Carpal Tunnel Syndrome After Recurrent Pregnancies

Mesude Kisli (✉ mesudekisli@yahoo.com)

Neurology Department of Numune Hospital

Research article

Keywords: Carpal tunnel syndrome, delivery, long term

Posted Date: July 28th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-41844/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: The primary aim of the retrospective study was to study whether the number of births in women (primipara, multipara and grand multipara women) the long term after deliveries has an impact on the development of Carpal tunnel syndrome (CTS).

Methods: Our study population is composed of patients who are referred with suspicion of CTS. Four hundred and fifty female patients (150 primipara, 150 multipara and 150 grand multipara women) referred to the electrophysiology laboratory with clinical suspicion CTS were included into the descriptive and retrospective study between November 2016 and June 2018. Primiparity, multiparity and grand multiparity were defined as women having 1, 2 – 5 and 6 - 9 deliveries, respectively. Patients who passed 2 years after their last birth were included in the study. All of the patients were assessed and compared in terms of electrophysiological CTS presence and degree of CTS. Also BMI was calculated for each patient and it compared among groups.

Results: The disease has not been changed with the number of births ($p > 0.05$). The mean BMI of the primipara, multipara and grand multipara women were $28,06 \pm 1,12 \text{ kg / m}^2$, $27,59 \pm 3,72 \text{ kg / m}^2$ and $27,82 \pm 3,11 \text{ kg / m}^2$, respectively. There was no significant statistically difference in BMI among groups ($p > 0.05$). However, the severity of the disease varies according to BMI ($p < 0.05$). It was calculated that as the BMI increases, the severity of the disease increases.

Conclusions: Number of pregnancies in women (primipara, multipara and grand multipara women) concerning the long term after deliveries has not impact on the development of CTS. Other risk factors such as BMI may play a significant role in the development of CTS in these patients.

Background

Carpel tunnel syndrome (CTS) is the most common peripheral neuropathy resulting from compression of the median nerve as it passes through the carpal tunnel in the wrist. This can result in various problems including pain, tingling, numbness, swelling, or weakness of the thumb, index, middle, and ring finger (1). Local, regional and systemic causes have been identified for CTS (2). Body mass index (BMI) has been attributed as a risk factor for the development of CTS (3–5).

CTS occurs frequently during pregnancy: pregnancy related CTS (PRCTS). Accurate data of prevalence rates are difficult to find in the literature and vary substantially (1–60%) (6–8). But concerning the long-term after deliveries there aren't enough evidence on CTS.

The primary aim of the retrospective study was to study whether the number of births in women (primipara, multipara and grand multipara women) the long term after deliveries has an impact on the development of CTS.

Methods

The present study was carried out in accordance with the current Helsinki Convention of the World Medical Association. Approval of all of the patients was obtained to use their medical records in retrospective file scanning. Our study population is composed of patients who are referred with suspicion of CTS. A total of 1150 patients were evaluated. Four hundred and fifty female patients (150 primara, 150 multipara and 150 grand multipara women) referred to the electrophysiology laboratory with clinical suspicion CTS were included into the descriptive and retrospective study between November 2016 and June 2018. Demographic data included age, BMI and delivery number of the participants (Table 1). Also BMI was calculated for each patient and it compared among groups. Primiparity, multiparity and grand multiparity were defined as women having 1, 2–5 and 6–9 deliveries, respectively. Patients who passed 2 years after their last birth were included in the study. EMG results were obtained from the computer records and the electrophysiological reports on the CD of the participants evaluated by the researcher. Exclusion criteria in this study are cervical radiculopathy or plexopathy, hypertension, dyslipidemia, chronic renal failure, gout, wrist fracture, malignancy, patients receiving chemotherapy and or radiotherapy, those with clinical and electrophysiological polyneuropathy, those with rheumatologic and thyroid diseases, pregnant women, and those with severe upper extremity trauma history and or any other disease resulting in CTS. All of the patients were assessed and compared in terms of electrophysiological CTS presence and degree of CTS.

Table 1
Demographic data of the patients

	Primiparity,	multiparity	grand multiparity	P value
Mean age (range) ± SD (year)	52,55 (30–77) ± 10,14	57,01 (32–79) ± 9,21	55,48 (35–77) ± 8,57	NS*
BMI ± SD (kg / m2)	28,06 ± 1,12	27,59 ± 3,72	27,82 ± 3,11	NS*
*NS: non significant				

The Electrodiagnostic test (EDT) studies

Nihon Cohden (Tokyo, Japan) electromyograph (EMG) tool was used for electrophysiological evaluation. Both patient's and room temperature were monitored so as not to affect the recording procedures, and the patient's skin was cleaned with alcohol 70% to decrease its resistance. The study was performed with surface electrodes, using standard nerve conduction techniques, according to the protocol recommended by the American Electrodiagnostic Medical Association (9). Patients of whom the both upper extremities were examined included in the study, median and ulnar nerve conduction in one extremity was performed, while only median nerve conduction study in the other extremity was performed. The median motor nerve conduction was recorded using standard techniques through ulation of the surface of the abductor pollicis brevis muscle located in the center of the muscle and wrist and antecubital fossa. For median nerve (8 cm) stimulation the upper limit of the motor distal latency was 4 ms and the lower of the transmission rate was 50 m/sec. The sensory neurotransmission study was performed on the second

finger and the mixed nerve conduction study was performed from the palm of the hand, recorded orthodromically from the wrist. The distance between the recording and the stimulator was 12–14 cm, the upper limit of sensory neural action potential (DSAP) peak latency difference was 0.5 ms, and the median sensory nerve conduction velocity at the wrist level was 50 m/sec. In order to exclude cervical radiculopathy, upper extremity needle ENMG studies were conducted when needed. Patients were divided into three groups by electrophysiological evaluation as described in the literature (10, 11). CTS severities in primipara, multipara and grand multipara women were given in Table 2. (Table 2).

Table 2
Comparison of CTS severity of the patients according to parity.

	Primipar	Multipar	Grandmultipar	P value
Normal	125 (% 83,33)	121 (% 80,67)	111 (% 74)	NS*
Mild	15 (% 10)	14 (% 9,33)	14 (% 9,33)	NS*
Moderate	8 (% 5,33)	10 (% 6,67)	18 (% 12)	NS*
Severe	2 (% 1,33)	5 (% 3,33)	7 (% 4,66)	NS*
*NS: non significant				

Statistical analyses

Statistical analyses were performed using SPSS 20.0 (Statistical Package for Social Sciences version 20, IBM, Chicago, Illinois, USA). Data were presented as mean scores $\pm$ SD for categorical data. The variables age, parity and BMI were used in all the patients. Chi - square test, Kruskal-Wallis H test and Mann-Whitney U test was used for statistical analysis. Significance level was accepted as $p \leq 0.05$.

Results

Because there is not enough information with prevalence rates on different birth numbers, the number of 450 women is estimated to meet the standard epidemiological criteria in long term after delivery. The mean age of the primipara, multipara and grand multipara women were 52,55 (range 30–77) $\pm$ 10,14 S.D. years, 57,01 (range 32–79) $\pm$ 9,21 S.D. years and 55,48 (range 35–77) $\pm$ 8,57 S.D. years, respectively.

The mean BMI of the primipara, multipara and grand multipara women were 28,06 $\pm$ 1,12 kg / m², 27,59 $\pm$ 3,72 kg / m² and 27,82 $\pm$ 3,11 kg / m², respectively (Table 1). There was no significant difference, statistically in BMI among groups ($p > 0.05$). There was no significant difference, statistically in severity of the disease in aspect of birth numbers among groups ($P = 0,073$). Also there was no significant statistical difference between groups in terms of frequency of the disease ($p > 0.05$). The disease has not been changed with the number of births ($p > 0.05$). However, the severity of the disease varies according to BMI ($p < 0.05$). It was calculated that as the BMI increases, the severity of the disease

increases. BMI was higher in grand multipara than other groups ($p < 0.05$). The cause why the disease was occurred higher in grand multipara was because of high BMI, not the number of births.

Discussion

Carpal tunnel syndrome (CTS) is defined as entrapment of median nerve traveling through the carpal tunnel to the hand (12). The prevalence of CTS is reported differently in different studies. In the United States, general prevalence is 2.7% (13). Carpal Tunnel Syndrome is a clinical diagnosis based on the presence of the typical symptoms described above. There is no single gold standard test for the diagnosis of CTS. Compression of the median nerve leads to a slowed conduction velocity at the carpal tunnel due to dysfunction of the myelin sheath, which can be measured using EDT (14). The most accurate diagnostic method is electrodiagnostic tests conducted by a competent electromyographer, which has a sensitivity of 49–84% and specificity of 95% (12, 15, 16).

Previous studies had found that CTS was more prevalent in the female population. It was postulated because morphologically, females are more prone to CTS compare to male (17). The female / male ratio varies between 3:1 and 10:1 (13). It is common during pregnancy and is considered to have a short and benign course. According to a recent systematic review by Padua et al., the prevalence of PRCTS based on clinical symptoms ranges between 31 and 62%, whereas electrophysiologically confirmed PRCTS ranges between 7 and 43% (7). Pregnancy increases the probability of relapse of CTS in the next pregnancy with higher intensity (8). Although the true cause of PRCTS is unknown, it is believed that the symptoms are caused by local oedema in the carpal tunnel due to hormonal changes (6, 18, 19, 20). Most CTS cases improve spontaneously without treatment but only in half of women CTS symptoms disappeared one year after delivery (21). Follow up showed that CTS at 6 and 12 months post partum was reported by 10.9% and 4.3% of the women, respectively. On the other hand, there was no difference in the number of previous pregnancies between women with CTS and without CTS during pregnancy ($P = 0.210$) (22). Up until now, it is unknown how long the period lasts that a woman normally needs to recover from pregnancy and delivery (23). The fact is, there are no real data to address this problem.

Apart from a previous obstetric history, the study include demographic features, assessment of BMI index, live births number and electro-physiologic findings which are female patients referred with suspicion of CTS. The key strength of this large retrospective study is the approach to parity in long term after delivery. The study is unique in aspect of grand multiparity especially. It has not yet been reported to investigate CTS in grand-multiparity in literature. The data we obtained from this study support that number of pregnancies and delivery are not a risk factor for CTS development in long-term. Moreover, a significant correlation between a negative trend and BMI and CTS. Also our findings support the results of research reporting that CTS development risk is related to BMI and weight increase.

We consider it important for the postpartum period to provide pregnant women or patients with recurrent pregnancies with the knowledge that their doctor will pass their symptoms and provide relief, so that they do not cause stress.

Conclusions

This study suggest that number of pregnancies in women (primipara, multipara and grand multipara women) concerning the long term after deliveries has not impact on the development of CTS. Other risk factors such as BMI may play a significant role in the development of CTS in these patients.

Abbreviations

CTS

Carpal tunnel syndrome

BMI

Body mass index

PRCTS

Pregnancy related carpal tunnel syndrome

EDT

Electrodiagnostic test

EMG

Electromyograph

ENMG

Electroneuromyograph

SPSS

Statistical Package for Social Sciences

S.D.

Standart deviation

Declarations

Ethics approval and consent to participate

This retrospective study was reviewed and approved by the review board of the institution where the author worked (Sivas Numune Hospital, 16. 05. 2018). Since this study was retrospective, informed consent obtained from study participants was verbal. Review board approved this procedure.

Competing interests:

Author Mesude Kisli declares that she has no conflict of interest. The author whose name is listed immediately above certify that she has NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript. All procedures performed in accordance with the ethical standards of the research committee

and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from individual participant included in the study.

Availability of data and material:

All data generated or analysed during this study are included in this published article. The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request. The datasets generated during and/or analysed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Funding:

This study was not funded.

Authors' contributions

Mesude Kisli conceived of the presented idea and developed the theory and performed the study. The author discussed the results and concluded.

Acknowledgements

I would like to thank the all Sivas Numune hospital staffs and for their participation who supported my work in this way and helped me get results of better quality. I am also grateful.

References

1. Sharief F, Kanmani J, Kumar S. Risk factors, symptom severity and functional status among patients with carpal tunnel syndrome. *Neurol India*. 2018;66:743–6.
2. Aroori S, Spence RA. Carpal tunnel syndrome. *Ulster Med J*. 2008;77(1):6–17.
3. Zyluk A, Dabal L, Szlosser Z. Association of anthropometric factors and predisposition to carpal tunnel syndrome. *Chir Narzadow Ruchu Ortop Pol*. 2011;76:193–6.
4. Enhesari A, Saied A, Mohammadpoor L, et al. Presence or absence of palmaris longus and fifth superficial flexor digitorum; is there any effect on median nerve surface area in wrist sonography. *Iran J Radiol*. 2014;11:e14441.
5. Vögelin E, Mészáros T, Schöni F, et al.: Sonographic wrist measurements and detection of anatomical features in carpal tunnel syndrome. *Scientific World J* 2014, 2014:10.1155/2014/657906.
6. Stolp-Smith KA, Pascoe MK, Ogburn PL Jr. Carpal tunnel syndrome in pregnancy: frequency, severity, and prognosis. *Arch Phys Med Rehabil*. 1998;79(10):1285–7.
7. Padua L, Di Pasquale A, Pazzaglia Cr Liotta GA, Librante A, Mondelli M. Systematic review of pregnancy-related carpal tunnel syndrome. *Muscle Nerve*. 2010;42(5):697–702.
8. Mondelli M, Rossi S, Monti t, Aprile I, Caliandro P, Pa//aglia C, Romano C, Padua L. Prospective study of positive factors for improvement of carpal tunnel syndrome in pregnant vvomen. *Muscle Nerve*.

2007;36(6):778–83.

9. American Academy of Neurology. American Association of Electrodiagnostic Medicine, and the American Academy of Physical Medicine and Rehabilitation. Practice parameter for electrodiagnostic studies in carpal tunnel syndrome (summary statement). *Neurology*. 1993;43(11):2404–5.
10. Cirakli A, Ulusoy EK, Ekinçi Y. The role of electrophysiological examination in the diagnosis of carpal tunnel syndrome: Analysis of 2516 patients. *Niger J Clin Pract*. 2018;21:731–4.
11. Stevens JC. AAEM minimonograph #26: the electrodiagnosis of carpal tunnel syndrome. American Association of Electrodiagnostic Medicine. *Muscle Nerve*. 1997;20(12):1477–86.
12. Johnson EW, Hennessey WJ. Carpal tunnel syndrome. In: Johnson EW, Pease WS, editors. *Practical electromyography*. 3rd ed. USA: Williams & Wilkins; 1997. pp. 195–8.
13. Khosrawi S, Maghrouri R. The prevalence and severity of carpal tunnel syndrome during pregnancy. *Adv Biomed Res*. 2012;1:43. doi:10.4103/2277-9175.100143. Epub 2012 Aug 28.
14. Werner RA, Andary M. Electrodiagnostic evaluation of carpal tunnel syndrome. *Muscle Nerve*. 2011;44:597–607.
15. Dumitru D, Zwarts MJ. Focal peripheral neuropathy. In: Dumitru D, Zwarts MJ, Amanto AA, editors. *Electrodiagnostic medicine*. 2nd ed. Philadelphia: Hanley & Belfus; 2002. pp. 1047–126.
16. Jablecki CK, Andary MT, Floeter MK, Miller RG, Quartly CA, Vennix MJ, et al. Practice parameter: Electrodiagnostic studies in carpal tunnel syndrome. Report of the American Association of Electrodiagnostic Medicine, American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation. *Neurology*. 2002;58:1589–92.
17. Pacek CA, Tang J, Goitz RJ, et al. Morphological analysis of the carpal tunnel. *Hand*. 2010;5:77–81.
18. Osterman M, Ilyas AM, Matzon JL. Carpal tunnel syndrome in pregnancy. *Orthop Clin North Am*. 2012;43:515–20.
19. Finsen V, Zeitlmann H. Carpal tunnel syndrome during pregnancy. *Scand J Plast Reconstr Surg Hand Surg*. 2006;40:41–5.
20. Padua L, Aprile I, Caliandro P, Carboni T, Meloni A, Massi S, et al. Symptoms and neurophysiological picture of carpal tunnel syndrome in pregnancy. *Clin Neurophysiol*. 2001;112:1946–51.
21. Pazzaglia C, Caliandro P, Aprile I, et al. Multicenter study on carpal tunnel syndrome and pregnancy incidence and natural course. *Acta Neurochir Suppl*. 2005;92:35–9. doi:10.1007/3-211-27458-8_9.
22. Turgut F, Cetinşahin M, Turgut M, Bölükbaşı O. The management of carpal tunnel syndrome in pregnancy. *J Clin Neurosci*. 2001;8(4):332–4. doi:10.1054/jocn.2000.0761.
23. 10.1186/1471-2393-14-312
Truijens SE, Meems M, Kuppens SM, et al. The HAPPY study (Holistic Approach to Pregnancy and the first Postpartum Year): design of a large prospective cohort study. *BMC Pregnancy Childbirth*. 2014;14:312. Published 2014 Sep 8. doi:10.1186/1471-2393-14-312.