Original Article

ASSESSMENT OF CARPAL TUNNEL SEVERITY IN THIRD-TRIMESTER PREGNANCY USING THE BOSTON CARPAL TUNNEL QUESTIONNAIRE (BCTQ) AT JINNAH HOSPITAL, LAHORE

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ABSTRACT:

Background: Carpal Tunnel Syndrome (CTS) is the entrapment of the median nerve at the level of wrist causing symptomatic neuropathy. The most typical symptoms are numbness and tingling in the thumb, index, middle, and radial half of the ring finger. Other common manifestations include burning dysesthesia wrist pain as well as the loss of grip strength and dexterity. Objective of this study was **t**o determine the severity of carpal tunnel syndrome in third trimester of pregnancy with using the Boston carpal tunnel syndrome questionnaire (BCTSQ) in Gynecology and Obstetrics outdoor of Jinnah Hospital Lahore.

Material and Methods: In this cross-sectional observational study,87 subjects were included in study by Non-Probability Convenience sampling technique. Boston carpal tunnel syndrome questionnaire (BCTSQ) was used to evaluate subjects to detect carpal tunnel syndrome severity. Data was analyzed using SPSS version 21.

Results: As per Boston Carpal Tunnel Symptom Severity Scale (BCTQ-SSS), from the total of 87 people who answered the survey, 18 (20.7%) reported with slight symptoms, 44 (50.6%) moderate ones, 22 (25.3%) severe ones, and 3 (3.4%) very severe ones.

According to Boston Carpal Tunnel Functional Status Scale (BCTQ-FSS), we took the same group of 87 respondents, 39 (44.8%) reported with slight functional impairment, 30 (34.5%) moderate, 14 (16.1%) severe, and 4 (4.6%) very severe.

Conclusion: This study concluded that third-trimester pregnant women generally experience mild functional impairment and moderate symptom severity of carpel tunnel syndrome.

Keywords: Boston carpal tunnel Functional status scale, Boston carpal tunnel symptom severity scale, Carpal tunnel syndrome

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INTRODUCTION

Carpal Tunnel Syndrome (CTS) results in compressive neuropathy when the median nerve gets entrapped at the wrist, consequently causing the hand and fingers to have sensory and motor symptoms.[1] According to the American Academy of Orthopedic Surgeons, CTS is the entrapment of the median nerve at the wrist, which leads to symptomatic neuropathy.[2,3]The most common manifestations of the disease are numbness, tingling, and weakness in the thumb, index finger, middle finger, and the radial half of the ring finger. The disease is very common in women, especially during pregnancy when there are hormonal, vascular, and mechanical changes that make the nerve more susceptible to being compressed.[4] The incidence of CTS among pregnant women is very different, ranging from 2% to 62%, and

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this is due to the varying characteristics of the study participants and the diagnostic methods used.[5] The majority of cases occur in the third trimester due to swelling of the body tissues, general edema, and increased pressure inside the wrist area. For the pregnancy period, CTS is a contributing factor to severe pain and discomfort, decreased physical ability, and a lower quality of life. Therefore, its evaluation and treatment are a significant concern in obstetrics.[4, 6] Various researchers have explored the clinical symptoms and underlying risk factors of CTS during pregnancy.[7] The recent developments bring to light the influence of hormonal fluctuations, gestational diabetes, obesity, and body mass index in the process. According to Gahlot et al, women's suffering from higher fluid retention and metabolic changes experienced it more.[8] Dias et al, pointed out gestational diabetes and maternal age to be the non-modifiable risk factors,[9] whereas Elmoniem et al, showed that the educational program had a positive impact on the degree of symptoms and functional condition of pregnant women suffering from it.[10] The (BCTQ) Boston Carpal Tunnel Questionnaire, which comprises the Symptom Severity Scale and Functional Status Scale, is still one of the most validated and reproducible patient-centered tools for assessing the severity of CTS and evaluating treatment outcomes. Although the number of studies from different countries is increasing, South Asia is still not well represented in terms of literature, and there is a lack of local epidemiological data.[10] Carpal tunnel syndrome (CTS) during pregnancy is a well-known and widely recognized condition, yet there is still not enough information regarding its clinical profile and severity in Pakistani women. The severity of pregnancy-related carpal tunnel syndrome (PRCTS) has not been investigated in published studies that utilized standardized techniques, such as the BCTQ.[4, 11] Grasping the level of functional disruption and symptom burden in third-trimester women would support improved screening, early intervention, and postpartum management. Given the limited local data, particularly from Pakistan, this study aimed to fill the gap by evaluating the severity of carpal tunnel syndrome using the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) among pregnant women in their third trimester visiting the Gynecology and Obstetrics Outpatient Department at Jinnah Hospital, Lahore.

MATERIAL AND METHODS

The current research was a cross-sectional observational study done at the Gynecology and Obstetrics Outpatient Department of Jinnah Hospital, Lahore, for six months after getting the research synopsis approved. Ethical review board (ERB) of Allama Iqbal Medical College/Jinnah Hospital Approved the study with reference no. 189/27/01/2022/S1 ERB.

The study group had only third-trimester pregnant women who were diagnosed with carpal tunnel syndrome (CTS). Eighty-seven participants were recruited using a non-probability convenience sampling technique. Women were added to the study if they were in their third trimester and passed the CTS diagnosis criteria by the Carpal Tunnel Syndrome-6 (CTS-6) scale. The study did not include participants who had other neurological, metabolic, or musculoskeletal disorders, such as cervical radiculopathy, gout, thyroid disease, hypertension, gestational diabetes, or any previous wrist trauma. As part of the data collection process, medical history was taken as per guidelines and questionnaires were not only structured but also standardized. First, the diagnosis of CTS was confirmed using the CTS-6 diagnostic tool that evaluates the median nerve distribution of symptoms, nocturnal numbness, thenar muscle atrophy, and clinical tests such as Phalen's, Tinel's, and two-point discrimination. Afterward, patients diagnosed with carpal tunnel syndrome were subjected to the BCTQ test for the evaluation of symptom severity and functional impairment.[12] There are two components of the BCTQ test: The Symptom Severity Scale (containing 11 items) and the Functional Status Scale (consisting of 8 items). Each item was rated using a 5-point

Likert scale where the highest score indicated the most severe symptom or greatest functional limitation. The data were collected through direct interviews conducted manually and recorded on pre-designed proformas.

All actions were taken following informed consent, a promise of participant anonymity, and the observance of ethical norms during conversations with the participants. SPSS version 21 was utilized to perform the data analysis. The numerical variables like age, symptom severity, and functional scores were presented in terms of mean ± SD and range, while the categorical variables such as the number of births and severity grades were delineated in terms of counts and percentages. The chi-square test was used to evaluate the associations among the categorical variables, and t-tests or ANOVA was applied to discover discrepancies in the mean scores when suitable. A p-value of less than 0.05 was regarded as statistically significant.

RESULTS

The research comprised 87 expectant mothers in their third trimester who had been diagnosed with carpal tunnel syndrome (CTS). The participants' average age was 26.16 ± 4.47 years, weight was 66.97 ± 12.82 kg, and height was 60.97 ± 6.95 inches. The average gestational age was 33.54 ± 3.08 weeks, with an overall parity of 2.45 ± 1.58. The CTS-6 evaluation revealed that every participant (100%) had provoked symptoms in the distribution area of the median nerve, while 94.3% of them stated having numbness during the night. Moreover, therapeutic hand exercise practice, among others, reported that 65.5% of the population had muscle wasting in the thenar area, the positivity rate for Phalen's test was 77%, Tinel's sign was identified in 43.7%, and 58.6% of the participants were indicated to have lost the ability to differentiate between two points. The average CTS-6 score obtained was 18.01 with a standard deviation of 3.24, while the minimum and maximum scores were 12 and 26, respectively. Figure no. 1 showing detailed result of CTS-6 evaluation.

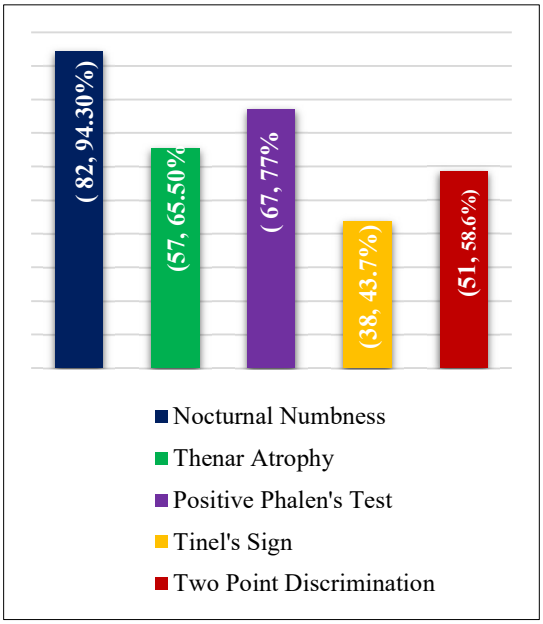

Figure no. 1: Carpel Tunnel Syndrome-6 Evaluation

The average result for the Symptom Severity Scale (SSS) was 29.06 ± 7.81, while the Functional Status Scale (FSS) score was 18.69 ± 6.81. According to BCTQ classification:

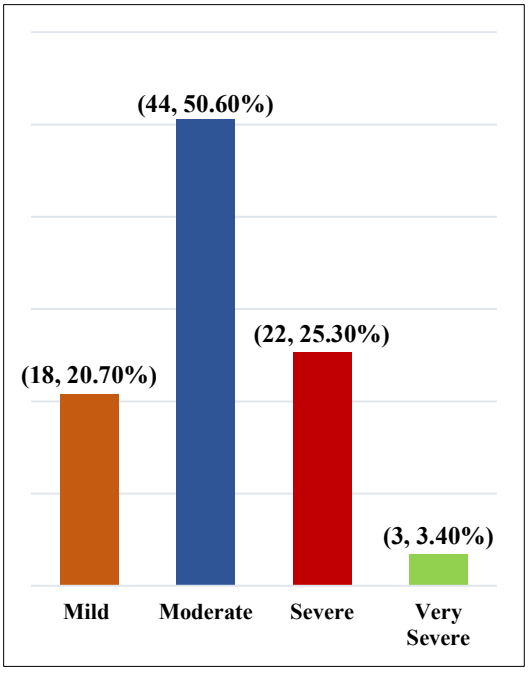

Figure no. 2: BCTQ Symptom Severity and Functional impairment distribution

There was a significant link between BMI and the Functional Status Scale (p = 0.028), while no significant connection between BMI and the Symptom Severity Scale (p = 0.221) was noticed. The distribution of BMI among subjects with severe functional impairment was as follows: 50% were obese, 28.6% were overweight, and 21.4% had normal BMI. On the other hand, 75% of very severe functional impairment patients were obese.

Table no. 1: Association between BMI and BCTQ Scores

SEVERITY	BMI			Total	P value
	Normal BMI (18 - 24.9)	Over weight BMI (25 -29.9)	Obese BMI > 30)		
Functional status scale (8 items)					
Mild Score (9 - 16)	20	9	10	39	0.028
	51.3%	23.1%	25.6%	100.0%	
Moderate Score (17 - 24)	6	14	10	30	
	20.0%	46.7%	33.3%	100.0%	
Severe Score (25 - 32)	3	4	7	14	
	21.4%	28.6%	50.0%	100.0%	
Very Severe (33 – 40)	0	1	3	4	
	0.0%	25.0%	75.0%	100.0%	
Symptom severity scale (11 items)					
Mild Score (12 - 22)	10	4	4	18	0.221
	55.6%	22.2%	22.2%	100.0%	
Moderate Score (23 - 24)	14	13	17	44	
	31.8%	29.5%	38.6%	100.0%	
Severe Score (34 - 44)	5	10	7	22	
	22.7%	45.5%	31.8%	100.0%	
Very Severe (45 - 55)	0	1	2	3	
	0.0%	33.3%	66.7%	100.0%	

Age and functional status did not show any statistically significant association (p = 0.476) and the same applied for the case of symptom severity (p = 0.559). Nonetheless, a considerable proportion of women with severe and very severe CTS were under 30 years old.

Table no. 2: Association between Age and BCTQ Scores

SEVERITY	Age		Total	P value
	< 30 Year	> 30 Year		
Functional status scale (8 items)				
Mild Score (9 - 16)	31	8	39	0.476
	79.5%	20.5%	100.0%	
Moderate Score (17 - 24)	26	4	30	
	86.7%	13.3%	100.0%	
Severe Score (25 - 32)	10	4	14	
	71.4%	28.6%	100.0%	
Very Severe Score (33 – 40)	4	0	4	
	100.0%	0.0%	100.0%	
Symptom severity scale (11 items)				
Mild Score (12 - 22)	13	5	18	0.559
	72.2%	27.8%	100.0%	
Moderate Score (23 - 24)	36	8	44	
	81.8%	18.2%	100.0%	
Severe Score (34 - 44)	19	3	22	
	86.4%	13.6%	100.0%	
Very Severe (45 - 55)	3	0	3	
	100.0%	0.0%	100.0%	

DISCUSSSION

This research determined the degree of carpal tunnel syndrome (CTS) in pregnant women who were in the third trimester while visiting the Gynecology and Obstetrics Department of Jinnah Hospital, Lahore. The third trimester was selected as the time when multiple recent studies reported that CTS was mostly caused by hormonal changes, the increase in fluid retention, and the compression of the wrist.[6] The Boston Carpal Tunnel Questionnaire (BCTQ), a reliable and patient-centered tool,

was employed to measure impact and function. Out of 87 participants, 39 (44.8 %) were found to have mild functional impairment, and 44 (50.6 %) had moderate symptom severity, suggesting that the majority of the cases were non-severe but still clinically relevant.[6]

The results of the current investigation are in agreement with a number of studies that have been published over the past ten years. As a matter of fact, Meems et al, noted that the majority of women experiencing pregnancy-related carpal tunnel syndrome (CTS) exhibited mild-to-moderate symptoms, which did not greatly affect their daily activities. [13]

In a more recent study, Padua, Coraci et al, have indicated that the swelling and nerve compression which is characteristic of late pregnancy is related to the median nerve's electrophysiological changes but usually does not lead to severe dysfunction.[14] On the other hand, Elmoniem, Abdelhakm et al, showed that the educational interventions had a great effect on the already reduced symptom severity and increased functional outcomes in the case of the affected women, thus pointing out the need for antenatal awareness.[10, 15] For the purpose of diagnosis, the CTS-6 clinical assessment was applied in this research, which included symptoms located in the distribution of the median nerve, thenar muscle wasting, and also the Phalen's and Tinel's tests. The current literature still supports this method as a quick and non-invasive screening technique.[6] These findings add to the already substantial global evidence that pregnancy-related CTS is a frequent occurrence, but its severity is usually mild to moderate. By not considering other conditions like diabetes and thyroid disease in this group, it was easier to find idiopathic CTS during pregnancy. However, the pain from even moderate CTS can be very bothersome and affect the women's performance during the last months of their pregnancy. Early ergonomic education, splinting, and conservative management may improve maternal comfort and prevent postpartum complications. This research presents the case-specific data from Pakistan which is in line with the global trends predicted around 2015 and 2025, and it also indicates the necessity for early detection and prevention of pregnancy-related carpal tunnel syndrome.

CONCLUSION

The research ultimately states that the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) is a reliable and convenient method for the assessment of carpal tunnel syndrome (CTS) in pregnant women. The majority of the third-trimester women showed only slight functional impairment and moderate symptoms severity, which proves that CTS during this period is very common but hardly if ever, painful. No relationship was found between age and symptom severity or function, but higher BMI was associated with more limitation in function. This study points out the potential of BCTQ in detecting pregnancy-related CTS and at the same time underlines the necessity of early diagnosis and supportive care in order to enhance maternal comfort and hand function in the last trimester of pregnancy.

LIMITATIONS

This research is not without limitations. Generalization might be an issue because of the small sample size and the fact that the data were gathered in one place. The participants were only pregnant women in their third trimester suffering from idiopathic carpal tunnel syndrome, thus excluding those with other neurological or metabolic disorders. The study only assessed severity, not prevalence or treatment outcomes. Due to time and resource limitations, data collection had to be done in a short period, and some participants' limited knowledge of CTS might have impacted the accuracy of their responses. As a result, the findings apply only to the third-trimester pregnant women at Jinnah Hospital in Lahore and should be taken with caution.

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CONFLICT OF INTEREST

None

AUTHOR'S CONTRIBUTIONS

MS: Principal Investigator, Data Collection
AS: Data Analysis, Initial Results Write up
SZ: Final Article Write up
RA: Critical Review, Rewriting and Results Modification
UA: Data Collection, writing and review

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