

Carpal Tunnel Syndrome in Pregnant Women: A Cross Sectional Study

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Abstract

Background: Carpal tunnel syndrome (CTS) is the most prevalent compression neuropathy of the median nerve, which can appear or exaggerate during pregnancy and sometimes needs surgical procedure to relieve its compression. When diagnosed early, it leads to simpler and less dangerous treatments.

Objective: To find out the prevalence of carpal tunnel syndrome in pregnant women and to find out functional limitation in affected pregnant women with carpal tunnel syndrome.

Study type, settings & duration: A cross sectional study was conducted at different hospitals of Punjab, Pakistan from December 2019 to May 2020.

Methodology: The clinical tests and physical examination for 200 pregnant women were done by using non-probability convenient sampling technique. Primigravida and multigravida women in 1st, 2nd and 3rd trimester of pregnancy were included. Fisher's Exact test was used to determine the associations and Spearman correlation between wrist pain and nature of pain was done.

Results: Total pregnant women enrolled were 200. The mean age of the patients was 27.65±4.05 years. Frequency of CTS pain reported in 1st, 2nd and 3rd trimesters was 22.5%, 34.6% and 47.0%, respectively. Out of 200 patients, 80 (40%) were reported CTS. A total of 55 patients in 3rd trimester with CTS, 38 (69.1%) patients were multigravida and 17 (30.9%) patients were primigravida. Correlation coefficient with 95% CI, relationship between side of wrist pain, nature of pain and parity status was significantly (p -value = 0.001, 0.015 and 0.010, respectively). The result revealed that carpal tunnel syndrome is prevalent in pregnant women with classical sign and symptoms of wrist pain with alteration of sensation and functional limitation was 40%.

Conclusion: This study concluded that carpal tunnel syndrome is more common in multigravida pregnant women in third trimester of pregnancy with alteration of sensation and functional limitation occurs due to this syndrome. Pregnant women should take care of their household activities limited to the physiological movements instead of involving single joint movement at wrist.

Key words: Carpal tunnel syndrome, pregnant women, multigravida, third trimester, wrist pain, alteration of sensation, functional limitation.

Introduction

Carpal Tunnel Syndrome is a trap of median nerve, this nerve is trampled between the longitudinal carpal ligament of wrist, hand muscles

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Authors Contribution

MW & MS conceptualized the project. NA & AN did the data collection. MS & MH did the literature search. NA & MR performed the statistical analysis. Drafting, revision and writing of manuscript were done by MW, NA, AN & MR.

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and transverse carpal ligament that is perpendicular, passing across the wrist.¹ It is the most prevalent mononeuropathy and can be caused by tendinitis, synovial thickening of ligaments and tendon sheaths. Neuropathy compression of the median nerve, which can appear or exaggerate during pregnancy and sometimes needs surgical procedure to relieve its compression. When diagnosed early, it leads to simpler and less risky treatments.²

With regard to the causes of CTS, there is a systematic link between increased pressure in the carpal tunnel and the onset of clinical symptoms.³ The etiology of CTS in pregnancy, however, is still idiopathic. Peripheral edema seen in about 80% of pregnant women, especially severe in the third trimester of pregnancy, can be one of the determining factors. This edema may be caused by

a decrease in venous return associated with hormonal changes that favor fluid retention.⁴ When edema is in the wrist, it can shorten or reduce the width of the carpal tunnel, compressing the nerve which passes through it.⁵ Another possible cause may be secretion of relaxin, which can cause relaxation of the carpal ligament, leading to its fattening and, consequently, to median nerve compression.⁶

CTS is a very common complication found in pregnancy, which is reported as high as 62% in pregnant females. The functioning of median nerve is compromised in almost all pregnant females especially during the third trimester of pregnancy, even in the absence of symptoms. Following delivery, most of the symptoms of carpal tunnel syndrome subside, however majority may still feel some symptoms up to at least 3 years after delivery and have to continue to wear the immobilizers.⁷ The most frequently encountered hand disorders in pregnancy are carpal tunnel syndrome and de Quervain's tenosynovitis.⁸ Fluid retention results in edemas, hormonal variations, nerve hypersensitivity and change in glucose level are factors that leads the pregnant women towards the development of symptoms.⁹

A cross-sectional descriptive analytic study reported that, carpal tunnel syndrome was higher in pregnant women (3.4%) than in non-pregnant women (2.3%). The prevalence of carpal tunnel syndrome in pregnant women was 2.7%. The study also concluded that the conservative management was more effective and safer in pregnant women.¹⁰ A local study reported that, the prevalence of carpal tunnel syndrome in pregnant women was 34%. The study also reported that multigravida women showed more occurrence than that of primagravid. On numeric pain rating scale, most patients reported severe pain.¹¹

This study was conducted with the objective to find out prevalence of carpal tunnel syndrome in pregnant women in all trimesters, with functional limitation at unilateral or bilateral wrist joints.

Methodology

It was a cross sectional study. The duration of study was 06 months from December 2019 to end of May 2020. It was conducted at Mian Maula Bakhsh Hospital, Sargodha, DHQ Hospital, Jhang, City Hospital, Jhang, Dar-ul-Barkat Medicare Hospital, Sheikhpura, Nawaz Sharif Children Complex, Sheikhpura, Military Hospital, Rawalpindi, Shifa International Hospital, Islamabad. A sample of 200 (sample size was calculated by WHO sample size calculator with 95% CI, and desired precision rate was 15.5%), volunteer

pregnant women with carpal tunnel syndrome were selected. Non-probability convenient sampling was used to include the females who were primagravida and multigravida pregnant women in 1st, 2nd and 3rd trimester. However, with high-risk patients e.g., with history of gestational diabetes, diabetic neuropathy, hypertension and hyperthyroidism were excluded.

After informed written consent, data was collected through a self-structured close ended questionnaires and clinical tests as well as demographic details. The validity and reliability of questionnaire was established by Ablove RH and TS Ablove.⁷ Total 18 questions were asked from the participants of the study (selection of participants were based on inclusion criteria of the study). The questionnaire was distributed in government and private hospitals of Punjab and data was collected on the same day. Questions were asked related to the presence of pain at wrist mostly during at night and the nature of pain (sharp, dull and radiating), swelling, alteration of sensations and any functional limitation if present was the focus. Pregnant women were free to choose the best option. Two clinical tests were utilized for evaluation.

1. Phalen's maneuver: in this test, the patient was asked to allow the wrist to do maximum flexion and they are asked to maintain this position continuously for 60 seconds. A response was considered positive if sensation of tingling was found over the distribution of median nerve.¹²
2. Tinel's sign: A response was considered positive if sensation of tingling occurred in the distribution of median nerve over the hand after tapping the median nerve at wrist in extension.¹³

Carpal tunnel syndrome diagnosed by pain, alteration of sensation, clinical tests and functional limitations of wrist joint.¹ Confirmation of any three of the above stated symptoms declare the carpal tunnel syndrome in pregnant women.

SPSS statistical software version 21 was used to analyze the data. Distributions of frequency and percentages were utilized for expressive reasons. Fisher's Exact Test was used for associations and Spearman correlation between categorical variables.

The Ethical approval was obtained from ethical review committee of Riphah College of Rehabilitation and Allied Health Sciences, Riphah International University, Lahore.

Results

The total numbers of patients were 200. The mean age of the patients was 27.65±4.05 years. Of the total 15.5% of first trimester, 26% of

second trimester and 58.5% were in third trimester and mean $\pm$ SD were calculated as 24.77 $\pm$ 2.19, 27.44 $\pm$ 5.09 and 30.74 $\pm$ 4.86 respectively. Out of 200 pregnant women, 71.5% were house wives, 11.5% teachers, 4.5% computer operators, 4.5% doctors, 2% receptionist and 6% of others occupation. The association between occupation of the patients with pain in trimesters was significant ($p=0.001$).

Table 1: Pain in trimesters. (n=200)

Trimesters	N (Total Number of patients)	Frequencies (Number of patients with pain)	%
1 st Trimester	31	7	22.58
2 nd Trimester	52	18	34.62
3 rd Trimester	117	55	47.00

Among 200 pregnant women, 80 (40%) were reported with CTS pain (Table-1). Pain in 1st, 2nd and 3rd trimesters, 7, 18 and 55 pregnant women were reported respectively. We studied side of wrist pain, nature of pain and parity status of all pregnant women. Fisher's Exact Test values, 7.02, 7.15, 0.28 and p -value 0.001 respectively (Table-2). Spearman's rho (r test) was used for correlation between previous parameters to measure the strength of the relationship (Table-3). We studied

other parameters like; swelling, alteration of sensation, history of CTS, previous physiotherapy treatment done, trauma, family history, functional limitations and clinical tests. Frequencies and percentages are given in Table-4.

The above table showed Fisher's Exact test values for association between side of wrist pain, nature of pain and parity status of pregnant women. This non-parametric test was used for determine the exact p -value for statistical measure of significance. In 3rd trimester, the parity status of patients, total number of patients were 117. Multigravida and primagravida were 78 and 39 respectively. In parity status of pregnant women, in 3rd trimester 55 patients were reported CTS. Out of 55 patients with CTS, 38 (69.1%) patients were multigravida and 17 (30.9%) patients were primagravida.

Spearman's rho (r test) for correlation coefficient and p -value showed the strength of the relationship between side of wrist pain with nature of pain and trimesters ($p=0.001$ & 0.015) respectively. Similarly, relationship between nature of pain (sharp, dull and radiating) with side of wrist pain and trimesters ($p=0.001$ & 0.010) respectively. The relationship between trimesters with side of wrist pain and nature of pain was ($p=0.015$ & 0.010) respectively.

Table 2: Association between side of wrist pain, nature of pain and parity status. (n=200)

		Side of Wrist Pain				Total	Fisher's Exact Test value	Exact Sig. (2-sided)
		Bilateral	Left	Right	No			
Trimesters	1st Trimester	4	2	1	24	31	7.02	.001
	2nd Trimester	9	5	4	34	52		
	3rd Trimester	29	11	15	62	117		
Total		42	18	20	120	200		
		Nature of Pain				Total	Fisher's Exact Test value	Exact Sig. (2-sided)
		Sharp	Dull	Radiating	No			
Trimesters	1st Trimester	1	4	2	24	31	7.15	.001
	2nd Trimester	2	7	9	34	52		
	3rd Trimester	9	24	22	62	117		
Total		12	35	33	120	200		
		Parity Status		Total	Fisher's Exact Test value	Exact Sig. (2-sided)		
		Multigravida	Primagravida					
Trimesters	1st Trimester	20	11	31	0.28	.001		
	2nd Trimester	32	20	52				
	3rd Trimester	78	39	117				
Total		130	70	200				

Table 3: Correlation between side of wrist pain, nature of pain and parity status. (n=200)

		Side of Wrist Pain	Nature of Pain	Trimesters
Spearman's rho	Side of Wrist Pain	Correlation Coefficient	1.00	-.172
		Sig. (2-tailed)	.001	.015
	Nature of Pain	Correlation Coefficient	.987	-.182
		Sig. (2-tailed)	.001	.010
	Trimesters	Correlation Coefficient	-.172	1.00
		Sig. (2-tailed)	.015	.010

Table 4: Frequencies and percentages of all variables.

Variables		Frequency	Percentage
Swelling	Yes	36	18.0
	No	164	82.0
Alteration of sensations	Yes	80	40.0
	No	120	60.0
History of CTS	Yes	42	21.0
	No	158	79.0
Physiotherapy Taken	Yes	15	7.5
	No	185	92.5
Trauma	Yes	12	6.0
	No	188	94.0
Family History	Positive	23	11.5
	Negative	177	88.5
Functional limitations	Yes	79	39.5
	No	121	60.5
Clinical Tests	Positive	80	40.0
	Negative	120	60.0

DISCUSSION

The results of this study showed that, the prevalence of carpal tunnel syndrome in pregnant women was 40%. Parity status, out of 200 pregnant women, 65% were multigravida and 35% were primagravida. The nature of pain and side of wrist pain was 47% calculated in third trimesters. According to side carpal tunnel syndrome was more common in bilateral wrists i.e. 21%. Functional limitation was 39% in pregnant women suffering from carpal tunnel syndrome.

In a local study conducted by Bukhari SRI, et al,¹¹ they reported prevalence of carpal tunnel syndrome in pregnant women was 34%, whereas in our study the prevalence of CTS was 40%. Bukhari SRI, et al., also reported CTS in multigravida women 72.8% showed more occurrence than that of primagravid, which was 27.2%. Whereas in our study multigravida patients had CTS 69.1% and in primagravida 30.9% patients had CTS.

According to a research conducted by Ablove R.H.,⁷ the carpal tunnel syndrome is a commonly found problem in pregnancy, with a high prevalence of 62%.

Another study was conducted in Isfahan University of Medical Sciences, Iran. It was found that 19% pregnant women had Carpal Tunnel Syndrome.² A research conducted in the Gynecological and Obstetrical University Hospital in Poznan in which 32.6% of participants reported that at least one CTS symptom during pregnancy became prominent and 22.4% participants had similar symptoms in previous pregnancies.¹⁴ Another study was conducted in Department of Physical Medicine and Rehabilitation, School of Medicine, Iran. Among the studied pregnant women, 19% had CTS, out of whom 47.5% were bilateral

and 26.3% had severe CTS.² In 2012, Orthopedic and Traumatology Department, University Kebangsaan Malaysia Medical Centre, Malaysia the results were 24.6% pregnant women presented with symptoms of CTS.¹⁵

A study from Yasouj, Iran showed that the prevalence of Carpel Tunnel Syndrome in all women was 2.7%. Overall, 51 pregnant women had CTS that 59.4% had mild, 18.8 % had moderate and 21.9% had severe.¹⁰

A recent study conducted by de Oliveira GA, et al.⁶ reported the prevalence of CTS in pregnant women was 23.03%. In relation to the severity of symptoms, over 44% of the participants presented indicative signs and symptoms of CTS referred the early third trimester of pregnancy. Functional impairment was 48% reported in their study. Whereas, in our study onset of pain was 47% in third trimester and functional impairment was 39%. Previous studies' results pointing to CTS symptoms appearing more frequently during the third trimester of pregnancy,^{16,17} which supports the findings of current study that CTS is more prevalent in third trimester.

It was concluded that carpal tunnel syndrome was directly related to pregnancy due to hormonal changes. Moreover, parity status, trimester, occupation, site of wrist pain with functional limitation were the factors for symptoms to develop. Findings of current research demonstrated that frequency of carpal tunnel syndrome among pregnant woman was more common in third trimester in multigravida women with bilateral involvement of wrist and hands.

It is recommended for future study to inculcate the nature of job of working women and household activities of pregnant women to be clearer about the causes of CTS.

Conflict of interest: None declared.

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