

Neurological Disorders in Pregnancy and Puerperium

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Abstract

Objectives: To study the clinical profile of the patients presenting with neurological disorders during pregnancy and puerperium.

Methods: The study was carried out at Father Muller Medical College, Karnataka, India between July 2015 to June 2016. All Patients in pregnancy or post abortal, post partum period attending to the Father Muller Medical College between July 2015 to June 2016 and requiring neurological consultation were included in the study.

Results: A total of 52 patients presented during pregnancy and puerperium with neurological disorders. Age of the patients ranged from 19 to 40 years. The total number of deliveries in the hospital during the period was 4285. Among 52 patients, included Epilepsy- 23 (44.2%), eclampsia-16 (30.76%) Cerebro vascular disorders-2 (3.8%), Central nervous system infections- 2 (3.8%), CNS tumors – 2 (3.8%), Neuropathies- 5 (9.6%), Metabolic encephalopathy-1(1.9%) and Nutritional encephalopathy -1(1.9%).In patients of epilepsy, the seizures had an equitable distribution in the trimesters and post partum period, were mainly of generalized type (90.9%) and were controlled in the majority (81.81%).

Conclusion: The incidence of neurological disorders in pregnancy and puerperium was fairly high. Epilepsy was the most common neurological condition following Eclampsia, CNS infections and Neuropathies. The treating team should have the complete knowledge of the effects of rare neurological disorders during pregnancy and puerperium.

Keywords: Epilepsy, Eclampsia, Cerebro vascular disorders, pregnancy, postpartum, Guillain-Barre syndrome.

I. Introduction

Pregnancy is a time of major hormonal and other physiological changes that can precipitate new neurological and psychiatric symptoms¹. Though neurological disorders during pregnancy and puerperium (NDDPP) represent a small subgroup, their range is broad². These disorders may be unrelated to the pregnant state (e.g., meningitis) or peculiar to or more prevalent during pregnancy (e.g., eclampsia, pelvic neural compression, cortical venous thrombosis)³. Pregnancy may affect the course of pre-existing neurological disorders such as epilepsy. A secondary neurological disorder (e.g., encephalopathy) can affect a pregnant patient with a non neurological medical disease. Identification and management of neurological disorders during pregnancy and puerperium (NDDPP) pose a special challenge to Neurologists and Obstetricians, and they should have thorough knowledge of impact of illness on maternal and fetal outcomes, risks of investigations, specific treatments and safety of breast feeding³. As many pregnancies are unplanned, diagnostic and therapeutic decisions should be taken to balance their beneficial and adverse effects on mother or child¹. It is ideal to consider every woman in reproductive age to be potentially pregnant from the very first visit¹.

The present study was undertaken with an objective of finding the common primary and secondary neurological disorders in pregnant and postpartum patients and to study their clinical features and course in relation to pregnancy.

II. Methods

The study was conducted in Father Muller Medical College between July 2015 and June 2016. All Patients in pregnancy or post abortal, post partum period (up to 6 weeks after the termination of pregnancy) presenting with predominantly neurological signs and symptoms evaluated with Inclusion criteria for the patients were:

1. Patients with primary medical disorders presenting with neurological manifestations.
2. Patients with a pre-existing neurological disorder.
3. Patients developing a primary neurological disorder during the course of pregnancy or puerperium. For all subjects, a detailed history was taken, a detailed examination including obstetric examination; basic investigations (complete blood count, liver and kidney function tests, serum electrolytes) and ultra sonogram.

Radiological imaging (CT/MRI brain or MRI spinal cord) was done in relevant cases only. Wherever possible, a definitive diagnosis was established based upon standard diagnostic criteria for individual conditions.

III. Results

A total of 52 patients presented during pregnancy/ puerperium with neurological disorders during the study period. The total number of deliveries in this hospital during the study period was 4285, giving an incidence of 1213 cases per 100000 deliveries. The distribution of various neurological disorders is given in Table 1. Among 52 patients, included Epilepsy- 23 (44.2%), eclampsia-16 (30.76%) Cerebro vascular disorders- 2 (3.8%), Central nervous system infections- 2 (3.8%), CNS tumors – 2 (3.8%), Neuropathies- 5 (9.6%), Metabolic encephalopathy-1(1.9%) and Nutritional encephalopathy -1(1.9%).29 were primigravida and 23 cases were multigravida.

Table 1: Distribution Of Neurological Disorders In The Study Group

Neurological Disorder	Number Of Cases	Percentage
1. Epilepsy	23	44.2%
2. Eclampsia	16	30.7%
3. Central Nervous System Infections	2	3.8%
4. Cerebrovascular Tumor	2	3.8%
5. Cerebrovascular Disorders	2	3.8%
6. Neuropathies	5	9.6%
7. Nutritional Encephalopathy	1	1.9%
8. Metabolic Encephalopathy	1	1.9%

Table 2 describes the age distribution studied which varied from 18-40 years, out of them maximum women were fallen in the age group of 30-35 years.

Table 2: Distribution Of Age Group Within The Study Group

Age Group In Years	Number Of Cases	Percentage
18-21	7	13.4 %
22-25	14	27 %
26-29	12	23 %
30-35	15	29 %
36-40	4	7.6 %

The details of cases presenting with epilepsy are summarized in table 3. Out of 23 patients, 21 had no abnormality on radiological imaging done prior to pregnancy and 2 had gliosis and granuloma in parietal lobe. Seizures were well controlled in 21 cases on one or more anti-epileptic drugs (AED) including phenytoin, carbamazepine and valproate. All 23 women with epilepsy during pregnancy had uncomplicated deliveries (13 cases underwent caesarean section for obstetric or fetal indication and 10 cases delivered vaginally). Among the gross congenital malformations, one baby had cleft palate with cleft lip.

Table 3: Clinical Features Of Patients With Epilepsy

	Number Of Cases	Percentage
1. Time In Relation To Pregnancy		
First Trimester	6	27.27%
Second Trimester	5	22.7%
Third Trimester	8	36.36%
Postpartum	4	17.4%
2. Type Of Seizures		
Generalized Tonic Clonic Type	21	91.3%
Simple Partial	2	0.9%
3. Number Of Seizures At Presentation		
Single Episode	19	82.60%
Multiple Episodes	4	18.18%
Status Epilepticus	-	
4. Onset Of Seizures And Poor Seizure Control		
New Onset During Pregnancy	4	17.4%
Recurrent During Pregnancy	19	86%
5. Adequate Control On Aed During The Study		
Seizures Controlled	21	91.3%
Seizures Not Controlled	2	0.9%

Eclampsia was the second most common neurological condition, affecting 16 cases as mentioned in table 1. Among the 15 patients, 9 developed eclampsia during antenatal period, one developed before delivery,

and the remainder has eclamptic seizures within 24 hours of delivery (table 4). Eclampsia was associated with one perinatal and 2 neonatal death.

Table 4: Onset Of Eclampsia In Relation To Pregnancy

Eclampsia	Number Of Cases	Percentage
Antepartum	9	56.25%
Intrapartum	1	6.66%
Postpartum	6	40%

Table 4 describes about the onset of eclampsia among the 16 cases. Majority were ante partum (53.3%). 10 cases (66.66%) among the 15 cases were diagnosed with pregnancy induced hypertension, 11 (73.3%) had received prophylactic magnesium sulphate regimen. Except one case all were taken up for caesarean delivery. 9 cases (60%) were preterm delivery and rest was term delivery.

Complications in relation to eclampsia are summarized in table 5. Among the 16 cases, four cases (26.6%) had abruption, three cases (20%) had DIC who needed ventilator support, two cases (13.3%) had PRES and rest of the complications as listed in the table 5.

Table 5: Complications In Eclampsia Cases

Complications	Number Of Cases	Percentage
Pres	2	13.3%
Hypertensive Retinopathy	1	6.6%
Abruptio	4	26.6%
Hellp Syndrome	2	13.3%
Trauma	1	6.6%
Iud	1	6.6%
Dic	3	20%
Ventilatory Support	3	20%

Out of 52 patients, two patients presented with poliomyelitis in first and second trimester, antenatal period were uneventful, underwent elective caesarean section in view of contracted babies, and had a healthy baby (table 6).

Table 6: Cerebro-Vascular Infections

Clinical Scenario	Investigations	Outcome
22 Yr Primi With 38 Weeks Gestation With Poliomyelitis	-----	Caesarean Section With Good Outcome
39 Yr Primi With Term Gestation With Residual Poliomyelitis	-----	Caesarean Section With Good Outcome

Out of 2 cerebro-vascular disorders, both were cortical vein thrombosis. Both the cases presented during postpartum period with complain of headache and left partial seizures (table 7). However, both didn't have a good outcome.

Table 7: Cerebro-Vascular Disorders

Clinical Disorder	Investigations	Outcome
21 Year, Multigravida 3 Weeks Postpartum With Headache	Ct- Left Fronto Temporal Hemorrhagic Venous Infarct Mrv: Sss Thrombosis	Residual Motor Paralysis
25 Years, Primigravida 3-4 Weeks Postpartum, Headache, Left Partial Seizures	Ct: Cortical Vein Thrombosis	Expired Within 4 Days

Among 52 cases, two had cerebro-vascular infections. Both the cases presented during the postpartum period. Clinical features included fever, headache, altered sensorium, seizures and also focal neurological deficits. Laboratory investigations were consistent with disease presentations. One case with viral meningitis recovered completely and while other case had recovered with residual left hemiparesis. Out of 52 cases, 5 cases presented with neuropathy, three cases were gullian barre syndrome, one with idiopathic facial palsy and other case with unilateral carpal tunnel syndrome (table 8). Among the three cases of GB syndrome, one patient of 20 weeks gestation expired even with aggressive monitoring and treatment.

Table 8: Neuropathies

Clinical Condition	Nerve Conduction Studies	Outcome
1. Gullian Barre Syndrome		
A. 26 Yr Multi With 36 Weeks Of Gestation With Loss Of Power In The Lower Limbs Of 3 Days Duration	Axonal Motor And Sensory Neuropathy	Recovered Well
B. 21 Yr, Primi With 20 Weeks Gestation With Symptoms Of Fever Of 3 Days Duration	Axonal Motor Neuropathy	Expired Within 1 Week
C. 23 Yr, Primi With 32 Weeks Gestation With Loss Of Lower Limb Power And Sensation Of 2 Days Duration	Aidp	Recovered Well
2. Idiopathic Facial Palsy		
30 Yr Old Grandmulti With 32 Weeks Gestation	-----	Good Maternal And Fetal Outcome
3. Unilateral Carpal Tunnel Syndrome		
28 Yr Old Primi Term Gestation With Tingling Sensation Over Both The Upper Limbs	-----	Improved

Among the two cases of central nervous system tumors, first was glioma and second case with tumefactive demyelination. Both had good outcome and recovered well (table 9).

Table 9: Central Nervous System Tumors

Clinical Scenario	Investigations	Outcome
30 Yr Multigravida With Term Gestation With Known Case Of Tumefactive Demyelination	-----	Good Outcome (Caesarean Section In View Of Previous Caesarean)
23 Yr Primi With 2 Weeks Postpartum Presented With Light Headedness And Vomiting	Mri : Glioma Mrv : Glioma	Recovered Well

Two cases presented with encephalopathy. Both presented in the antenatal period, relevant investigations were done and diagnosed to be encephalopathy, monitored and delivered with a good outcome (table 10).

Table 10: Encephalopathies

Clinical Scenario	Investigations	Outcome
19 Yr Primi With 11 Weeks Gestation Presented With Altered Sensorium And Vomiting	Mri: Central Pontine Myelinosis	Followed Up Vaginal Delivery (Term)Recovered Well
23 Yr Multigravida With Term Gestation Presented With Seizure And Injury	Mri: Nil Serum Electrolytes And Abg: Metabolic Encephalopathy	Caesarean Section Recovered Well

IV. Discussion

A wide range of neurological conditions can affect women during pregnancy and puerperium^{1, 2}. The studies carried out so far have included only primary neurological disorders²⁻⁶ and their incidence during pregnancy has not been studied systematically in most studies. A comparative chart of the distribution of neurological disorders among various studies is given in Table 11. Epilepsy is a common neurological disorder characterized by a tendency to develop recurrent seizures⁷. Epidemiological studies have suggested that about 7% of epileptic females become pregnant during their lifetime and that approximately 0.5% of all pregnancies are complicated by epilepsy⁸; 0.4% of patients had epilepsy in this report.

Analysis of various studies²⁻⁶ shows a wide variation in the occurrence of epilepsy [Table 11]. In the current study, the timing of seizures in relation to pregnancy showed an almost uniform distribution across the trimesters and the postpartum period, whereas in other studies^{9, 10} the seizure frequency was found to be least during the third trimester and postpartum period. Most seizures in this study were encountered in the antenatal period and were attributable to noncompliance, physical exhaustion or metabolic derangements. The distribution of type of seizures (generalized vs. partial) was similar to other studies⁹⁻¹².

Knight and Rhind report that the control of epilepsy during pregnancy becomes worse in 45% of patients, is unchanged in 50%, and improves in 5%⁹. Poor seizure control prior to pregnancy is associated with

an increased seizure frequency during pregnancy^{9, 11}. Among the gross congenital malformations in epileptic cases, only one baby had cleft palate unlike other studies where it varied between four and 12%^{2, 9, 10}.

Table 11: Distribution Of Neurological Disorders During Pregnancy Compared Among Different Studies

Condition	TO Et Al ²	Gupta Et Al ³	Janaki Et Al ⁴	Srinivasan Et Al ⁵	Agarwal Et Al ⁶	Present Study
Total Number	161	76	97	68	87	52
	NO [%]	NO [%]	NO [%]	NO [%]	NO [%]	NO [%]
Epilepsy	102 [63.3]	22 [28.9]	30 [30.9]	17 [23.5]	5 [6.7]	23 [44.2]
Eclampsia	19 [11.8]	-	-	-	-	16 [30.7]
Cvd	7 [4.9]	9 [11.9]	48 [49.5]	41 [60.3]	72 [82.7]	2 [3.8]
Cns Infections	—	12 [15.8]	4 [4.1]	3 [4.4]	5 [5.7]	2 [3.8]
Cns Tumors	12 [7.5]	1 [1.3]	7 [7.2]	16 [23.5]	16 [23.5]	2 [3.8]
Demyelinating Diseases	4 [2.5]	1 [1.3]	1 [1.03]	3 [4.4]	1 [1.1]	—
Neuropathies	12 [7.5]	1 [1.3]	1 [1.03]	1 [1.5]	2 [2.3]	5 [9.6]
ENCEPHALOPATIES	-	28 [36.8]	-	-	-	2 [3.8]

Eclamptic seizures, which may be focal motor or generalized tonic-clonic, usually appear within the first 24 hours postpartum. The underlying causes for pre-eclampsia and eclampsia remain unknown, but abnormal immunological interactions between foetal and maternal tissues are involved¹³. The occurrence of eclampsia was higher [30.7%] than that in Hongkong study [44-48%]². Pre eclampsia/Eclampsia were found to be an etiological factor for stroke in previous studies¹⁴, and are the major leading cause of stroke in the peripartum maternal mortality and morbidity¹⁵. Association between history of Pre eclampsia and ischemic stroke remote from pregnancy necessitates close monitoring of women beyond postpartum period¹⁵.

Higher occurrence of cerebrovascular disorders in the previous Indian studies⁴⁻⁶ is noted in comparison to the present study (Table 11). The difference is due to less cases of CVT (3.8%) as compared to these studies where CVT accounted for 35-65% of the cases⁴⁻⁶. CVT has an exceptionally high incidence in India, attributable to a combination of dehydration; infection; and the traditional fat-rich diet fed to postpartum women causing a hypercoagulable state¹⁶. All cases presented with classical clinical features, similar to those in other studies.¹⁷⁻¹⁹

Anemia, a predisposing factor for CVT,¹⁸ was uniformly present. However, lower incidence in this study could be explained by the increased awareness among patients and their families, with better facilities for asepsis during delivery as compared to the other studies⁴⁻⁶. One patient had residual motor paralysis, but no mortality was seen. Mortality rate in cases of CVT was approximately 28% in most studies^{5, 16-19}. Current mortality rates are estimated to be as low as 5.5% with anticoagulation.¹⁶

CNS infections showed a lower incidence in this study than in others (3.8%). Poliomyelitis was the most common cause in the present studies when compared to other studies³⁻⁶. Both the cases had good outcome with a healthy baby. Two cases presented with CNS Tumors were in the third trimester lower incidence of 3.8% when compared to other studies²⁻⁶. Usually there is an increase in the size of the tumor during pregnancy due to hormonal changes and amelioration of symptoms in the postpartum period² but both of the cases had healthy baby with uneventful postpartum period.

Guillain-Barre syndrome affects 6-24/100,000 of population during pregnancy²⁰ and our study with an incidence of 70/100000. Among the three cases in our study, two patients recovered well, however one patient expired in spite of aggressive management with similar results in other studies^{2,3}. Incidence in pregnancy is not greater than expected in nonpregnant woman of child bearing age²¹. GB syndrome is known to worsen during the postpartum period due to increase in the delayed hypersensitivity²². Relapses during subsequent pregnancies can occur. Pregnancy, labour and delivery proceed normally for most woman²¹. Both plasmapheresis²² and immunoglobulins²³ were used with good maternal and fetal outcome. New born children of mothers with GBS may also be effected rarely²⁴.

An increase in the incidence of idiopathic facial palsy during pregnancy and postpartum period was found in previous studies^{2, 26}, and in third trimester and immediate postpartum in recent study²⁷. Prognosis is excellent and similar to that observed in nonpregnant patients^{26, 27}. Our patient presented in the third trimester and labour was induced in view of severe gestational hypertension. Other neurological conditions that may be

seen during pregnancy were not observed in our local obstetric population during the period of review. Headaches are extremely common in women, irrespective of pregnancy. Common benign causes include migraine, tension headache, and acute sinusitis. Symptomatic headache occurs in subarachnoid haemorrhage, intracerebral haemorrhage, cerebral venous thrombosis, benign intracranial hypertension, and intracranial tumour²⁵.

Out of 52 cases, two cases presented with encephalopathies (3.8%). Among the two cases one case was wernicke's encephalopathy (1.9%) and other was metabolic encephalopathy (1.9%) but studies are lacking. Pregnancy and delivery have been reported to exacerbate metabolic encephalopathy and firm data on management is lacking³⁵. Gupta et al³ studied regarding the hepatic encephalopathy and the overall mortality from hepatic encephalopathy was 64.3%. however, our study didn't show any cases with hepatic encephalopathy. Many neurological conditions that may be seen during pregnancy were not observed in this study, probably because the period of study was relatively short. A study spanning at least 6 years would be more inclusive of all varieties of neurological diseases.

V. Conclusion

To conclude, many different neurological conditions may be encountered during pregnancy, epilepsy and eclampsia emerge as the predominant neurological disorders during pregnancy and puerperium with a substantial contribution by cerebrovascular diseases and neuropathies. A comparative analysis with previous Indian studies and international studies has been highlighted. Effects of these conditions and their treatments on pregnancy and the effects of pregnancy on the course of these disorders should be kept in mind when dealing with these conditions in pregnancy. Appropriate management, preferably under the joint care of neurologists, obstetricians and neurosurgeons, paediatricians in established centres, will ensure successful maternal and fetal outcomes.

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