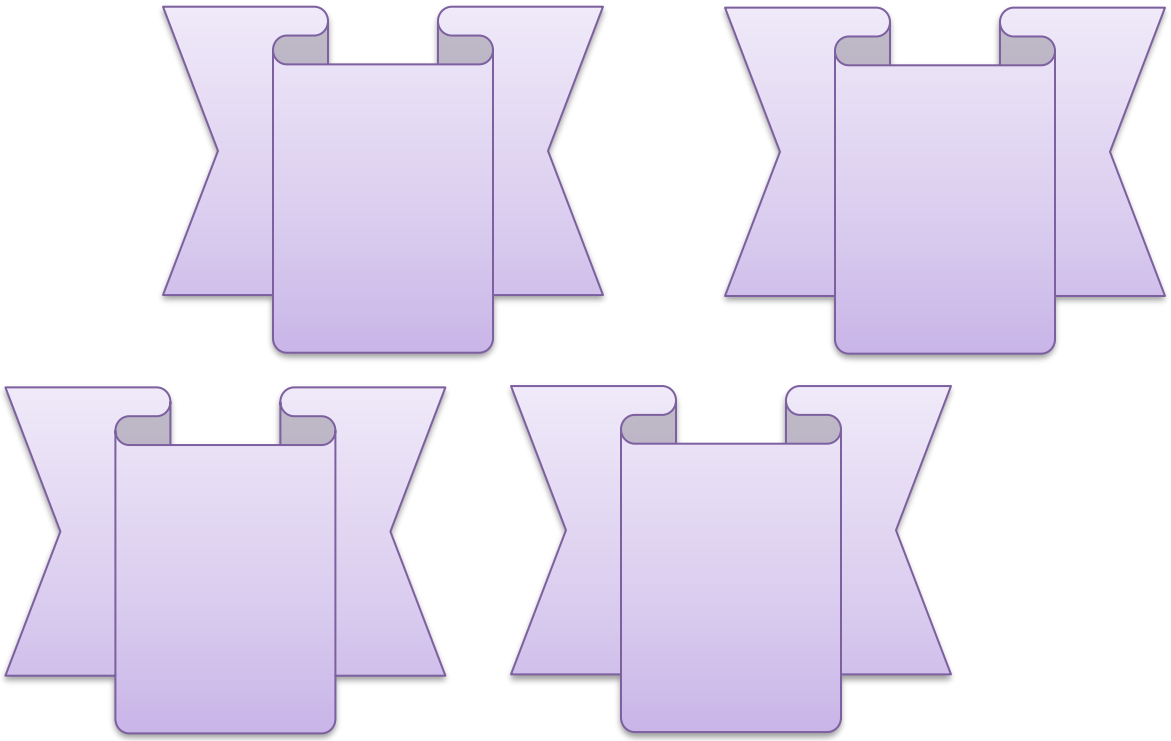
International Journal of Medical Arts

Volume 5, Issue 4, April 2023

https://ijma.journals.ekb.eg/



Print ISSN: 2636-4174

Online ISSN: 2682-3780

Available online at Journal Website
https://ijma.journals.ekb.eg/
Main Subject [Neurology]

Original Article

Epidemiological Study of Prevalence of Entrapment Neuropathies Among Pregnant Women Attending the Hospital and Health Care Center in New Damietta

Omar Saad Elnady [1]*, Kamel Mahmoud Hewedi [2], Hossam Abdelmonem Ali [1], Ayman Ahmed Ibrahim [3]

[1] Department of Neurology, Damietta Faculty of Medicine, Al-Azhar University, Damietta, Egypt

[2] Department of Neurology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

[3] Department of Public Health and Community Medicine, Damietta Faculty of Medicine, Al-Azhar University, Damietta, Egypt

Article information

Received: 01-01-2023

Accepted: 06-05-2023

DOI: 10.21608/IJMA.2023.184678.1589.

*Corresponding author

Email: omarelnady747@gmail.com

Citation: Elnady OS, Hewedi KM, Ali HA, Ibrahim AA. Epidemiological Study of Prevalence of Entrapment Neuropathies Among Pregnant Women Attending the Hospital and Health Care Center in New Damietta. IJMA 2023 April; 5 [4]: 3146-3152. doi: 10.21608/IJMA. 2023.184678.1589.

ABSTRACT

Background: Reproductive hormone release during pregnancy induces a cascade of other physiological changes that can have an impact on the peripheral nerve. Meralgia paresthetica and carpal tunnel syndrome are two entrapment neuropathies that frequently occurred during pregnancy.

Aim of the work: This study aims to estimate the prevalence of entrapment neuropathy and related risk factors among pregnant women in New Damietta.

Patients and Methods: Our study is a cross-sectional community-based study that included 1200 pregnant women. We collected our data in 3 steps, first by questionnaire, then the positive cases by questionnaire had undergone clinical examination, and the positive cases from examinations were confirmed by the neurophysiological study.

Results: Prevalence of entrapment neuropathy was 10.4% by questionnaire, and 7.2% by examination. The accurate prevalence was confirmed by the nerve conduction study, which was 5.5%. Spearman correlation analysis was done to detect the correlation between the trimester, order of pregnancy, and neuropathy, and we found a significant positive correlation between the trimester and the neuropathy [r = 0.23, p-value = 0.03]. Binary logistic regression analysis was done to determine the significant predictors of Entrapment neuropathy in pregnant females as regards the results of the neurophysiological investigation. We found that the only significant factor which can predict the occurrence of entrapment neuropathy is the third trimester, P value < 0.04 which means that pregnant females in the second trimester have a lower risk of developing neuropathy than females in the third trimester by a degree of 12.2%

Conclusion: The prevalence of entrapment neuropathies in pregnant women in Damietta is 5.5% are distributed as median, lateral femoral cutaneous. Facial, peroneal, intercostal nerves [3%, 2.7%, 1%, 0.2%, 1.8% respectively] With a predictor is the third trimester.

Keywords: Entrapment neuropathy, Pregnant Women, Neurophysiological study.

INTRODUCTION

Epidemiological studies of entrapment neuropathy in Egypt are few. The most frequent form of neuropathy is compression neuropathy, which occurs when a nerve is pushed on at one of its many vulnerable anatomical points [1].

During pregnancy, the peripheral nerve may be impacted by several physiological changes associated with the release of reproductive hormones. Meralgia paresthetica and carpal tunnel syndrome are two entrapment neuropathies that frequently occur during pregnancy [2]. Carpal tunnel syndrome [CTS] has a 4% prevalence in the general population, a 10% prevalence among those who work, and a prevalence between 31% and 62% in pregnant women [3].

Bell's palsy is the most prevalent facial nerve disorder. Pregnancy does not alter the clinical course or the symptoms experienced by the patient. Clinical evaluation is sufficient for diagnosis; detailed imaging or electrophysiological testing is unnecessary. It appears that prenatal obesity and hypertensive problems both increase the likelihood of developing Bell's palsy [4]. Pregnant women with intercostal neuralgia presented with pain [mild to severe] in the thoracic region. The cause of this neuralgia is unclear, However, it may be due to mechanical pressure on the thoracic roots by the fetus enlargement [5].

In this study, we aimed to estimate the prevalence of entrapment neuropathy and related risk factors among pregnant women in New Damietta.

PATIENTS AND METHODS

Study population: Our study is a cross-sectional community-based study that included 1200 pregnant women to estimate the prevalence of entrapment neuropathy at Al-Aznar university hospital, Damietta **.**From March 2022 to Sept 2022. Our study followed the guidelines of the Helsinki Declaration, and ethical approval was obtained from the Institutional Review Board of Damietta Faculty of Medicine, Al-Azhar University. We recruited the participants after taking informed consent. We excluded any participant with a history of medical disorders that could affect peripheral nerve diseases such as diabetes and chronic renal failure.

Data collection: The pregnant women will be recruited from obstetric out clinic of Al-Azhar University hospital and maternal health center of New Damietta City. We collected our data in 3 steps, first by questionnaire, then the positive cases by questionnaire had undergone clinical examination, and the positive cases from examinations were confirmed by the neurophysiological study.

Questionnaire: The questionnaire was translated into Arabic and was previously used by **Khedr *et al.*** [6] in Assiut, Egypt with sensitivity and specificity of 97 % and 86 %, respectively. The questionnaire was divided into two parts; Part I recorded the socio-demographic information, and Part II involves screening questions for diagnosis of neuropathy.

Part II questions divided into two sets of questions;

A] Standard screening questionnaire for diagnosis of neuropathic disorders. It includes the following questions:

[1] Have you ever had trouble walking more than other people of the same age and which is not due to arthritis?

[2] Have you ever had weakness or numbness or tingling in the hands or feet lasting for more than 24 h?

[3] Have you ever had clumsiness in the use of the fingers for fine work?

B] Screening questionnaire for diagnosis of each type of focal compression neuropathies, which was as follows:

CTS was diagnosed if any 2 of the following criteria are fulfilled: [1] Paresthesia in the hands, particularly at night, [2] Weakness and wasting in the abductor policies' brevis or other muscles innervated by the median nerve, or [3] Numbness in the distribution of the median nerve.

Ulnar nerve entrapment at the elbow was diagnosed if one or more of the following criteria are fulfilled: [1] Numbness and tingling in the little and ulnar half of the ring fingers, [2] Claw deformities of the fourth and fifth fingers and loss of grip, or [3] Wasting of the intrinsic musculature in the hand.

Radial nerve palsy was diagnosed if the patient failed to extend the wrist and it hangs flaccidly. Tarsal tunnel syndrome was diagnosed when the patient complains of burning pain in the plantar aspect of the foot, often in the metatarsal area, with a positive Tinel's sign over the area of the tarsal tunnel. Common peroneal nerve [CPN] entrapment was diagnosed by: [1] numbness along the lateral aspect of the leg; [2] acute foot drop.

This questionnaire was modified to include all affected nerves as Bell's palsy, lateral femoral cutaneous nerve of the thigh, brachial plexus, intercostal nerves, and obturator nerve. Also, we did some modifications to the questionnaire of **Khedr *et al.*** [6] according to the criteria of diagnosis of nerve entrapment that are not present in the questionnaire. The modification was made under the supervision of experts from the neurology department, then a pilot study was conducted in March 2022 on 120 pregnant women.

Examination: All positive cases were submitted for full history taking, general examination including [BMI, weight and height], full neurological examination, and laboratory investigation.

Nerve conduction study: Nerve conduction studies were achieved via Nihon Kohde apparatus; Model UT- 0800 J. Box BOARD [2CH] For JB-942BK. Made in Tokyo, Japan. That includes:

Motor nerve conduction: nerve conduction study was operated by electrical stimulation of peripheral nerves [facial, median, ulnar, radial, common peroneal, and posterior tibial nerves] and reporting amplitude, motor latency, and conduction velocity from a Recording muscle supplied by these nerves [frontalis / nasalis, abductor pollicis brevis, abductor digit minimi muscle, extensor indices, extensor digitorum brevis, and abductor halluces, respectively].

Reference: 3 to 4 cm distal to the active electrode. **Ground electrode:** Positioned between the recording electrode and the stimulator.

Sensory nerve conduction [sensory NCS] [antidromic]: was operated by electrical stimulation of peripheral nerves [median, ulnar, radial] and reporting the amplitude, sensory latency, and conduction velocity Recording form [index, little finger, dorsum of 1st web space, respectively] lateral femoral cutaneous nerve Recording Site: G1 placed over the anterior thigh, 12 cm distal to the stimulation site, on a line drawn directly from the anterior superior iliac spine [ASIS] to the lateral patella G2 placed 3–4 cm distally. Stimulation Site: 1 cm medial to the ASIS. Ground electrode: Sited between the stimulator and the recording electrode [7].

The cut-off value for the motor median, ulnar, radial, tibial, peroneal, and facial nerve studies, the least normal compound motor action potentials [CMAP] of amplitude was 5.2 mv, 4.2 mv, 3.2 mv, 3.6 mv, and 3.1 mv, 1.0 mv respectively, and the least motor nerve conduction velocity of the median, ulnar, radial, tibial, and peroneal nerves were 49 m/s, 51.2 m/s, 62.9 m/s, 42.9 m/s, and 48.4 m/s, respectively.

The cutoff value for the sensory median, ulnar and radial nerve studies, the least normal sensory nerve action potentials [SNAP] were 15 uV, 18.9 uV, and 16.4 uV, respectively, and the least sensory nerve conduction velocity of the median, ulnar nerves were 38.8 m/s and 37.9 m/s, respectively and diagnosis of lateral femoral cutaneous nerve Important to get the side-to-side comparison, side-to-side amplitude difference of >50% is considered abnormal [7, 8].

Statistical analysis: All data analysis was done using the SPSS version 26. Categorical data were presented as numbers and percentages and were compared using the Chi-Square Test. The normality of continuous data was initially checked by the kolmogorov-smirnov test. All continuous data were not parametric, so we present them as median and Interquartile range [IQR], and were compared using the Mann-Whitney U-test. Spearman correlation analysis was done to detect the correlation between the different parameters. Binary logistic regression analysis was done to determine the predictors of entrapment neuropathy in pregnant females.

RESULTS

Our study included 1200 pregnant women, 124 of them suspected to have entrapment neuropathy. We collected our data in 3 steps, first by questionnaire, then the positive cases by questionnaire had undergone clinical exam, and the positive cases [87; 7.2%] from examination, sixty-six cases of them were confirmed by the

neurophysiological study, giving 5.5%, of focal compression neuropathies [median, lateral femoral cutaneous. Facial, peroneal, intercostal nerves] [37 [3%], 34 [2.7%], 13[1%], 3 [0.2%], 22 [1.8%] respectively]. The remaining 58 cases had negative neurophysiological findings for focal neuropathies, 22 cases of intercostal neuroglia difficult to perform the neurophysiological study, 16 cases with normal neurophysiological findings [mostly psychogenic], 12 cases with radicular pain, 8 cases of musculoskeletal pain.

Table [1] shows the prevalence of entrapment neuropathy in each step of data collection and in each pregnancy trimester, which was 10.4%, and 7.2% by questionnaire, and examination respectively. The accurate prevalence was confirmed by a nerve conduction study, which was 5.5%.

Table [2] shows the demographic characteristics of the patients. The median and IQR age and BMI of the patients were 25 [23 – 27] years, and 23 [21 – 26] Kg/m2 respectively. Most of the included patients were in the 3rd trimester [48.4%], and the order of pregnancy was the 2nd in most cases [43.4%]. As regards the residency of the patients, 63.7% of the patients were from urban areas, and 36.3% were from rural areas. Regarding the patient's jobs, 53.2% were housewives, 35.55% were teachers, 4.8% were farmers, and 2.4% were doctors.

In our study, the most accurate step to diagnose neuropathy was the nerve conduction study. So, positive cases of examination had undergone nerve conduction study to confirm the diagnosis. A Nerve conduction study was done on 75 cases. Sixty-six of them were confirmed as positive neuropathy, and only 9 cases were confirmed as negative neuropathy. We compared the positive and negative cases as regards all reported variables to determine the predictors of neuropathy in pregnant females, and we found that most of the positive cases were, at the age of 25 [23 -28] years, BMI of 23 [21 -26] [Kg/m2], in the third trimester, in their second pregnancy, from the urban areas, working as a housewife, and complaining from the median, meralgia paresthetica, and fascial nerve neuropathy. However, the difference between the positive and negative cases was statistically significant regarding the following only; trimester, and order of pregnancy [P value < 0.013, and 0.018] [table 3].

Spearman correlation analysis was done to detect the correlation between the trimester, order of pregnancy, and neuropathy, and we found a significant positive correlation between the trimester and the neuropathy [r = 0.23, p-value = 0.03] [table 4].

Binary logistic regression analysis was done to determine the significant predictors of Entrapment neuropathy in pregnant females as regards the results of the neurophysiological investigation. We found that the only significant factor which can predict the occurrence of entrapment neuropathy is the trimester, P value < 0.04 which means that pregnant females in the second trimester have a lower risk of developing neuropathy than females in the third trimester by a degree of 12.2%, or we can say that pregnant females in the third trimester have a higher risk of developing neuropathy than females in the first and second trimester by a degree if 12.2% [table 5].

The odds [probability] of being in 3rd trimester among the positive neuropathy patients was 29.2 times the odds of being in the 1st trimester among the control group. The odds [probability] of being in 3rd trimester among the positive neuropathy patients was 2.9 times the odds of being in the 2nd trimester among the control group. The odds [probability] of being in 2nd trimester among the positive neuropathy patients was 9.7 times the odds of being in the 1st trimester among the control group [table 6].

Table [1]: Pregnancy entrapment neuropathy by Questionnaire, clinical examination and neurophysiology among studied group

Pregnancy trimester						
		Total [n]	**%**	**1st**	**2nd**	**3rd**
Number of cases		1200	100	300	410	590
Methods	Questionnaire	124	10.4	8	30	50
	Clinical examination	87	7.2	14	31	42
	Neurophysiology study	66	5.5	5	20	41

Table [2]: Demographic characteristics of the neuropathic patients [n=124]

Age [years] [Median and IQR]	25 [23 – 27]
BMI [Median and IQR] global	23 [21 – 26]
Trimester n [%]	
First	18 [14.5%]
Second	46 [37.1%]
Third	60 [48.4%]
Order of pregnancy n [%]	
First	49 [39.5%]
Second	54 [43.5%]
Third	19 [15.3%]
Fourth	2 [1.6%]
Residency n [%]	
Urban	79 [63.7%]
Rural	45 [36.3%]
Job n [%]	
Doctor	3 [2.4%]
Teacher	44 [35.5%]
House wife	66 [53.2%]
Farmer	6 [4.8%]
Managerial	3 [2.4%]
Writer	2 [1.6%]

Table [3]: Predictors of Entrapment neuropathy as regarding nerve conduction study results

Variables	Positive neuropathy [n = 66]	Negative neuropathy [n = 9]	P value
Age [years] [Median and IQR]	25 [23 -28]	25 [21 -29.5]	**0.78** [a]
BMI [Kg/m^2] [Median and IQR]	23 [21 -26]	21 [20.5 -22.5]	**0.12** [a]
Trimester. N [%]			**0.013*** [b]
First	5 [7.5%]	1 [11.1%]	
Second	20 [30.3%]	7 [77.8%]	
Third	41 [62.1%]	1 [11.1%]	
Order of pregnancy. N [%]			**0.018*** [b]
First	20 [30.3%]	7 [77.8%]	
Second	32 [48.4%]	2 [22.2%]	
Third	14 [21.2%]	0 [0%]	
Culture. N [%]			**1** [b]
Urban	44 [66.6%]	6[66.6%]	
Rural	22 [33.3%]	3 [33.4%]	
Job. N [%]			**0.75** [b]
Doctor	3 [4.5%]	0 [0%]	
Teacher	15 [22.6%]	4 [44.4%]	
House wife	41 [62.1%]	5 [55.5%]	
Farmer	5[7.5%]	0 [0%]	
Writer	1 [1.5%]	0 [0%]	
Managerial	1 [1.5%]	0 [0%]	

Continuous data represented as median and IQR. Categorical variables represented as numbers and percentages [n%]. a: Mann-Whitney U test. b: Chi square test. *: significant at p value < 0.05.

Table [4]: Spearman correlation analysis of Nerve conduction study results with different parameters

Parameters	Neuropathy [NCS]	
	r	P value
Trimester	0.23	0.03*
Order of pregnancy	0.03	0.78

Table [5]: Binary logistic regression analysis to determine the Predictors of Entrapment neuropathy as regards the nerve conduction study

Variables	B	P value	Exp[B] [OR]
Trimester [third trimester]		.054	
First trimester	-2.104	.158	.122
Second trimester	-2.664	.016	.070

Table [6]: Odds ratio based on the nerve conduction study

		Positive neuropathy	Control group	OR
Trimester	First Third	5 41	39 11	**29.2**
	Second Third	20 41	16 11	**2.9**
	First Second	5 20	39 16	**9.75**

DISCUSSION

Damietta governorate is one of the new cities in Egypt, and its residents are distinguished by working men and women in factories, wood workshops, fishing, and agriculture. Therefore, they are exposed to entrapment neuropathies, and there is no epidemiological study in Egypt for entrapment neuropathies, so we did this study in pregnant women. based on a questionnaire, clinical examination, and confirm the diagnosis by neurophysiological study. We found the prevalence of entrapment neuropathies in pregnant women 5.5%, for focal compression neuropathies. our study is the first on entrapment neuropathies in pregnant women in Egypt.

We found the prevalence of CTS among pregnant participants was 3 %. that 41.8% and 53.8% in the aged group [20-29] and [30-39] years respectively. In a large retrospective study of 10,873 women who received antenatal care in Olmsted County, Minnesota, **Stolp-Smith *et al.*** [9] in the United States, found that 8% of the cases of carpal tunnel syndrome occurred in the first trimester, 32% in the second trimester, and 60% in the third trimester. No association was found with weight increase.

We collected our data in 3 steps, first by questionnaire; then, the positive cases had undergone clinical examination, and the positive cases from examination had undergone nerve conduction study. In contrast, **Rosier and Camdessanché** [3] depend on clinical diagnosis only. Carpal tunnel syndrome during pregnancy has an unknown cause. Pregnancy-related CTS has several hypothesized causes, including local oedema, hormonal changes [which may affect ligamentous flexibility], a shift in sleeping posture, and an increase in fatty tissue [10].

Kandil *et al.* [1] and **Khedr *et al.*** [6] found the prevalence of CTS in Qena/Egypt and Assiut/Egypt [1.77% with 2.9% for females, and 0.53% for males] [1.69% [1,686/100,000] with 3.1% for females and 0.31% for male] respectively. This difference could be explained by the nature of the study setting as they conduct their study in upper Egypt and our study in one of the newly constructed cities their study was conducted on the general population and our study was on a specific type of population. In the present study, most of the participants were housewives, of younger ages, and mainly from Urban areas unlike previous Egyptian studies on the general population they were mainly Rural citizens.

Pain in the hands during pregnancy is common, but carpal tunnel syndrome [CTS] is distinct from other forms of pregnancy-related hand pain because it often only occurs in the third trimester and is less severe and less likely to occur at night [11].

The prevalence of pregnancy-related CTS is likely underreported since neither patients nor doctors routinely report experiencing symptoms. Compared to the general population, the severity of the symptoms is lower [10].

In our study, we found the prevalence of peroneal entrapment neuropathy was 0.2 %. This agrees with **Massey and Stolp** [10] in North Carolina USA.

In our study, the prevalence of meralgia paresthetica was about 2.8 % in pregnant women mostly in the third trimester, rural more

than urban in affection. 4.3 cases of meralgia paresthetica occur per 100,000 people per year, according to research by **van Slobbe *et al.*** [12], who also found a statistical link between CTS and pregnancy, with the latter condition likely attributable to the mother's weight gain and/or the baby's position.

It is normal for pregnant women to experience meralgia paresthetica in their third trimester. Gaining weight or expanding the abdomen can put pressure on the sciatic nerve, putting it at risk for injury from stretching. This can happen at the inguinal ligament or where the nerve enters or exits the tensor fossa Lata. This is a clinical diagnosis, and the symptoms usually go away once the baby is born [13].

The prevalence rate of Bell's palsy in our study was about 1%. while **Rosier and Camdessanché** [3] found a prevalence of Bell's palsy during pregnancy [0.8%] in France. the risk of Bell's palsy may be higher, especially in the third trimester.

Khedr *et al.* [6] reported a lower prevalence of Bell's palsy. Bell's palsy is three times more likely to occur in pregnant or recently postpartum women than in women who have not recently given birth [10]. Prevalence of Intercostal neuralgias was found to be 1.8 % while **Massey and Guidon** [5] found 1.3 % of participants of pregnant women in the USA. No electrodiagnostic test is mandatory for the diagnosis.

Conclusion: The prevalence of entrapment neuropathies in pregnant women in Damietta is 5.5 % are distributed as median, lateral femoral cutaneous, facial, peroneal, intercostal nerves [3%, 2.7%, 1%, 0.2%, 1.8% respectively] with a predictor is the third trimester.

Conflict of Interest and Financial Disclosure: None.

REFERENCES

1. Kandil MR, Darwish ES, Khedr EM, Sabry MM, Abdulah MA. A community-based epidemiological study of peripheral neuropathies in Assiut, Egypt. Neurol Res. 2012 Dec;34[10]: 960-6. doi: 10.1179/1743132812Y.0000000099.
2. Schmid AB, Fundaun J, Tampin B. Entrapment neuropathies: a contemporary approach to pathophysiology, clinical assessment, and management. Pain Rep. 2020 Jul 22;5[4]:e829. doi: 10.1097/PR9.0000000000000829.
3. Rosier C, Camdessanché JP. Neuropathy and pregnancy: An overview. Rev Neurol [Paris]. 2021 Mar;177[3]:220-224. doi: 10.1016/j.neurol.2020. 04.024.
4. Katz A, Sergienko R, Dior U, Wiznitzer A, Kaplan DM, Sheiner E. Bell's palsy during pregnancy: is it associated with adverse perinatal outcome? Laryngoscope. 2011 Jul;121[7]:1395-8. doi: 10.1002/lary.21860.
5. Massey EW, Guidon AC. Peripheral neuropathies in pregnancy. Continuum [Minneap Minn]. 2014 Feb;20[1 Neurology of Pregnancy]:100-14. doi: 10.1212/01.CON.0000443839.02884.bb.
6. Khedr EM, Fawi G, Allah Abbas MA, El-Fetoh NA, Zaki AF, Gamea A. Prevalence of Common Types of Compression Neuropathies in Qena Governorate/Egypt: A Population-Based Survey. Neuroepidemiology. 2016;46[4]:253-60. doi: 10. 1159/000444641.
7. Ali HA, Al-Adl AS. Neurophysiological biomarkers of peripheral nervous system affection in patients with stable chronic obstructive pulmonary disease [COPD]. Egypt J Neurol Psychiatry Neurosurg. 2021 Dec;57[1]:144. doi: 10.1186/s41983-021-00400-6.
8. Electromyography and Neuromuscular Disorders.2013.3rd ed - David C. Preston.pdf.
9. Stolp-Smith KA, Pascoe MK, Ogburn PL Jr. Carpal tunnel syndrome in pregnancy: frequency, severity, and prognosis. Arch Phys Med Rehabil. 1998 Oct;79[10]:1285-7. doi: 10.1016/s0003-9993[98]90276-3.
10. Massey EW, Stolp KA. Peripheral neuropathy in pregnancy. Phys Med Rehabil Clin N Am. 2008 Feb;19[1]:149-62, vii-viii. doi: 10.1016/j.pmr. 2007.10.004.
11. Meems M, Truijens S, Spek V, Visser LH, Pop VJ. Prevalence, course and determinants of carpal tunnel syndrome symptoms during pregnancy: a prospective study. BJOG. 2015 Jul;122[8]:1112-8. doi: 10.1111/1471-0528.13360.
12. van Slobbe AM, Bohnen AM, Bernsen RM, Koes BW, Bierma-Zeinstra SM. Incidence rates and determinants in meralgia paresthetica in general practice. J Neurol. 2004 Mar;251[3]:294-7. doi: 10.1007/s00415-004-0310-x.
13. Coffey R, Gupta V. Meralgia Paresthetica. 2022 May 12. In: StatPearls [Internet]. Treasure Island [FL]: StatPearls Publishing; 2023 Jan–. PMID: 32491667.

International Journal of Medical Arts

https://ijma.journals.ekb.eg/
Print ISSN: 2636-4174
Online ISSN: 2682-3780