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Original Research Article

Spectrum of neurological disorders in pregnancy in a neurology clinic in eastern Uttar Pradesh

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ABSTRACT

Background: Pregnancy-induced endocrinal and physiological changes increase the risk of neuropathy and musculoskeletal problems in pregnancy. The purpose of this study is to provide a comprehensive look at the neurological and musculoskeletal disorders occurring during pregnancy.
Methods: A total of 202 antenatal women with neurological and musculoskeletal problems were enrolled for study. Their demographic characteristics were noted. Detailed clinical history and neurological examination was done. Radiological investigations including x-ray, CT head, MRI brain, MRA, MR Venography with electrophysiological NCS studies were performed accordingly.
Results: Among musculoskeletal symptoms most prevalent was LBA (50%), cramps (15.7 %) followed by pelvic girdle pain (10%) and wrist pain (8,5). Among peripheral neurological disorders most common was CTS (12.37%) followed by bells palsy. Among Central neurological disorders most common was headache (26.23%), seizures (12.37%), eclampsia (2.47%), followed by Cortical venous thrombosis CVT, BIH, PRES.
Conclusions: Among musculoskeletal complaints the most frequent symptoms during pregnancy were low back pain, hip joint pain, cramps and wrist pain. Among neuropathies CTS prevalence was relatively higher in pregnant women especially in third trimester and was mostly bilateral. Among central neurological symptoms headache especially migraine without aura and seizures were common while eclampsia, CVT, BIH, PRES were less common.

Keywords: MRA, Carpal tunnel syndrome, Nerve conduction study, Benign intracranial hypertension, Posterior

INTRODUCTION

Pregnancy is associated with anatomical and physiological changes, such as decreased vascular resistance, increased vascular permeability and cardiac output. Hormonal and physiological changes occurring during pregnancy can cause numerous musculoskeletal problems and neuropathies. Hypercoagulability state of pregnancy itself increases the risk of thromboembolism. In these situations, elevated levels of progesterone induce vasodilation, vascular stasis and edema, which further increase the risk of thromboembolism. The prevalence of musculoskeletal problems in pregnancy can vary according to socio-cultural and environmental factors. Heavy housework and working conditions, having many children, depression, anxiety and also violence can trigger many musculoskeletal problems. Some peripheral neuropathies (carpal tunnel syndrome, peripheral facial palsy) and some central neurological disorders (seizure, migraine, cerebrovascular malformations, epilepsy) may be more frequent during pregnancy due to an exacerbation of a pre-existing neurological condition, or by an acute onset of a neurological disorder associated with physiological changes engendered by pregnancy (such as headache or vascular disorders).[1-4] An estimated 0.2% to 0.7% of pregnant female suffer from epilepsy, one of the most

common major neurological complication during the pregnancy. Both peripheral and central neurological disorders can occur during the third trimester of pregnancy. Early diagnosis and treatment of musculoskeletal problems in pregnancy is significantly important in order to increase the quality of life and prevent the development of chronic disorders. The aim of this review is to describe and characterize the most common peripheral and central neurological disorders during each trimester of pregnancy.

METHODS

This was a descriptive study conducted from May 2019 to May 2021 at Shikhar neuro clinic and research centre OPD, Gorakhpur, Uttar Pradesh. A total of 202 pregnant women were included in the study. The study included antenatal women with aged over 18 years attending neurology clinic for various neurological and musculoskeletal symptoms. Chronic musculoskeletal disorder and history of orthopedic surgery that may be a reason of musculoskeletal symptoms other than pregnancy were excluded. All the patients were investigated as per appropriate guidelines.

Demographic characteristics of the patients comprising age, weight, employment status, socioeconomic status, gestational age of pregnancy, parity and presence of other disorders (gestational diabetes, hypertension) were recorded from the medical records and face-to-face interviews. interviews. Detailed history and clinical examination was done. Musculoskeletal pain sites were defined as hand–wrist, elbow, shoulder, neck, back, low back, hip, knee, and ankle–foot. The symptoms of all those musculoskeletal conditions were described to the participants. Leg muscle cramp was described as a strong, painful contraction or tightening of a muscle in the thigh, the calf or the foot that comes on suddenly and lasts from a few seconds to several minutes. The symptoms of CTS were described as tingling, numbness, weakness, or pain in the fingers or hand. Bells palsy was described as asymmetrical weakness involving eye and face. Meralgia paresthetica was described as numbness, pain or an irritating sensation felt in the outer thigh. The symptoms of tarsal tunnel syndrome were described as tingling, numbness, or pain in the sole of the foot. The interviews with participants were done to assess their neuropathic and musculoskeletal pain separately at each trimester follow-up visit. Lastly appropriate blood investigations, radiological investigations including CT head, MRI brain with MRA angiography, MRV venography with electrophysiological electrodiagnostic NCS studies performed accordingly. All antenatal patients were referred to BRD Medical college, Gorakhpur for obstetric care.

Data analysis was performed using Statistical package for social sciences (SPSS) for Windows, version 15.0. The data were treated in a descriptive and inferential manner. The chi-square test was used to compare the data. The statistical significance level was determined at $p<0.05$.

RESULTS

A total of 202 women were enrolled for study during study period from May 2019 to May 2021.

Table 1: The demographic characteristics of the pregnant women.

Demographic profile	N=202
Age median	30.9±5.0
Weight (mean ± SD) (kg)	71.45±12.26
Height (mean±SD) (cm)	159.78±6.34
Socioeconomic status	
Upper SEC	13 (6.44%)
Middle SEC	65 (32.18%)
Lower SEC	123 (60.89%)
Working	24 (11.88%)
Not working	178 (88.11 %)
Parity	
Nulliparity	78 (38.6%)
Multiparity	124 (61.4 %)
Trimester	
1ST	26 (12.87%)
2nd	52 (25.74%)
3rd	124 (61.38%)

Table 2: Spectrum of neurological problems in enrolled patients.

Neurological disorder	N=202
Musculoskeletal symptoms	70 (34.65%)
Peripheral neuropathy	37 (18.32%)
Central neurological disorder	95 (47.02%)

Table 1 demonstrate demographic characteristics of participants. Median age of patients was 30.9±5.0. Mean weight was 71.45±12.26 and mean height was 159.78±6.34. Considering socioeconomic status 13 (6.44%) were belonged to upper SEC, 65 (32.18%) were belonged to middle SEC and maximum 123 (60.89%) patients were of low SEC. 178 (88.11 %) patients were non working and only 24 (11.88%) were working. Maximum 124 (61.4 %) patients were multipara and 78 (38.6%) patients were nullipara. Most of the pregnant female enrolled belongs to 3rd trimester124 (61.38%).

(Table 2) This table shows the frequency of neurological disorders in enrolled patients. Most common symptom was of central nervous system in 95 (47.02%) patients followed by musculoskeletal symptoms in 70 (34.65%). 37 (18.32%) patients were presented with peripheral neuropathy.

Table 3: Spectrum of musculoskeletal symptoms in enrolled patients.

Musculoskeletal symptoms	Total, N=202	Ist trimester	2nd trimester	3rd trimester
LBA	35 (17.33%)	4 (11.42%)	20 (57.14%)	11 (31.43%)
Pelvic girdle pain	7 (3.47%)	0 (0%)	4 (57.14%)	3 (42.85%)
Neck/shoulder pain	5 (2.48%)	1 (20%)	3 (60%)	1 (20%)
Wrist joint pain	6 (2.97%)	1 (16.67%)	3 (50%)	2 (33.33%)
Elbow pain	3 (1.49%)	0 (0%)	1 (33.33%)	2 (66.67%)
Cramp	11 (5.45%)	1 (9.09%	6 (54.55%)	4 (36.36%)
Dequervain tendinitis	1 (0.49%)	0 (0%)	1 (100%)	0 (0%)
Trigger finger	1 (0.49%)	0 (0%)	0 (0%)	1 (100%)
Coccydynia	1 (0.49%)	0 (0%)	1 (100%)	0 (0%)

Table 4: Spectrum of peripheral neuropathies.

Perpheral neuropathy N=37 (18.32%)	Total n=202	1st trimester	2nd trimester	3rd trimester
Carpal tunnel syndrome	25 (12.37%)	3	7	15
Bells palsy	6 (2.97%)	1	2	3
6th cranial nerve	2 (0.99%)	0	1	1
Tarasal tunnel syndrome	1 (0.49%)	0	1	0
Digitalgic pain	1 (0.49%)	0	0	1
Meralgia paresthetica	1(0.49%)	0	0	1
Cherlagia parathetica	1 (0.49%)	0	0	1

Table 5: Spectrum of central neurological disorders in antenatal patients.

Cental neurological disorder N=95 (47.02%)	Total N= 202	1st trimester	2nd trimester	3rd trimester
Headache	53 (26.23 %)	10	12	31
Seizure	25 (12.37%)	2	5	18
Eclampsia	5 (2.47%)	0	1	4
CVT	4 (1.98%)	0	1	3
Press	3 (1.49%)	0	0	3
CVA	2 (0.99%)	0	0	2
BIH	3 (1.49%)	1	1	1

Table 6: Spectrum of headache in antenatal patients.

Headache	Total N=53 (26.23%)	1st trimester	2nd trimester	3rd trimester
Migraine without aura	35 (17.32%)	6	8	21
Migraine with aura	8(3.96%)	2	1	5
Tension headache	6 (2.97%)	1	1	4
Cluster headache	2 (0.99%)	1	0	1
Snuct	1 (0.49%)	1	0	0
Trigeminal neuralgia	1 (0.49%)	1	0	0

(Table 3) shows the frequency of musculoskeletal symptoms in antenatal patients. 70 (34.65%) out of 202 patients had musculoskeletal symptoms. Low backache was most common musculoskeletal symptoms 35 (17.33%) followed by cramp 11 (5.45%), then pelvic girdle pain 7 (3.47%) while 6 (2.97%) patients had wrist joint pain and 5 (2.48%) patients had neck/shoulder pain. 3 (1.49 %) had elbow pain. Dequervain tendinitis, trigger finger and coccydynia were least common.

(Table 4) Peripheral neuropathies was noticed in 37 (18.32 %) patients. Among peripheral neurological disorders most common was CTS (n=25 ,12.37%) followed by bells palsy (n=6, 2.97%). CTS was more common in 3rd trimester as compared to 1st and 2nd trimester ($p<0.005$).

Among these 2 (0.99%) patients presented with 6th cranial nerve palsy while each 1 (0.49%) patients presented with cherlagia, parathetica meralgia, parathetica, tarasal tunnel syndrome and digitalgic pain.

Table 7: Classical presentation of CTS.

Symptoms	N = 25
Paresthesia	18
Pain and paresthesia	10
Diurnal day and night	7
Nocturnal pain	13
Numbness	17
Hand weakness	7
Wasting APB	2

(Table 5) Central neurological disorder was noticed in 95 (47.02%) patients. Among Central neurological disorders most common was headache (n=53, 26.23%), seizures (n=25, 12.37%), eclampsia (n=5, 2.47%), followed by CVT (N=4,1.98%). BIH and PRES were observed in 3 (1.49%) patients while CVA occurred in. 2 (0.99%). These cental disorders were more common in 3rd trimester as compared to 1st and 2nd trimester (p<0.005)

(Table 6) Among headache migraine without aura (n=35, 17.32%) was more common followed by migraine with aura (n=8, 3.96%) and tension headache (n=6, 2.97%). Cluster headache was present in 2 (0.99%) patients. Least common presentation was SNUCT and trigeminal neuralgia each 1 (0.49%).

Table 8: CTS - clinical severity and signs.

CTS n=25	Total	1st trimester	2nd trimester	3rd trimester
	N=25 (12.37%)	4	7	14
Mild	12 (5.9%)	2	3	7
Mod	6 (2.97%)	1	2	3
Severe	7 (3.46%)	1	2	4
Unilateral	10 (4.95%)	1	3	6
Bilateral	15 (7.42%)	1	5	9
Tinel sign	4 (1.98%)	0	2	2
Phalen sign	5 (2.47%)	0	2	3
Reversre phalen	3 (1.48%)	0	1	2

Table 9: Dominant hand involvement of CTS.

Hand with CTS	% laterality
Right	7
Left	3
Bilateral more right	6
Bilateral more on left	5
Bilateral equal	4

(Table 7) Most common presentation of CTS was parasthesia (n=18, 72%) followed by Pain and parasethisa (n- 10, 40%). Diurnal day and night Pain was observed in (n=7, 28%) patients while Nocturnal pain was noticed in (n=13, 52%), Numbness (n=17, 68%), Hand weakness (n=7, 28%) and APB wasting (n=2, 8%).

(Table 8) Further pregnant women having CTS involvement (n=25, 12.37%), bilateral presentation was observed in 15 (60%) while severe CTS was noticed in 7 (3.4%). The CTS prevalence in the first, second and third trimesters were 16%, 28%, and 56%, respectively and clinical sign were detected in (n=17, 68%). Tinel sign, phalen sign, reverse phalen was mostly positive in 3rd and 2nd trimester than first trimester.

(Table 9) Dominant hand was more affected whatever CTS presentation is bilateral or unilateral. During NCS study CTS was unilateral in 10 (4.95%) patients. Right hand involvement (n=7) was more common than left hand (n=3). Patients presented with Bilateral NCS abnormalities right predominance was presented in (n=6) while left predominance in (n=5). Bilateral equal NCS abnormality was detected in (n=4) patients.

Table 10: NCV EPS severity grading.

CTS EPS grading	Total CTS patients n=25	% of CTS
Grade 0	0	0%
Grade 1	3	12%
Grade 2	9	36%
Garde 3	6	24%
Grade 4	6	24%
Grade 5	1	4%
Grade 6	0	0%

(Table 10) NCV EPS severity grading is as follows: normal (grade 0); very mild (grade 1), CTS demonstrable only with most sensitive tests; mild (grade 2), sensory nerve conduction velocity slow on finger/wrist

measurement, normal terminal motor latency; moderate (grade 3), sensory potential preserved with motor slowing, distal motor latency to abductor pollicis brevis (APB) <6.5 ms; severe (grade 4), sensory potentials absent but motor response preserved, distal motor latency to APB <6. 5 ms; very severe (grade 5), terminal latency to APB >6.5 ms; extremely severe (grade 6), sensory and motor potentials effectively unrecordable (surface motor potential from APB <0.2 mV amplitude).

According to CTS EPS Severity grading system grade 2 abnormility was presented in 36% patients, grade 3 and 4 abnormality was present in 24% each. Grade 1 in 12% patient while severe grade 5 abnormality was detected in 4% patients.

DISCUSSION

The most frequent musculoskeletal pathology was lower back pain (50%) in our study. These results are consistent with the results obtained from several studies in the literature. In one study, lower back pain was reported in 68.8% of the 105 mothers who had given birth within the last 6 months and in another study it was reported 79.8%.[5] Not only in pregnancy but also in other patients, low back pain was reported the most common reason for admission by a pain clinic.[6] The most important factors implicated in the etiology of low back pain are; the center of gravity shifting to the front due to weight gain and the growth of the uterus, and the relaxation of the joints due to the increased relaxin levels.[7] These findings are in alignment with those of our study in terms of low back pain and pelvic girdle pain was most observed in the second trimester. Similarly, Ramachandra et al conducting a study of 261 primipara cases, found the highest prevalence of low back pain and pelvic girdle pain in the second trimester.[8] The decrease in the prevalence of back pain in the third trimester can be attributed to the increased need for rest resulting from the various changes that occur during pregnancy. In our study, the second most common musculoskeletal problem was cramp this was mostly reported in the second and third trimesters. These cramps mostly occur during sleep in the second half of pregnancy and last for only a few seconds. In the etiology of cramps during pregnancy, magnesium and calcium deficiency are mostly implicated.[9]

Carpal tunnel syndrome and peripheral facial palsy are common examples of minor peripheral neurological disorders in pregnancy. Peripheral facial palsy, also called Bell's palsy, is an idiopathic facial neuropathy named after Sir Charles Bell, who first described this condition and its link to pregnancy. The incidence is around 28–45:100.000 pregnancies; it is rarely recurrent and it is more common in the third trimester.[10,11]

The most frequent problem was found to be carpal tunnel syndrome which was mostly detected in the second and third trimester in the morning and at night. They are associated with fluid retention and nerve compression upon wrist flexion during sleep. Hormonal changes, fluid accumulation with a predisposition to edema, nerve hypersensitivity and glucose level fluctuations can all increase the risk of pregnant women developing symptoms of carpal tunnel syndrome.[12] The incidence of CTS in pregnant women is two to three times higher than in women who are not pregnant. The rate of CTS in pregnancy varies from 0.23% to 62%.[13,14] In the present study, frequency of CTS by electromyography methods was 12.37% (60% in third trimester), while in two other studies presentation in the third trimester was 28% and 43%.[15,16] The incidence varies from 2 to 70% during pregnancy depending on the diagnostic method and the physician.[17,18] However, unlike many studies, numbness and tingling sensation were prominent symptoms in our cohort of pregnant women with CTS. Pain was reported to be quite common among patients by other authors. We found that the incidence of numbness/ tingling during daytime was slightly higher than at night among the women.

Similar to other reports patients with bilateral symptoms of CTS outnumbered those with unilateral complaints in our study. The provocative tests (including tinels, Phalen's and reverse phalens sign) alone were insufficient to diagnose CTS precisely in patients. This may be the reason why the proportion of women with CTS who had positive provocative tests was 48%. Nonetheless, we found that the Phalen's sign and Durkan's test served as a useful guide and more accurate for CTS diagnosis in our population.

Central Neurological Disorders Headache is a common presenting complaint during pregnancy.[19,20] Despite the strong link between hormonal changes and headache, the recognition of non-hormonal factorsis crucial. A pulsating and unilateral headache, associated with nausea and/or vomiting and/or photophobia or phonophobia are typical symptoms of a migraine headache (MH) .[21-24.]

The increase in estrogen levels can be the source of MH with aura in susceptible women. In general, women with MH (with or without aura) can be assured that there are no adverse effects on pregnancy's outcome or maternal health.

Most pregnancy-related cerebral venous thrombosis (CVT) occurs in the third trimester of pregnancy and puerperium, accounting for 27 to 57% of all pregnancy-related strokes.[25,26] Common presenting complaints include headache (typically sub-acute), focal neurological deficits, seizures, altered mental status and signs of high intracranial pressure such as papilloedema.[27]

Limitations

Major limitation of our study was that it does not show true incidence of musculoskeletal or neurological symptoms in antenatal women as study was conducted at the super speciality centre of neurology.

CONCLUSION

The central and peripheral neuropathies was more prevalent than musculoskeletal symptoms. Among musculoskeletal complaints the most frequent symptoms during pregnancy were low back pain, hip joint pain Restless leg syndrome and wrist pain. Among neuropathies CTS prevalence was relatively high in pregnant women especially in third trimester and was mostly bilateral with nocturnal paraesthesia and numbness presentation. Central neurological symptoms headache especially without aura and seizures were more common while eclampsia, CVT, BIH, PRES were less common. The results of the study suggest that numerous musculoskeletal symptoms and neuropathies may complicate pregnancy especially in the third trimester. Obstetrician should be aware of these presentations so that they can do timely management and referral.

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