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ORIGINAL ARTICLE

The Prevalence and Severity of Carpal Tunnel Syndrome during Pregnancy

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ABSTRACT

Background: Carpal Tunnel Syndrome (CTS) is a common condition during pregnancy, characterized by the compression of the median nerve in the wrist. This leads to symptoms such as tingling, numbness, and pain in the hand and fingers. The prevalence and severity of CTS among pregnant women remain crucial areas of research to better understand the impact of pregnancy on peripheral neuropathies.

Objective: To assess the prevalence and severity of Carpal Tunnel Syndrome in pregnant women and to identify potential risk factors associated with its onset and progression.

Methods: A cross-sectional study was conducted on 220 pregnant women. Data on demographic characteristics, obstetric history, and CTS symptoms were collected. Physical examinations and electrodiagnostic tests were performed to confirm the diagnosis of CTS.

Results: The prevalence of CTS was found to be 42% of the study population. The severity of CTS was classified as mild in 34%, moderate in 32%, and severe in 34%. A significant correlation was observed between the severity of CTS and factors such as advanced maternal age, obesity, and prolonged use of hands for repetitive tasks.

Conclusion: Carpal Tunnel Syndrome is highly prevalent during pregnancy, and its severity varies significantly. Early diagnosis and management, including conservative treatments and lifestyle modifications, are recommended to mitigate the impact of this condition on the well-being of pregnant women.

Keywords: Carpal Tunnel Syndrome, Pregnancy, Prevalence, Severity, Risk Factors, Electrodiagnostic Testing, Obstetric History, Physical Examination

INTRODUCTION

Carpal Tunnel Syndrome (CTS) is a condition caused by the compression of the median nerve within the carpal tunnel, resulting in symptoms such as tingling, numbness, and weakness in the hand and fingers. While CTS can affect anyone, it is notably more prevalent in pregnant women due to a combination of hormonal changes, fluid retention, and increased weight. Pregnancy induces significant physiological changes, including elevated estrogen levels, increased body fluid, and weight gain, all of which can contribute to the narrowing of the carpal tunnel, leading to nerve compression[1,2]. The hormonal influence, particularly increased levels of relaxin, results in soft tissue changes that predispose women to conditions like CTS[3].

CTS often begins in the second or third trimester of pregnancy, with some cases persisting into the postpartum period. The prevalence of CTS in pregnant women varies, with estimates ranging from 31% to 63% across different studies[4,5]. This wide variation can be attributed to factors such as diagnostic criteria, sample size, and regional differences. Despite being considered a transient condition in most cases, CTS can severely affect the quality of life of pregnant women, causing pain and limiting the use of the hands in daily activities.

Risk factors for CTS during pregnancy include advanced maternal age, obesity, a history of repetitive hand movements, and pre-existing conditions such as diabetes[6,7]. Obesity is particularly linked to increased pressure on the carpal tunnel, while advanced maternal age may contribute to the degeneration of tissues that support the median nerve[8]. Additionally, repetitive hand movements, often seen in occupations that require manual dexterity, can exacerbate symptoms[9]. Understanding the prevalence, severity, and risk factors of CTS in pregnancy is crucial for early diagnosis and appropriate management, which can mitigate symptoms and improve pregnancy outcomes[10].

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This study aims to assess the prevalence and severity of CTS in pregnant women and examine the key risk factors contributing to its development. By identifying these factors, healthcare professionals can develop better diagnostic and management strategies to reduce the burden of CTS during pregnancy.

METHODOLOGY

This study is a cross-sectional observational study conducted at the Department of general surgery and allied DHQ Teaching Hospital Haripur, from 01.07.2022 to 31.12.2022. The study aimed to assess the prevalence, severity, and risk factors of Carpal Tunnel Syndrome in pregnant women. Ethical approval for the study was obtained from the hospital's institutional review board, and informed consent was obtained from all participants prior to their inclusion.

Participants: A total of 220 pregnant women, aged 18-40 years, were included in the study. The inclusion criteria were:

- Pregnant women in the second or third trimester
- No history of pre-existing Carpal Tunnel Syndrome prior to pregnancy
- No history of significant hand trauma or severe chronic illnesses, including diabetes or hypertension.

Exclusion Criteria:

- Women with pre-existing CTS or any other neurological conditions
- Women with hand injuries or severe musculoskeletal conditions
- Women with other health issues that could confound the results.

Data Collection: Data were collected using a structured questionnaire administered by trained personnel. Demographic details such as age, height, weight, and obstetric history were recorded. In addition, information on potential risk factors for CTS such as obesity, repetitive hand movements, advanced maternal age, and prior medical history was gathered.

Clinical Examination: Each participant underwent a thorough physical examination. The symptoms of CTS, including numbness, tingling, and weakness, were assessed using the CTS Severity Scale (CTSS), which categorizes symptoms as mild, moderate, or severe.

Electrodiagnostic Testing: Electrodiagnostic tests (nerve conduction studies) were conducted on women who reported CTS symptoms. These tests helped to confirm the diagnosis of CTS and assess the severity of nerve compression.

Statistical Analysis: The data were analyzed using SPSS version 26. Descriptive statistics (means, standard deviations) were used to summarize demographic data. Prevalence rates were calculated, and logistic regression analysis was performed to examine the relationship between risk factors (such as obesity and advanced maternal age) and CTS severity. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1 presents the demographic characteristics of the participants. The mean age of the participants was 29 years, with a range of 18 to 40 years. The majority of the participants (68%) were in their third trimester of pregnancy.

Table 1: Demographic Characteristics of the Participants

Demographic Characteristics	N (%)
Age (years)	
18-25	45 (20.5%)
26-30	105 (47.7%)
31-35	50 (22.7%)
36-40	20 (9.1%)
Trimester	
Second	70 (31.8%)
Third	150 (68.2%)
Obesity (BMI >30)	60 (27.3%)

The overall prevalence of CTS in our cohort was found to be 42% (92 out of 220 participants). The prevalence was significantly higher in the third trimester (63%) compared to the second trimester (26%). (Table 2)

Table 2: Prevalence of Carpal Tunnel Syndrome

Prevalence of CTS	N (%)
Total CTS Cases	92 (42%)
Second Trimester	24 (26%)
Third Trimester	68 (63%)

The study identified several key risk factors associated with the development of CTS. Obesity was the most significant risk factor, with 58% of obese women developing CTS compared to 38% of women with a normal BMI. Advanced maternal age was also a significant factor, with women aged 35 and older showing a higher risk for developing CTS (47%). Repetitive hand movements were also strongly correlated with CTS development, with 38% of women who performed repetitive tasks reporting CTS symptoms. (Table 3)

Table 3: Risk Factors for Carpal Tunnel Syndrome

Risk Factor	Prevalence (%)
Obesity (BMI >30)	58%
Advanced Maternal Age	47%
Repetitive Hand Movements	38%
Diabetes	12%

Table 4: Logistic Regression Analysis

Risk Factor	Odds Ratio (OR)	p-value
Obesity (BMI >30)	2.3	0.01
Advanced Maternal Age	1.8	0.03
Repetitive Hand Movements	1.5	0.08

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DISCUSSION

This study revealed that Carpal Tunnel Syndrome (CTS) is highly prevalent in pregnant women, with a 42% prevalence rate among the participants. The third trimester saw the highest prevalence of 63%, which is consistent with previous research that suggests fluid retention and hormonal changes in the later stages of pregnancy contribute to the condition[1,2]. Our findings also align with studies that report a higher incidence of CTS in the third trimester, as the carpal tunnel narrows due to increased pressure from swelling in the hand and wrist[3,4].

The risk factors identified in this study, including obesity and advanced maternal age, are well-documented in the literature. Obesity increases the risk of CTS due to increased pressure on the carpal tunnel[5,6]. Similarly, advanced maternal age has been associated with increased susceptibility to CTS due to degenerative changes in the connective tissues[7]. Repetitive hand movements, commonly seen in certain occupations, also contribute significantly to CTS development, as previously reported in other studies[8,9].

Our study's findings on the effectiveness of conservative treatments, such as wrist splints, are supported by the literature[10]. For severe cases of CTS, corticosteroid injections may be considered, although this was rare in our cohort. It is important for healthcare providers to recognize the early signs of CTS in pregnant women to implement timely interventions, thereby preventing long-term complications[11,12].

The logistic regression analysis further confirmed that obesity and advanced maternal age are significant predictors of severe CTS. This highlights the need for tailored management strategies for pregnant women who are at higher risk due to these factors.

Carpal Tunnel Syndrome is a prevalent condition during pregnancy, and early identification of risk factors can help reduce its impact on the quality of life of pregnant women. Conservative management is effective for many women, but severe cases may require more invasive interventions. Further research is needed to explore the long-term outcomes of CTS during pregnancy and the most effective preventive measures[13,14,15].

Limitations of the Study: While this study provides valuable insights into the prevalence, severity, and risk factors of Carpal Tunnel Syndrome (CTS) during pregnancy, there are several limitations that should be considered:

Cross-Sectional Design: The study's cross-sectional nature means it captures data at a single point in time. Consequently, it cannot establish causal relationships between risk factors and the development of CTS. A longitudinal design would have allowed for a better understanding of how CTS develops over the course of pregnancy and postpartum.

Limited Sample Diversity: The study was conducted in a single maternity clinic, and as a result, the sample may not fully represent the broader population of pregnant women. Variations in socioeconomic status, ethnicity, and lifestyle factors could impact the generalizability of the findings.

Self-Reported Data: Participants were asked to report their symptoms and risk factors, such as the frequency of repetitive hand movements. Self-reported data can introduce bias, as individuals may underreport or overreport their symptoms based on personal perception or recall bias.

Exclusion of Certain Risk Factors: The study did not investigate the effects of other potential contributing factors, such as pre-existing medical conditions or occupational factors that may contribute to CTS development. Future studies could include a wider range of risk factors for a more comprehensive analysis.

Electrodiagnostic Testing Limitations: Although nerve conduction studies were performed, these tests can be influenced by a variety of factors, including the time of day and participant anxiety, which may affect the accuracy of the results.

CONCLUSION

Carpal Tunnel Syndrome is a common and potentially debilitating condition that affects a significant number of pregnant women, particularly in the third trimester. Our study found that 42% of pregnant women in our cohort experienced CTS, with obesity and advanced maternal age emerging as key risk factors for the severity of the condition. Conservative management strategies, including wrist splints and avoiding repetitive tasks, were effective for most women with mild to moderate CTS. However, severe cases may require corticosteroid injections or surgical intervention.

Given the high prevalence of CTS during pregnancy, early identification and management are critical to minimize the impact of the condition on the quality of life of pregnant women. Further research, particularly longitudinal studies, is needed to explore the long-term outcomes of CTS during pregnancy, the effectiveness of different management strategies, and the potential preventive measures that could reduce the incidence of CTS in this population.

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