Original Research Article

The effect of comorbidities of preeclampsia and eclampsia on maternal and fetal outcome

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ABSTRACT

Background: The aim of this study is to comparatively assess the maternal and fetal outcome in preeclampsia and eclampsia patients with and without comorbidities. The objectives are to assess the comorbidities associated with preeclampsia and eclampsia cases and to find out the effects of the comorbidities of preeclampsia and eclampsia on maternal and fetal outcome.
Methods: 380 patients who had attended antenatal OPD and emergency labour room of Assam medical college and hospital, Dibrugarh during June 2020 to July 2021 with preeclampsia and eclampsia were selected for present study. Based on relevant history, clinical and laboratory findings, these patients were further evaluated for associated comorbidities. The cases were distributed in the respective comorbidity group. Then the outcome of the mother and the baby were analyzed till the day of discharge in patients without comorbidities and with comorbidities and the same was compared.
Results: The eventful maternal (44.1%) and fetal (50.92%) outcome was more in preeclampsia and eclampsia patients with comorbidities than in patients without comorbidities which is statistically significant, (p value=0.029), (p value=0.009) respectively.
Conclusions: The effect of preeclampsia and eclampsia itself would adversely affect the pregnancy outcome and the effect is worse when associated with comorbidities. Appropriate prenatal counselling and optimization of the comorbidities is critical for women who are planning pregnancy.

Keywords: Eclampsia, Preeclampsia, Comorbidities, Maternal and fetal outcome

INTRODUCTION

The hypertensive disorders complicate about 5 to 10 % of all pregnancies.[1] Hypertensive disorders of pregnancy is one of the leading causes of maternal and fetal morbidity and mortality worldwide.[2] WHO systematically reviews maternal mortality worldwide, 16% of maternal deaths were attributed to hypertensive disorders in developed countries.[1,3] There is a risk of two-to-three-fold increase in perinatal mortality in women with hypertension and the risk of stillbirth is increased to four-fold, if the patient has early onset preeclampsia. Severe preeclampsia is a major risk for iatrogenic preterm birth.[4] The terminology and classification of hypertensive disorders of pregnancy is given by a Task Force of ACOG (2013); preeclampsia and eclampsia syndrome, chronic hypertension of any etiology, preeclampsia superimposed on chronic hypertension and gestational hypertension-definitive evidence for the preeclampsia syndrome does not develop and the hypertension resolves by 12 weeks post-partum.[1]

Hypertensive disorders when associated with other comorbidities would make the condition catastrophic. There are limited studies about the fetomaternal outcome when hypertensive disorders are associated with other comorbidities. In this study, common comorbidities associated with preeclampsia and eclampsia cases in our institution were studied and their effects on maternal and

fetal outcome were compared with those cases without comorbidities.

METHODS

Total 380 patients who had attended antenatal OPD and emergency labour room of Assam medical college and hospital, Dibrugarh during June 2020 to July 2021 with preeclampsia and eclampsia were selected for present study. Based on relevant history, clinical and laboratory findings, these patients were further evaluated for comorbidities such as anemia, hypothyroidism, cardiovascular disorders, depression and anxiety disorders, hepatobiliary disease, respiratory system disorders such as bronchial asthma or COPD, urinary tract infection, renal disease, overt diabetes mellitus (type 1 and type 2), overweight and obesity. The cases were distributed in the respective comorbidity group according to the following criteria: anemia: Hb <11g% (WHO definition of anemia in pregnancy), Hypothyroidism: First trimester S.TSH >2.5 mIU/l, second trimester and third trimester serum TSH>3 mIU/l (American thyroid association). Overt diabetes mellitus: FBS >126 mg/dl Or RBS >200 mg/dl Or HbA1c >6.5% at prenatal care initiation (IADPSG consensus panel 2010). Overweight and obesity: BMI 25 to 29.9 kg /m^2: overweight BMI ≥30 kg /m^2: obesity (National Institute of Health 2000).[1]

Other comorbidities such as chronic kidney disease, bronchial asthma, cardiovascular disorder, depression and anxiety disorders, autoimmune disorders, urinary tract infection, hepatobiliary disorders were distributed in respected comorbidity group according to relevant history, clinical findings and laboratory investigations. The patients with only one comorbidity were counted in the respective group. Those patients with more than one comorbidity were distributed in group whichever is predominant i.e., patients with both hypothyroidism and anemia were counted in hypothyroidism group if S.TSH > 6 mIU/l or were counted in anemia group if Hb <9g%. All patients with overt diabetes mellitus were counted in overt diabetes mellitus group irrespective of other comorbidities. Patients with both obesity and hypothyroidism were counted in overweight and obesity group if serum TSH <6 mIU/l. Then the outcome of the mother and the baby were analyzed till the day of discharge in patients without comorbidities and with comorbidities and the same was compared.

RESULTS

In this study, out of 380 patients who were having either preeclampsia or eclampsia, 56 patients (14.7%) had no comorbidities whereas 324 patients (85.26%) had comorbidities (Table 1). Anemia was found to be the common comorbidity (41.31%). Cardiovascular disorders (0.5%), Hepatobiliary disorders (0.5%) and autoimmune diseases (0.5%) were found to be the least common comorbidities (Table 2).

Table 1: Distribution of cases based on comorbidities.

Nomenclature	N	%
Preeclampsia and eclampsia cases without any comorbidities	56	14.73
Preeclampsia and eclampsia cases with comorbidities	324	85.26
Total	380	100

Table 2: Distribution of comorbidities among cases (n=324).

Distribution of comorbidities	N	%
Anemia	157	41.31
Hypothyroidism	107	28.15
Overt diabetes mellitus	16	4.21
Urinary tract infection	11	2.89
Chronic kidney disease	4	1.05
Overweight and obesity	13	3.42
Bronchial asthma	7	1.84
Cardiovascular disorders	2	0.52
Depression and anxiety disorders	3	0.78
Autoimmune diseases	2	0.52
Hepatobiliary diseases	2	0.52
Total	324	85.2

Eventful maternal and fetal outcome were more when associated with comorbidities which is statistically significant (p value=0.029), (p value=0.009) respectively (Table 3). The most common maternal complication among both groups were PPH (post-partum hemorrhage) followed by AKI (acute kidney injury), HELLP (hemolysis, elevated liver enzymes, low platelet count) syndrome and puerperal sepsis (Table 4). The most common fetal outcome were NICU (neonatal intensive care unit) admissions (9.5%), neonatal death (7.75%), intra uterine death (5.2%), prematurity (5.2%), neonatal jaundice (4.9%).

DISCUSSION

In this study, out of 380 patients who were having either preeclampsia or eclampsia, 56 patients (14.7%) had no comorbidities whereas 324 patients (85.26%) had comorbidities (Table 1). Anemia was found in (157) 41.31% of cases in present study, which was most common comorbidity and 1.57% patients were with both hypothyroidism and anemia (Table 2). Ali et al conducted a retrospective case control study at Kassala Hospital, Eastern Sudan, which shows that 41.8% had anemia and prevalence (11.5%) of preeclampsia and eclampsia was high in patients with severe anemia. The study also states that women with severe anemia had a 3.6 times higher risk of preeclampsia than women without anemia and the susceptibility of women with severe anemia to preeclampsia could be explained by a deficiency of micronutrients and antioxidants.[5]

Table 3: Maternal outcome and fetal outcome in both groups.

Outcome		Cases without comorbidities, N (%)	Cases with comorbidities N (%)	P value
Maternal outcome	Uneventful	40 (71.42)	181 (55.86)	
	Eventful	16 (28.57)	143 (44.1)	0.029
	Total	56	324	
Fetal outcome	Uneventful	38 (67.85)	159 (49.08)	
	Eventful	18 (32.15)	165 (50.92)	0.009
	Total	56	324	

Table 4: Distribution of maternal outcome in both groups.

Maternal outcome	Cases without comorbidities		Cases with comorbidities	
	N	%	N	%
Uneventful	40	71.42	181	55.86
AKI	2	3.57	23	7.10
Hepatic failure	1	1.79	7	2.16
CVA (cerebro vascular accident)	1	1.79	9	2.78
HELLP syndrome	2	3.57	13	4.01
Abruptio placenta	1	1.79	8	2.47
PPH	3	5.36	26	8.02
Puerperal sepsis	2	3.57	14	4.32
Wound infection	1	1.79	8	2.47
Postpartum psychosis	1	1.78	13	4.01
DIC	0	0.00	4	1.23
Maternal death	2	3.57	18	5.56
Total	56	100	324	100

Table 5: Distribution of fetal outcome in both groups.

Fetal outcome	Cases without comorbidities		Cases with comorbidities	
	N	%	N	%
Uneventful	38	67.85	159	49.07
LBW and SGA	2	3.57	13	4.01
FGR	1	1.79	7	2.16
Birth asphyxia	2	3.57	12	3.70
Meconium aspiration syndrome	1	1.79	6	1.85
Prematurity	3	5.36	17	5.25
Neonatal jaundice	1	1.78	16	4.93
Neonatal sepsis	2	3.57	13	4.01
Congenital anomalies	0	0.00	1	0.31
IUD	1	1.78	17	5.24
Still birth	1	1.79	7	2.16
Neonatal death	2	3.57	25	7.72
NICU admission	2	3.57	31	9.57
Total	56	100.0	324	100.0

In present study thyroid dysfunction was associated with 107 (28.15%) cases (Table 2), 6 (1.57%) patients had hypothyroidism and anemia, 3 (0.7%) patients had obesity and hypothyroidism. In a study done by Banik et al 44.2% patients with preeclampsia had thyroid dysfunction.[6] Deshpande et al carried out a study which shows significant association between preeclampsia and thyroid hypo function, with p value being 0.0406.[7] In our study 16 (4.2%) cases were associated with diabetes mellitus (Table 2) and 2 cases of overt diabetes mellitus patients had mild

anemia. Ganesh et al in their study said that the likelihood of preeclampsia nearly increases by 8.7 (OR=8.7) times if diabetes is present before pregnancy.[8] In present study urinary tract infection was associated with 11 (2.8%) cases (Table 2). Harrington et al in their study observed that 6.7% of the women who had urinary tract infections developed preeclampsia compared with 2.6% of women in the control group.[9] In this study, 4 (1.05%) cases were with chronic renal disease (Table 2). In a study carried out by Ganesh et al it is said that history of renal disease

(OR=7.98) is associated with 7.98 times higher risk for developing preeclampsia.[8] In our study 13 (3.4%) patients were overweight and obese (Table 2), 3 (0.7%) patients were having obesity and hypothyroidism. Ganesh et al study says that BMI>25 is associated with 11.2 times higher risk (OR=11.2) of developing preeclampsia.[8] Seven (1.8%) patients had bronchial asthma in this study (Table 2). A study of Czerwinski et al says that there is increased risk of hypertensive disorders among pregnant asthmatics.[10]

Rheumatic heart disease was associated with 2 (0.5%) patients in this study (Table 2). Ellamagun et al conducted a study in a quaternary care hospital at New York city to describe clinical characteristics, maternal and fetal outcomes, and cardiovascular readmissions in a cohort of pregnant women with underlying cardiovascular disease. In their study they found that 12.1% of the women with pre-existing cardiovascular disease had preeclampsia.[11] History of depression and anxiety disorders was found in 3 (0.7%) patients in this study (Table 2). Depression and anxiety in early pregnancy and risk for preeclampsia was studied by Tapio Kurki et al and it shows that depression (30%) and anxiety (16%) was associated with increased risk for preeclampsia.[12] In present study 2 (0.52%) cases (Table 2) were found to have SLE (systemic lupus erythematosus). In a study carried out by Miranda et al to investigate whether angiogenic factors are associated with risk of developing preeclampsia in pregnant women with SLE says that Changes in circulating concentrations of sFlt-1 (soluble fms-like tyrosine kinase-1), PlGF (placental growth factor), sEng (soluble endoglin), and the sFlt-1/PlGF ratio precede the onset of preeclampsia in SLE pregnancies.[13] In the present study 2 (0.5%) patients were found to have HBsAg seropositivity (Table 2). Ahmed et al conducted a case control study to investigate the association between HBsAg seropositivity and preeclampsia, it was found that HBsAg seropositive women were at higher risk of preeclampsia than who were HBsAg seronegative (p value 0.003).[14] In the present study, uneventful maternal outcome was 71.42% in cases without comorbidities and it was 55.86% in cases with comorbidities (Table 3). Eventful maternal outcome was 28.57% in cases without comorbidities and it was 44.1% in cases with comorbidities (Table 3), which is statistically significant (p value=0.029). The most common complication among both groups were PPH followed by AKI, HELLP syndrome and puerperal sepsis but the incidence was slightly high in cases with comorbidities (Table 4). The most common causes of maternal mortality were pulmonary edema, aspiration pneumonia, acute hepatic failure, MODS (multi organ dysfunction). In the study conducted by Varalakshmi et al PPH was the most common maternal complication (6.53%), followed by partial HELLP (4.80%) and Eclampsia (12.69%).[15] Igberase in a study of ten-years of experience in a rural tertiary hospital in the Niger delta, Nigeria observed that common causes of death were acute renal failure, cardiopulmonary failure, disseminated intravascular coagulopathy (DIC) and cerebrovascular accident.[16] In the present study ,uneventful fetal outcome was 67.85% in cases without comorbidities and it was 49.07% in cases with comorbidities. Eventful fetal outcome was 32.14% in cases without comorbidities and it was 50.92% in cases with comorbidities (Table 3), which is statistically significant (p value 0.009). The most common outcome were NICU admissions (9.5%), neonatal death (7.75%), IUD (5.2%), prematurity (5.2%), neonatal jaundice (4.9%). The indication for NICU admissions were birth asphyxia 12 (38.75%), meconium aspiration syndrome 4 (12.9%), prematurity 6 (19.4%), neonatal jaundice 9 (29.03%). In their study Varalakshmi et al observed that LBW (low birth weight) was the most common complication among neonates (41.47%). Uteroplacental insufficiency seen in severe preeclampsia and eclampsia was the major cause of FGR (fetal growth restriction) in 10% of the cases.[15] Catov et al in their study said that among multiparous women, the pre-existing conditions like diabetes, obesity were associated with 50% of early preeclampsia cases and 59% of severe cases and these women represented a subgroup of preeclamptic women with the worst neonatal outcomes.[17] The high incidence of LBW and premature delivery could be due to the early intervention and induction of labour or LSCS done to avoid further maternal and perinatal complications.

CONCLUSION

The outcome of pregnancy is adversely affected with preeclampsia and eclampsia and is significantly more when comorbidities are associated. Appropriate prenatal counselling and optimisation of the comorbidities is critical for women who are planning pregnancy. Quality antenatal care, early diagnosis and comprehensive intervention is required for optimal outcome. Large scale Multicentric studies are required to know the effect of comorbidities of preeclampsia and eclampsia.

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