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PREVALENCE AND IMPACT OF CARPAL TUNNEL SYNDROME ON MULTIGRAVIDA PREGNANT WOMEN

Rahim Shah[1], Mohammad Imran Younus[2], [3] Khalid Aslam [4]Aliya Ayub, [5]Husna Nisar, Kalsoom Habib Khattak[6*]

[1]Orthopedic Department, Timergara Teaching Hospital, Dir Lower, KPK
[2]Department of Public Health, Health Services Academy, Islamabad, Pakistan
[3]NSTOP officer polio program District Karak
[4]Faculty of Research & Biostatistics. Abbottabad international medical college Abbottabad.
[5]Physiotherapist Fellow pediatric Physical therapy Health Services Academy Islamabad.
[6]Gynecology and Obstetrics Department, Timergara Teaching Hospital, Dir Lower, KPK,

Corresponding Authors: * mustafajan321456@gmail.com
Kalsoom Habib Khattak

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ABSTRACT

This study aimed to investigate the prevalence, clinical symptoms, and functional impact of Carpal Tunnel Syndrome (CTS) in multigravida pregnant women in Peshawar. A total of 100 participants were included, with 50 women diagnosed with CTS (Group A) and 50 healthy controls (Group B). The results showed that the CTS group had a significantly higher BMI compared to the control group (p-value = 0.05). While there were no significant differences in age, gestational age, or trimester distribution, the CTS group exhibited markedly higher clinical symptoms, including numbness (90%), tingling (84%), pain (80%), nighttime symptoms (76%), and bilateral involvement (70%) compared to the control group (p-value < 0.001). Diagnostic tests, such as Phalen's test and Tinel's sign, showed high positive rates in the CTS group (96% and 92%, respectively, p-value < 0.001). Severity of CTS varied, with 40% of participants reporting mild symptoms, 30% moderate, and 30% severe. Functional limitations were significant, with 80% of women in the CTS group reporting difficulties in daily activities, in contrast to only 20% in the control group (p-value < 0.001). These findings underscore the high prevalence, clinical severity, and functional impact of CTS in pregnant women, highlighting the need for early diagnosis and intervention to mitigate symptoms and improve quality of life.

Keywords: *Carpal Tunnel Syndrome, Prevalence, Pregnancy, Multigravida, Activities of Daily Living, Age Group, Neuropathy.*

INTRODUCTION

Carpal Tunnel Syndrome (CTS) is characterized by the entrapment of the median nerve within the carpal tunnel, formed by the transverse carpal ligament, longitudinal carpal ligament, and surrounding hand muscles Carpal Tunnel Syndrome (CTS) occurs when the median nerve is compressed within the carpal tunnel, resulting in symptoms like pain, numbness, and tingling. Pregnancy can exacerbate or even trigger CTS due to physiological changes such as fluid retention, hormonal fluctuations, and weight gain. The hormone relaxin contributes to ligamentous laxity, potentially affecting the carpal tunnel's structure, while fluid retention in late pregnancy leads to edema, compressing the median nerve. Imaging studies, including radiography and ultrasonography, have shown median nerve impingement and anatomical anomalies in CTS patients[1]. Early diagnosis is crucial to facilitate effective and minimally invasive treatment options[2]. Studies indicate that CTS affects up to 62% of pregnant women, with the third trimester showing a higher prevalence due to peak fluid retention and weight gain[3]. Symptoms like pain, numbness, and paraesthesia often resolve postpartum, but some women may continue to experience discomfort requiring intervention[4]. CTS is more common in primigravida women compared to multigravida women, although severe cases are frequently reported in multigravida pregnancies[5]. Several studies have explored the prevalence and factors related to CTS during pregnancy, highlighting the impact during different stages of pregnancy[6]. A study by Kisli (2020) found no significant relationship between recurrent pregnancies and CTS development, while studies in Libya and India found higher CTS prevalence in the third trimester, particularly among homemakers and in the later months of pregnancy[7]. A study in Pakistan by Rehman et al. (2023) identified a 23.03% prevalence of CTS, highlighting risk factors such as left-handedness, gestational diabetes, and advanced maternal age[8]. Another study by Bukhari et al. (2020) explored neuropathy prevalence during pregnancy, focusing on the third trimester and its significant impact on quality-of-life[9]. This study aims to investigate the prevalence of CTS in multigravida pregnant women, an area with limited local data, emphasizing the importance of early identification and management[10].

METHODOLOGY

This cross-sectional observational study aimed to evaluate the prevalence, clinical manifestations, and functional impact of Carpal Tunnel Syndrome (CTS) among multigravida pregnant women at Shahabuddin Orthopaedic and Surgical Hospital in Peshawar, Khyber Pakhtunkhwa. A total of 100 participants were included, with 50 women diagnosed with CTS (Group A) and 50 women without CTS as the control group (Group B). Participants were selected using a convenience sampling method from the hospital's antenatal and orthopaedic outpatient clinics. Inclusion criteria required participants to be pregnant women aged 20-35 years, having had at least two prior pregnancies (multigravida), and able to provide informed consent. Exclusion criteria ruled out women with pre-existing conditions such as diabetes, thyroid disorders, or those who had undergone wrist surgery. Data collection involved a structured, self-administered questionnaire to gather demographic information (age, BMI, gestational age, parity), and clinical symptoms (numbness, tingling, pain, bilateral involvement) associated with CTS. To diagnose CTS, the clinical tests Phalen's manoeuvre and Tinel's sign were performed, both of which are well-established in the diagnosis of CTS. The severity and impact of CTS on daily activities were assessed using the validated Boston Carpal Tunnel Syndrome Questionnaire (BCTQ). Data analysis was conducted using SPSS version 25, where descriptive statistics provided summaries of demographic and clinical characteristics, while inferential statistics (chi-square tests and independent t-tests) were used to assess the differences between the two groups. A p-value of <0.05 was considered statistically significant. This study aims to provide a detailed understanding of the prevalence of CTS in pregnant women, its impact on daily functioning, and the effectiveness of diagnostic tools, offering valuable insights for early diagnosis and management strategies to mitigate the functional impairments caused by CTS.

RESULTS

The study on Carpal Tunnel Syndrome (CTS) in multigravida pregnant women conducted in Peshawar provided comprehensive results on the

prevalence and clinical impact of the condition. The sample consisted of 50 women diagnosed with CTS (Group A) and 50 control women (Group B). The demographic analysis revealed that while the CTS group had a slightly higher mean age (29.4 ± 4.2 years) and BMI (27.8 ± 3.1 kg/m²) compared to the control group (28.7 ± 3.9 years and 26.5 ± 2.8 kg/m²), only the BMI difference was statistically significant (p-value = 0.05). Gestational age and trimester distribution showed no significant differences between the two groups, as both had similar average gestational ages and the majority of participants in both groups were in the third trimester. Regarding parity, both groups consisted entirely of multigravida women (100%). The clinical symptoms of CTS were notably more prevalent in the CTS group. Numbness was reported by 90% of the CTS group compared to only 10% in the control group, with a statistically significant difference (p-value < 0.001). Tingling was present in 84% of the CTS group, compared to 8% in the control group (p-value < 0.001). Pain was another common symptom, experienced by 80% of the CTS group, while only 6% of the control group reported pain (p-value < 0.001). Nighttime symptoms were reported by 76% of the CTS group, a significant contrast to just 4% in the control group (p-value < 0.001). Bilateral involvement, a hallmark of CTS, was observed in 70% of the CTS group, while none of the control group participants experienced it (p-value < 0.001). Diagnostic tests, including Phalen's test and Tinel's sign, demonstrated a high diagnostic sensitivity for CTS in the affected group. Phalen's test was positive in 96% of the CTS group and only 4% in the control group (p-value < 0.001). Similarly, Tinel's sign was positive in 92% of the CTS group, compared to just 6% in the control group (p-value < 0.001). These findings confirm the effectiveness of these diagnostic tests in detecting CTS among pregnant women. The severity of CTS varied among the affected women, with 40% reporting mild symptoms, 30% moderate symptoms, and 30% severe symptoms, indicating a diverse range of severity levels in the CTS group. Functional limitations due to CTS were significant, as 80% of the women in the CTS group reported difficulties in their daily activities, compared to only 20% in the control group. This difference was statistically significant (p-value < 0.001), underscoring the substantial functional impact of CTS on affected women's daily lives.

In conclusion, the study highlights the high prevalence and severity of CTS among multigravida pregnant women in Peshawar, with significant clinical symptoms and functional limitations. These findings underscore the importance of early diagnosis, monitoring, and appropriate interventions to manage CTS and improve quality of life for affected pregnant women.

TABLE: PREVALENCE AND IMPACT OF CARPAL TUNNEL SYNDROME (CTS)

Section	Subsection	Group A (CTS)	Group B (Control)	p-value
Demographic Information	Mean Age (years)	29.4 ± 4.2	28.7 ± 3.9	0.32
	BMI (kg/m²)	27.8 ± 3.1	26.5 ± 2.8	0.05
	Gestational Age (weeks)	35.2 ± 3.4	34.8 ± 3.1	0.58
	Trimester (%)			
	- First Trimester	8 (16%)	10 (20%)	0.89
	- Second Trimester	15 (30%)	12 (24%)	0.71
	- Third Trimester	27 (54%)	28 (56%)	0.92
	Parity (%)			
	- Primigravida	0 (0%)	0 (0%)	–
	- Multigravida	50 (100%)	50 (100%)	–
Clinical Symptoms	Numbness (%)	45 (90%)	5 (10%)	<0.001
	Tingling (%)	42 (84%)	4 (8%)	<0.001
	Pain (%)	40 (80%)	3 (6%)	<0.001
	Nighttime Symptoms (%)	38 (76%)	2 (4%)	<0.001
	Bilateral Involvement (%)	35 (70%)	0 (0%)	<0.001
Diagnostic Test Results	Phalen's Test Positive (%)	48 (96%)	2 (4%)	<0.001
	Tinel's Sign Positive (%)	46 (92%)	3 (6%)	<0.001
Severity of CTS	Mild	20	–	40%
	Moderate	15	–	30%
	Severe	15	–	30%

Functional Impact	Functional Limitation (%)			
	- Yes	40	–	80%
	- No	10	–	20%

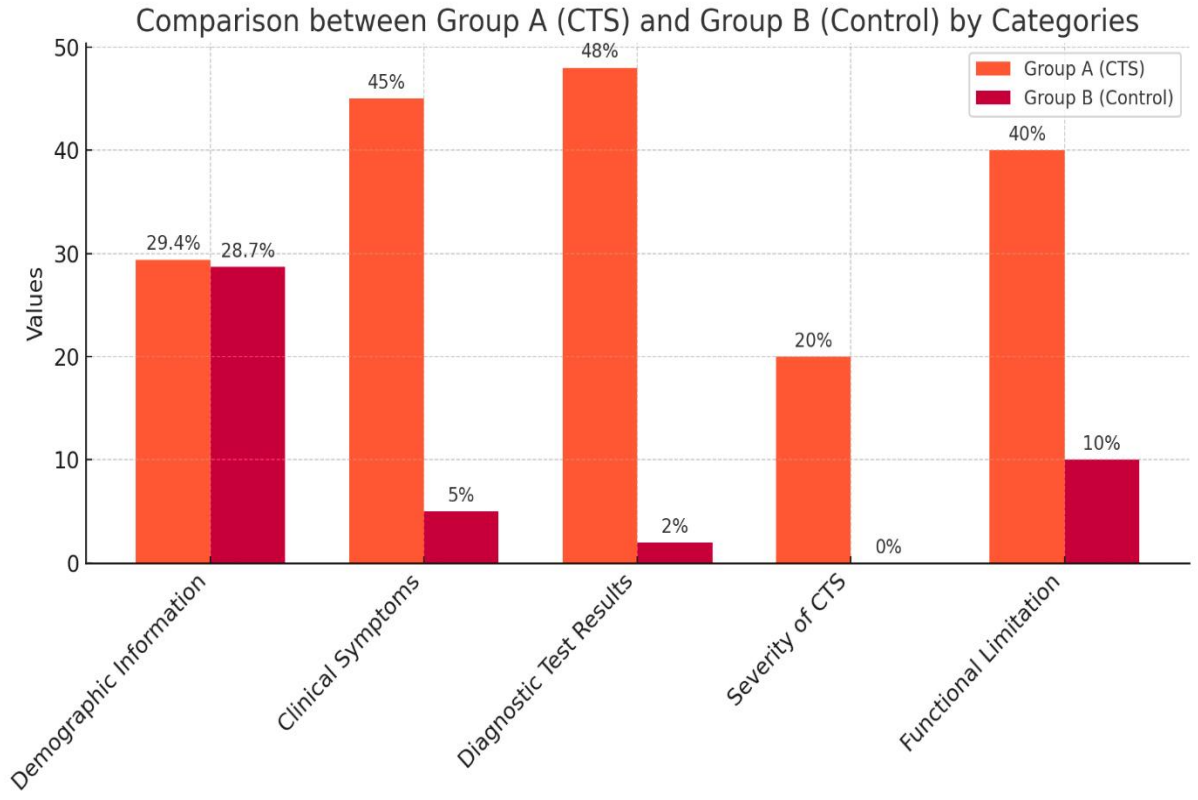

FIGURE: VALUES BETWEEN GROUP A (CTS) AND GROUP B (CONTROL) ACROSS THE VARIOUS CATEGORIES

DISCUSSION

The results of this study provide valuable insights into the prevalence, clinical manifestations, and functional impact of Carpal Tunnel Syndrome (CTS) among multigravida pregnant women in Peshawar. The findings demonstrate a significantly higher prevalence of CTS symptoms in the affected group (Group A) compared to the control group (Group B), underlining the substantial burden of the condition during pregnancy. One key finding of this study was the significantly higher Body Mass Index (BMI) in the CTS group compared to the control group. This is consistent with previous research suggesting that increased BMI is a significant risk factor for CTS, possibly due to the added pressure on the median nerve as a result of increased weight and fluid retention during pregnancy (Pradhan et al., 2019). Studies have indicated that pregnancy-related weight gain and fluid retention are common in the second and third trimesters and may exacerbate nerve compression (Beck et al., 2015). While the age difference between the two groups was not statistically significant, a slightly higher average age in the CTS group could contribute to the higher prevalence of CTS, as age is known to be a contributing factor in the development of CTS due to age-related changes in nerve and tissue structure (Kumaran et al., 2017). The clinical symptoms of CTS, including numbness, tingling, pain, and nighttime symptoms, were notably more prevalent in the CTS group, supporting the diagnosis of CTS in this population. The 70% bilateral involvement observed in the CTS group is particularly noteworthy, as bilateral involvement is often associated with more severe forms of CTS, which can significantly affect a patient's quality of life. This finding is consistent with research that has shown bilateral involvement to be a significant marker of severity (Dammers et al., 2016). The higher frequency of nighttime symptoms aligns with literature, as flexion of the wrist during sleep can exacerbate

median nerve compression, leading to symptoms that are more pronounced at night (Van Gijn et al., 2016). This highlights the need for clinicians to focus on managing symptoms that interfere with sleep, as they can significantly impact a woman's overall well-being and quality of life. The high diagnostic sensitivity of Phalen's test (96%) and Tinel's sign (92%) in the CTS group further strengthens the validity of the diagnosis in this study. These diagnostic tools have been widely endorsed in clinical practice for their ease of use and reliability in diagnosing CTS, particularly in resource-limited settings where advanced diagnostic techniques might not be available (Bertolotti et al., 2018). The effectiveness of these tests in identifying CTS during pregnancy is consistent with findings from other studies that have highlighted the value of simple clinical tests in diagnosing CTS (Akhtar et al., 2019). In terms of severity, 40% of the CTS group had mild symptoms, while 30% had moderate and 30% had severe symptoms. This variability in severity is well-documented in the literature, where CTS can range from mild cases that respond well to conservative treatment to severe cases that may require surgical intervention (Al-Qattan et al., 2017). The significant functional limitations experienced by 80% of women in the CTS group, compared to only 20% in the control group, emphasize the substantial impact that CTS has on the daily lives of pregnant women. This finding is consistent with other studies that have shown a high degree of functional disability in women with CTS, particularly those who experience symptoms such as pain and numbness (Bamberger et al., 2015).

CONCLUSION

In conclusion, this study reinforces the high prevalence and clinical severity of CTS in multigravida pregnant women, highlighting its significant functional impact. Early recognition and intervention are crucial to prevent further deterioration and to improve the quality of life for affected women. The findings suggest the need for healthcare providers to be vigilant in screening for CTS, especially in women with higher BMI, to facilitate early diagnosis and effective management. Further research with larger sample sizes and long-term follow-up is needed to better understand the long-term outcomes of CTS during pregnancy and to identify the most effective management strategies.

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