



Original Article


Correlation of Pregnancy Related Carpal Tunnel Syndrome (PRCTS) with the Different Categories of Body Mass Index (BMI) in the Pregnant Females of Different Trimesters of Pregnancy

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 OPEN ACCESS

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Received: 02-01-2026

Accepted: 01-03-2026

Available online: 07-05-2026

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Medical and Pharmaceutical Research

ABSTRACT

INTRODUCTION: Pregnant women are at a risk of developing carpal tunnel syndrome (CTS) due to the 30% increase in the volume of blood. It is the most common mononeuropathy of the median which is at risk of compression due to its location in the carpal tunnel at the level of wrist joint due to the hypervolemic state of pregnancy. the compression leads to decreased conduction velocity and increased nerve latency of the median nerve which is detected by the electrodiagnostic technique. Raised body mass index is further contributing to the compression leading to a higher prevalence when compared to females of normal body mass index.

AIM: To assess the correlation between increasing in Body Mass Index and incidence of pregnancy related carpal tunnel syndrome in the pregnant females of different trimesters.

MATERIAL AND METHODS: In this cross-sectional study 75 pregnant females (25 from each trimester) were recruited from the ante natal clinic of J.N Medical College, Aligarh Muslim University, Aligarh. These served as cases and the controls were recruited from the gynaecology OPD of the same institute. the controls were age matched, healthy and non-pregnant females (25 in number). The entire study population was screened for pregnancy related carpal tunnel syndrome via the electrodiagnostic technique of nerve conduction study. body mass index was calculated for all the females (for pregnant females, using the weight at the initiation of pregnancy)

RESULTS: Among the diagnosed cases of pregnancy related carpal tunnel syndrome 23% were overweight and 77% were obese pregnant females. Increased body mass index was found to have a positive correlation with pregnancy related carpal tunnel syndrome.

CONCLUSION: The study found a positive correlation between raised body mass index and pregnancy related carpal tunnel syndrome, which highlights the significance of obesity as a risk factor to be addressed in the preventive measures that can be taken for pregnancy related carpal tunnel syndrome.

Keywords: body mass index, pregnancy related carpal tunnel syndrome, obesity, mononeuropathy, electrodiagnostic technique, nerve conduction velocity, latency, median nerve.

INTRODUCTION

Pregnant women are at a risk of developing carpal tunnel syndrome (CTS) due to the 30% increase in the volume of blood. [1] It is the most common mononeuropathy of the median nerve which is at risk of compression due to its compact location

in the carpal tunnel at the level of wrist joint due to the hypervolemic state of pregnancy . The compression and traction of the median nerve inside the carpal tunnel causes a neuropathy which is known as the carpal tunnel syndrome (CTS)[2] [Alfonso C et al]. Carpal tunnel syndrome consists of predominantly tingling and numbness in the typical median nerve distribution in the radial three and a half digits (thumb, index, long and radial side of the ring)[3] [Campbell WC et al]. The compression leads to decreased conduction velocity and increased nerve latency of the median nerve which is detected by the electrodiagnostic technique . Raised body mass index (BMI) is further contributing to the compression leading to a higher prevalence when compared to females of normal body mass index. BMI is calculated for all the pregnant females by taking into record the weight at the initiation of pregnancy.

RESEARCH METHODS OR METHODOLOGY

In this cross-sectional study 75 pregnant females (25 from each trimester) were recruited from the ANC OPD of J.N Medical College , Aligarh Muslim University , Aligarh. These served as cases . The controls were recruited from the gynaecology OPD of the same institute. the controls were age matched , healthy and non-pregnant females (25 in number). (Table No 1) . The entire study population was screened for pregnancy related carpal tunnel syndrome via the electrodiagnostic technique of nerve conduction study , which was done in the Neurophysiology Laboratory of the Physiology department , J.N Medical College , Aligarh Muslim University , Aligarh . Distal Motor Latency and nerve conduction velocity of the median nerve was taken into record . Diagnosis of PRCTS was made using the criteria of cut off value of distal motor latency of median nerve being more than or equal to 4.2ms . (4) BMI was calculated for all the females recruited in the study (for pregnant females ,using the weight at the initiation of pregnancy). Among the recruited study population 23% were belonging to the normal BMI range , 68% belonged to the overweight and 9% belonged to the obese BMI range . (Table No. 2) The Categorization of BMI is according to the Indian population standards. Normal BMI = 18.5 to 22.9kg /m², overweight=23 to 27.5 kg/m², obese= >27.5kg/m² [5]. the distribution of the right median motor nerve latency among the study population with different categories of BMI was taken into record . (table no 3). The right median motor latency was found to be ≥ 4.2 ms in 13 overweight pregnant females and 15 obese pregnant female.

Statistical analysis was done using pearson's correlation coefficient and chi-square test, distribution of median nerve latency (ms) among the overweight pregnant females. Out of the 59 overweight pregnant females studied 13 females had their right median motor latency ≥ 4.2 ms and 14 had their left median motor latency ≥ 4.2 ms. distribution of median nerve latency (ms) among the obese pregnant females. Out of the 18 obese pregnant females studied 15 females had their right medianmotor latency ≥ 4.2 ms and 12 had their left median motor latency ≥ 4.2 ms.

Among the diagnosed PRCTS cases 23% were overweight pregnant females and 77% were obese pregnant females. A higher BMI was seen significantly associated with the incidence of PRCTS in the study population.(significance =0.000 by Chi-square tests depicts the distribution of the right median motor nerve latency among the study population with different categories of BMI. shows that right median motor latency was found to be ≥ 4.2 ms in 13 overweight pregnant females and 15 obese pregnant female.

Table No.1: Distribution of study population into cases and controls.

S.No.	Study Group	Frequency	Percent
1	Non-pregnant females (Controls)	25	25.0
2	Pregnant females of 1st trimester (cases)	25	25.0
3	Pregnant females of 2nd trimester (cases)	25	25.0
4	Pregnant females of 3rd trimester (cases)	25	25.0
	Total	100	100.0

Table No. 2: Association between BMI and Median nerve motor Latency BMI status of the diagnosed cases of the PRCTS.

BMI Category	Frequency	Percent
Normal	23	23.0
Overweight	68	68.0
Obese	9	9.0
Total	100	100.0

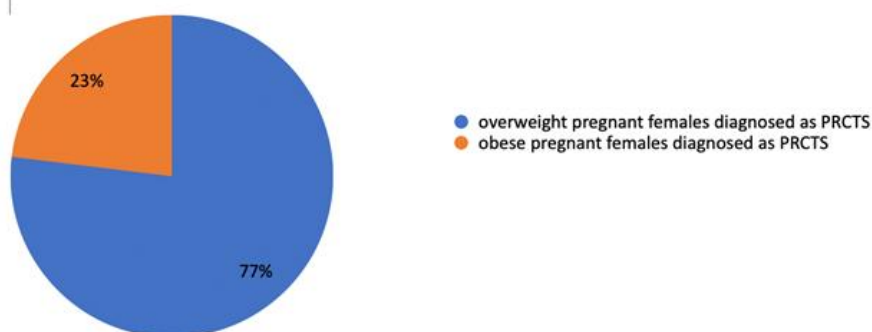
Table No. 3: BMI distribution of the study population

BMI Category	Right median motor latency		Total
	< 4.2 ms	> 4.2 ms	
Normal	23	0	23
overweight	46	13	59
Obese	3	15	18
Total	72	28	100

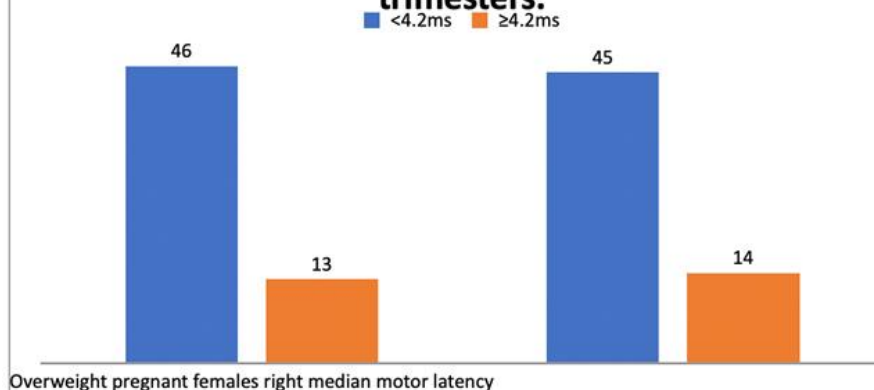
Table No. 4 : BMI distribution of the study population

BMI Category	Left median motor latency		Total
	< 4.2 ms	> 4.2 ms	
Normal	23	0	23
overweight	45	14	59
Obese	3	15	18
Total	72	28	100

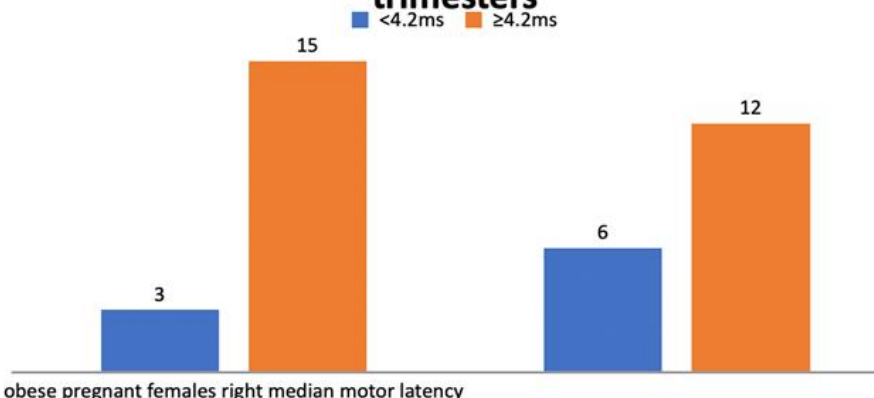
BMI distribution in the diagnosed cases of PRCTS



distribution of median motor nerve latency (ms) among the overweight pregnant females of various trimesters.



Distribution of median motor nerve latency(ms) among the obese pregnant females of various trimesters



ASSOCIATION BETWEEN BMI AND MOTOR LATENCY

Association between BMI Category and right median motor latency

Table No. 5 : Pearsons chi-square value value depicting association between BMI Category and right median motor latency

BMI Category	Right median motor latency		Total
	< 4.2 ms	> 4.2 ms	
Normal	23	0	23
overweight	46	13	59
Obese	3	15	18
Total	72	28	100
Pearson Chi-Square	Value	Df	Asymptotic, Significance (2-sided)
	42.372	2	0.000

Pearsons chi-square value= 42.373 Df=2 Asymptotic. Significance= 0.000 (<0.05). It depicts significant association between higher BMI and right median motor nerve conduction latency.

Association between BMI Category and left median motor latency

Table No. 6 : Pearsons chi-square value depicting association between BMI Category and left median motor latency

BMI Category	Left median motor latency		Total
	< 4.2 ms	> 4.2 ms	
Normal	23	0	23
overweight	45	14	59
Obese	3	15	18
Total	72	28	100
Pearson Chi-Square	Value	Df	Asymptotic, Significance (2-sided)
	21.798	2	0.000

Pearsons chi-square value= 21.798 Df=2 Asymptotic. Significance= 0.000 (<0.05). It depicts significant association between higher BMI and left median motor nerve conduction latency.

Correlation between motor nerve conduction velocity and increased BMI.

Table no 7- Correlation between the medium motor nerve conduction velocity and Increased BMI.

NCV	Mean	Sst. Deviation	Pearsons Correlation	Significance
Right median motor NCV	54.9098	6.12816	-0.344	0.000
Left median motor NCV	55.505	6.71223	-0.352	0.000

Right median motor NCV Pearsons R= -0.344. It signifies moderately negative correlation between right median motor NCV and increasing BMI

Left median motor NCV Pearsons R= -0.352. It signifies moderately negative correlation between left median motor NCV and increasing BMI.

RESULT

Among the diagnosed cases of pregnancy related carpal tunnel syndrome 23% were over weight and 77% were obese pregnant females. Increased body mass index was found to have a positive correlation with the Distal Motor Latency of the Median nerve (p-value < 0.05) and a negative correlation with the nerve conduction velocity of the Median nerve (pearson's correlation coefficient = -0.35) in case of the recruited pregnant female population, which strengthens the fact that increased BMI has a positive correlation with pregnancy related carpal tunnel syndrome. It is an important preventable risk factor which can significantly impact the disease outcome and the quality of life of the pregnant females with PRCTS.

DISCUSSION

Association between BMI and Median motor nerve latency was established by using the Chi-square test. Association between BMI category and median motor nerve (right and left) latency was calculated. Significant association between a higher BMI and median motor nerve (right and left) latency was found (significance = 0.000). BMI of the diagnosed

cases of PRCTS was also assessed . Among the 36 cases Diagnosed of PRCTS cases , 23% were overweight pregnant females and 77% were obese pregnant females. A higher BMI was seen significantly associated with the incidence of PRCTS in the study population. (significance = 0.000) by Chi-square tests in results. A similar finding was seen when F Turgut et al (2001) studied the prevalence of carpal tunnel syndrome (CTS) symptoms after delivery and its relationship to individual factors like BMI , age of the pregnant female , infant birth weight , parity and diabetes mellitus status during pregnancy. The study revealed that women with a higher BMI were at a greater risk of developing PRCTS. [6]. Similarly Charmaine Wright et al (2014) also analysed the prevalence , onset and risk factors of CTS during pregnancy. Their study suggested that mothers with CTS had a higher rate of overweight, obesity and excessive gestational weight gain . [7]All of these were associated with increased risk of CTS.

CONCLUSION

Among the 36 diagnosed cases of PRCTS , 23% were overweight pregnant females and 77% were obese pregnant females . A higher BMI was seen significantly associated with the incidence of PRCTS in the study population. The study found a very strong association (statistically significant) of advancement of BMI with PRCTS.

Identifying the risk factors for PRCTS will help the pregnant females and their treating obstetricians for the prevention , early diagnosis and timely intervention of the occurrence of this syndrome.

REFERENCES

1. Hall, John E.. (2021). Guyton and Hall textbook of medical physiology, 14th international edition, (14). Philadelphia: Elsevier. 2020 june. 13:689
2. Alfonso, C., Jann, S., Massa, R., & Torreggiani, A. (2010). Diagnosis, treatment and follow-up of the carpal tunnel syndrome: a review. *Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology*, 31(3), 243–252. <https://doi.org/10.1007/s10072-009-0213-9>
3. Campbell, W, C. et al (2008). *Campbell's operative orthopaedics : Operative orthopaedics.vol.04* (11th International ed.). Philadelphia: Mosby/Elsevier.
4. Misra, U. K., & Kalita, J. (2019). *Clinical Neurophysiology: Nerve Conduction, Electromyography, Evoked Potentials* (4th ed.). Elsevier India.
5. WHO Expert Consultation (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet* (London, England), 363(9403), 157–163. [https://doi.org/10.1016/S0140-6736\(03\)15268-3](https://doi.org/10.1016/S0140-6736(03)15268-3)
6. Turgut, F., Cetinşahinahin, M., Turgut, M., & Bölükbaşı, O. (2001). The management of carpal tunnel syndrome in pregnancy. *Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia*, 8(4), 332–334. <https://doi.org/10.1054/jocn.2000.0761>
7. Wright, C., Smith, B., Wright, S., Weiner, M., Wright, K., & Rubin, D. (2014). Who develops carpal tunnel syndrome during pregnancy: An analysis of obesity, gestational weight gain, and parity. *Obstetric Medicine*, 7(2), 90-94.