-to-date study available on the prevalence of CTS in pregnancy by Shaafi et al, which reported its incidence as 26.6%, was adapted for our use.⁽²⁾ A minimum sample size of 300 patients was required for our study.

RESULTS

A total of 333 women (age range 17–45 years) who satisfied the inclusion criteria were interviewed and examined for CTS. 263 (79.0%) women were Malay, while the remaining 70 (21.0%) patients were of other ethnicities such as Chinese, Indian and other minor races. Out of the 333 pregnant women, 139 (41.7%) respondents were primigravidae and 194 (58.3%) were multigravidae (G2 n = 88, 26.4%; G3 n = 49, 14.7%; G4 n = 38, 11.4%; G5 n = 16, 4.8%; G6 n = 1, 0.3%; G7 n = 2, 0.6%). 145 (43.5%) women were nulliparous and 188 (56.5%) were multiparous. CTS was diagnosed in 82 (24.6%) women. The median age of the respondents was 28 (IQR 27–32) years. The median gravidity was two (IQR 1–3) pregnancies and the median parity was one (IQR 0–2) childbirth. A majority of CTS respondents were Malays (n = 72, 87.8%), with only ten (12.2%) women of non-Malay ethnicity. The estimated risk of a Malay woman developing CTS in the third trimester of pregnancy was twice that of a non-Malay woman (OR 2.262, 95% CI 1.10–4.46; p = 0.024).

The most common complaint was numbness/tingling, particularly during the daytime (76.8%), while the least frequent symptom reported was pain, especially pain that awakened patients at night (17.1%) (Table 1). 52 (63.4%) respondents presented with bilateral hand symptoms, whereas 30 (36.6%)

Table II. Relationship between hand symptoms and symptom severity.

Symptom	Symptom severity [†]		Total no.	p-value (χ^2)	OR (95% CI)
	Mild	Moderate-to-severe			
Hand pain					
Positive	13 (52.0)	12 (48.0)	25	< 0.001* (16.067)	12.23 (3.39–44.16)
Negative	53 (93.0)	4 (7.0)	57		
Hand numbness					
Positive	65 (81.3)	15 (18.8)	80	0.843* (0.039)	0.23 (0.01–3.90)
Negative	1 (50.0)	1 (50.0)	2		
Awakened by symptoms (pain/numbness)					
Positive	13 (46.4)	15 (53.6)	28	< 0.001 (31.406)	61.15 (7.39–506.02)
Negative	53 (98.1)	1 (1.9)	54		

*p-value was derived using Yates' continuity for correction. [†] Data is presented as number (%).

χ^2 : chi-square; CI: confidence interval; OR: odds ratio

Table III. Relationship between hand symptoms and functional severity.

Symptom	Functionality [†]		Total no.	p-value (χ^2)	OR (95% CI)
	Affected	Unaffected			
Hand pain					
Positive	15 (60.0)	10 (40.0)	25	0.001 (10.691)	5.08 (1.85–13.96)
Negative	13 (22.8)	44 (77.2)	57		
Hand numbness					
Positive	27 (33.8)	53 (66.3)	80	1.000* (0.000)	0.51 (0.03–8.46)
Negative	1 (50.0)	1 (50.0)	2		
Awakened by symptoms (pain/numbness)					
Positive	18 (64.3)	10 (35.7)	28	< 0.001 (17.176)	7.92 (2.82–22.27)
Negative	10 (18.5)	44 (81.5)	54		

*p-value was derived using Yates' continuity for correction. [†] Data is presented as number (%).

χ^2 : chi-square; CI: confidence interval; OR: odds ratio

patients had symptoms in just one hand. Most women with CTS regarded the severity of their symptoms to be mild according to the BCTQ–Symptom Severity Scale, with only a few respondents who experienced severe symptoms. The performance of daily activities was mostly unaffected in our study population, as most respondents reported no difficulty in carrying out daily routines and chores (65.9%) (Fig. 1). We also found that hand pain and symptoms that awakened patients at night (such as pain/numbness) were associated with symptom severity and functional status in women with CTS (Tables II & III). Physical examination revealed that wasting of the thenar eminence was uncommon among respondents with CTS (n = 2, 2.4%), and only a few patients had decreased sensation over the median nerve distribution (n = 9, 11.0%). Power of the abductor pollicis brevis was also diminished in only a small portion of the symptomatic group (n = 7, 8.5%). Furthermore, results of both the Phalen's sign and Durkan's test were not consistent among patients with CTS (Table I).

Surprisingly, only a quarter of the respondents with CTS (n = 21, 25.6%) reported mentioning their discomfort to attending doctors/physicians. All of these patients were Malay. Respondents with moderate or severe symptoms were four times more likely to mention their problems to doctors (OR 4.08, 95% CI 1.02–7.92; p = 0.013), while individuals who had difficulty in performing daily activities were three times more likely to complain to their doctors (OR 2.84, 95% CI 1.29–12.91; p = 0.041). None of the affected patients had ever been diagnosed with CTS previously.

Table IV. Pattern of trivialisation among patients with carpal tunnel syndrome in the third trimester of pregnancy (n = 82).

Pattern	No. (%)
Patients who complained to the physician	
Received treatment	2 (2.4)
Did not receive treatment	19 (23.2)
Patients who did not complain to the physician	
	61 (74.4)

Among women who complained to their doctors, only two (9.5%) respondents received appropriate treatment (Table IV).

DISCUSSION

The prevalence of CTS in pregnancy has been reported to be as high as 62%⁽¹⁰⁾ and as low as 0.23%.⁽⁶⁾ Our findings were in agreement with those of a study by Voitk et al that showed that 25% of 1,000 postpartum patients had CTS hand symptoms during their third trimester of pregnancy.⁽⁵⁾ To the authors' knowledge, no previous study has clearly stated the actual prevalence of CTS during the third trimester of pregnancy alone. Our study also excluded all other associated risk factors of CTS, which has not been attempted previously as well. We found a significant association between ethnicity and the prevalence of CTS in our study population, with the likelihood of Malay women having CTS during the last trimester of pregnancy being twice that of women of other ethnicities. To the authors' knowledge, this is the first study that has described a relationship between ethnicity and CTS

in pregnant women. This finding has significant implications for health services planning and its implementation in a multiracial population.

We also found that maternal age ($p = 0.753$), number of pregnancies or gravidity ($p = 0.842$), and parity ($p = 0.940$) had no significant correlation with the development of CTS in pregnant women, which is consistent with other studies.^(5,10,11) However, unlike many studies, numbness and tingling sensation were prominent symptoms in our cohort of pregnant women with CTS. Pain was reported to be quite common among patients by other authors.^(6,11,12) We found that the incidence of numbness/tingling during daytime was slightly higher than at night among the women, which is at odds with the classical description of nocturnal paraesthesia in such patients in many orthopaedic textbooks. We were unable to make any comparisons with other similar studies, as previous reports did not specify the time when patients experienced numbness or tingling sensation. Similar to other reports,^(6,10,11) patients with bilateral symptoms of CTS outnumbered those with unilateral complaints in our study.

A majority of our patients with CTS regarded their symptoms to be mild. From a functional point of view, over half of our patients had no difficulty in performing daily activities. This may be because the symptoms in our cohort were not severe enough to significantly impact the patients' daily lives. An assessment of the relationship between clinical features and the severity of CTS among our respondents revealed that hand pain and symptoms that awakened patients from sleep were more likely to occur in women who had moderate-to-severe symptoms as well as functional impairment. It is likely that these two clinical features are reliable indicators of disease severity in patients with CTS.

Most women in our group neglected their symptoms and failed to highlight their problems to attending doctors during routine check-ups, as they regarded these symptoms to be insignificant and completely normal during pregnancy. Although the authors perceived subjectively that the awareness of CTS among patients was related to the level of their education, we were unable to obtain objective data to support the impression. Pregnant women were more likely to volunteer hand symptoms to their doctors if the symptoms were moderate or severe and/or functional impairment was present. This might be reflective of the tendency among patients to only mention their problems to physicians when the symptoms were more severe and at later stages of the disease. It may also in part be attributed to the disposition of attending clinicians to trivialise patient complaints if the symptoms are mild and/or if the patient is functionally unaffected. Similar conclusions were also arrived at by a previous study.⁽⁶⁾ Overt dependence on provocative tests that have a low sensitivity on the part of physicians for CTS diagnosis may be another possible explanation for the generally high number of pregnant women with undiagnosed CTS. It is widely accepted and recognised that CTS is a syndrome whose accurate diagnosis requires a combination of both signs and symptoms.⁽¹³⁾

Interestingly, only two (9.5%) women among the 21 respondents who mentioned their symptoms to doctors in our study population received any treatment. These two women were prescribed painkillers and vitamins, and advised to drink plenty of milk, which is not a proper treatment for CTS. Unlike our findings, Voitek et al found that a higher percentage of patients who complained to their physicians of CTS symptoms received advice and treatment (35%) in their study.⁽⁵⁾ These findings might suggest that doctors generally fail to recognise the importance of treating CTS at the very early stages.

In the present study, the motor and sensory physical findings were negative in a majority of symptomatic respondents. This may be because the women typically presented with mild symptoms and were, most probably, still in the early stages of the disease when diagnosed. Also, motor and sensory deficits are usually seen only in patients who have severe CTS. Only the Phalen's sign and the pressure provocation test (Durkan's test) were used as provocative tests in our study. The Tinel's sign was not included in this study, as it was deemed the least accurate among several such tests by Mondelli et al and also known to be present in polyneuropathies besides CTS.⁽¹⁴⁾ These authors also concluded that provocative tests (including Phalen's sign and Durkan's test) alone were insufficient to be diagnostically precise in patients with CTS. This may be the reason why the proportion of women with CTS who had positive provocative tests was less than 50% in our study. Nonetheless, we did find that the Phalen's sign and Durkan's test served as a useful guide and enhanced the accuracy of CTS diagnosis in our population.

This study was not without limitations. One shortcoming was perhaps the questionnaire selected for use in the study, as BCTQ – being a subjective and patient-oriented questionnaire – is associated with the possibility of patients overestimating or underestimating the severity of their disease. For instance, the perception of the intensity of symptoms, such as pain, may vary from individual to individual. A skewed patient population was another weakness, as Malays form the majority of the patient populations being served in our country. The possibility of our results being unduly affected by a skewed ethnic distribution thus cannot be disregarded.

In conclusion, our results demonstrate that CTS is prevalent among women in the third trimester of pregnancy, and the risk of developing the syndrome is two-fold among Malay women when compared to patients of other ethnicities. Despite CTS being widespread in pregnant women, this troublesome complication of pregnancy is often trivialised, with most patients not receiving appropriate treatment. We suggest that doctors attending to pregnant women keep an eye out for such patients, and treat the patient as a whole by attending to all aspects of their health and not merely their obstetric needs.

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