Review Article

Eclampsia Managed at Nnamdi Azikiwe University Teaching Hospital (NAUTH), NNEWI, South-East Nigeria: A 5-Year Retrospective Cross-Sectional Studya

Obi NC[1], Oguejiofor CB[1,2]*, Okafor OC[1], Eleje GU[1,2], Okafor CG[1], Nkesi JC[1], Ezeigwe CO[1,2], Egbuniwe MC[3], Odugu BU[4], Nweze SO[4], Emeka EA[5], Ofiaeli CC[5], Onah NL[4], Okon VV[6], Onyekpa IJ[4], Obioha KC[7], Okpala BC[1,2], Ejikeme TB[1], Anyaoku CM[5], Egwuatu EC[1], Nnabuchi OK[1], Okeke CA[1,2], Egbogu SC[1], Agbo TN[2], Ugwu OD[2], Ekwebene OC[8]

[1]Department of Obstetrics and Gynaecology, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State, Nigeria.

[2]Department of Obstetrics and Gynaecology, Nnamdi Azikiwe University, Awka, Nigeria.

[3]Faculty of Health Sciences & Wellbeing, University of Sunderland, United Kingdom.

[4]Department of Obstetrics and Gynecology, ESUT Teaching Hospital, Parklane, Enugu, Nigeria.

[5]Department of Family Medicine, Nnamdi Azikiwe University Teaching Hospital, Nnewi, South-east, Nigeria.

[6]College of Medicine, University of Nigeria, Nigeria.

[7]Department of Obstetrics and Gynecology, University of Nigeria Teaching Hospital, Ituku Ozalla, Nigeria.

[8]Department of Biostatistics and Epidemiology, East Tennessee State University, Johnson City, Tennessee, United State.

*Corresponding Author: Oguejiofor CB, Department of Obstetrics and Gynecology, Nnamdi Azikiwe University Teaching Hospital, Nigeria.

Abstract

Background: Obstetric emergencies like eclampsia continue to be a leading cause of morbidity and mortality in pregnant women and fetuses in modern society. Given its detrimental consequences on the pregnant woman, her unborn child, and any later medical difficulties linked to this illness, it has remained to be a cause of concern for obstetricians, especially in low- and middle-income countries. Hence the requirement for periodic review in our environment. **Objectives:** The objective of this study is to determine the prevalence, pattern of presentation as well as fetal and maternal outcome of cases of eclampsia with a view to suggest interventions to reduce the incidence and associated morbidity and mortality associated with eclampsia. **Materials and Methods:** This study examines all eclampsia cases treated at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Nigeria between January 1, 2017, and December 31, 2021. The hospital's medical records division provided access to the case notes of every eclampsia patient. The socio-demographic and clinical data of the subjects were gathered using a systematic proforma, and they were then evaluated and analysed. The teaching hospital's ethics committee was contacted in order to request and get ethical clearance and permission. The statistical software for social sciences (SPSS) version 25 was used to analyse the data. **Results:** The eclampsia prevalence rate observed was 1.65%. The ages of the women ranged from 18 to 41 years with mean age and standard deviation given as 26.97 ± 4.61 years. The majority 41 (95%) of the pregnant women were unbooked, and about 50% of the women presented at gestational ages of 28-33weeks. Antepartum eclampsia identified as the most common clinical type occurring in 38 (63.3%) of cases and headache was the most common prodromal symptom associated with eclampsia. Majority (86.7%) of the eclamptic women had ceaserean section as their mode of delivery. There were 4 (6.7%) maternal deaths within the study period from eclampsia and 11 (18.3%) of the women had Acute kidney injury among other complications. Twenty-eight women (46.7%) delivered babies that had birth asphyxia and 24(40%) of the babies required admission into the special care baby unit (SCBU). Four (6.7%) of the babies of women with eclampsia during the study period died within the neonatal period. **Conclusion:** Eclampsia is a leading cause of maternal and perinatal morbidity and mortality especially in developing countries like Nigeria. Therefore, Women should be adequately counseled on preconception care, early booking and regular antenatal care visits, with proper monitoring and control of blood pressure, to enable early detection and effective management to mitigate the associated feto-maternal complications of eclampsia. Prompt diagnosis and management of hypertensive disorders are key in preventing the maternal and perinatal morbidity and mortality that are associated with these disorders.

Introduction

One of the main causes of maternal and perinatal death worldwide is hypertensive disorders of pregnancy (HDP), which are also linked to a higher risk of recurrence and future cardiovascular disease. Women's health conditions, methods of delivery, hospital stays, and relationships with their children and families are all impacted by HDP [1]. One of the types and clinical symptoms of hypertension diseases during pregnancy is eclampsia [2]. In Nigeria, it is still one of the main factors contributing to maternal and neonatal morbidity and mortality [1,2].

Eclampsia is the development of tonic-clonic convulsions or coma in a preeclamptic woman in the absence of a neurological disorder at the underlying level [3]. While the incidence of eclampsia varies geographically in low and middle-income nations, with reported values of 0.16%-0.7% [4], it has remained generally steady in high-income countries at 1.6-10 instances per 10,000 deliveries.

In order to help healthcare practitioners improve their management outcomes, it is crucial to identify predictors for unfavourable maternal outcomes of eclampsia because their frequency and associated adverse maternal outcomes are quite high in low and middle-income countries [6]. This diversity reflects variations in health seeking behaviour, trained obstetricians and delivery attendants, antenatal care services, and changes in preeclampsia and eclampsia detection, prevention, treatment, and follow-up of women [5, 6].

It is not entirely apparent what causes seizures in pregnant women. There have been some theories. The first theory postulates that hypertension damages the cerebral circulation's auto-regulatory mechanism, resulting in hypoperfusion, endothelial dysfunction, and vasogenic oedema. According to the second hypothesis, hypertension causes the autoregulatory system to become activated, which in turn leads cerebral arteries to constrict, resulting in hypoperfusion, localised ischemia, endothelial dysfunction, and vasogenic oedema [7]. Inflammation of the brain may also be involved [8].

The most prevalent antecedent signs and symptoms, together with the proportion of women who had them, were found in a systematic review of several research that included over 21,000 eclamptic women from 26 different countries [9]: Consistent frontal or occipital headaches (66%), hypertension

(75%), headache, visual abnormalities (27%), right upper quadrant or epigastric discomfort (25%), and asymptomatic (25%). Patients with eclampsia frequently have ankle clonus [9,10].

Fetal bradycardia for about three to five minutes is a common finding during and immediately after the seizure. Resolution of maternal seizures activity is associated with fetal tachycardia and loss of heart rate variability, sometimes with transient decelerations [11]. The fetal heart rate pattern generally improves with maternal and fetal therapeutic interventions. A non-reassuring pattern with frequent, recurrent decelerations for more than 10 to 15 minutes despite maternal and fetal resuscitative interventions suggests the possibility of an occult abruptio placenta [11].

In this region of the world, antepartum eclampsia accounts for 80% of all clinical cases of eclampsia. This is not unusual for a nation like Nigeria that has low and moderate income levels and antenatal care facilities that are inadequate. The majority of the women had antepartum eclampsia, which is consistent with findings from other studies conducted in this region of the world [10–12], but not with data from high-income nations where postpartum eclampsia is more typical [8]. Improvements in prenatal care, screening and early preeclampsia identification, and the preventive use of magnesium sulphate in the treatment of severe preeclampsia in high-income nations have all been credited with this [8]. Only a minority of the women with eclampsia were booked patients in similar studies from other regions of the country, with the majority of patients being unbooked [2, 10,12]. Recent years have seen an increase in the promotion of prevention through the identification of those who are at risk and early preeclampsia detection [10, 12].

The maternal condition eclampsia has been linked to a number of issues. Women with eclampsia are more likely to experience severe maternal complications, including placental abruption, HELLP syndrome (haemolysis, elevated liver enzymes, and low platelet count), disseminated intravascular coagulation, pulmonary oedema, aspiration pneumonia, cardiopulmonary arrest, and acute renal failure, while their unborn children are more likely to experience preterm delivery, intrauterine growth restriction (IUGR), and neonatal death. Hence, this study is designed to determine the prevalence of eclampsia, review the pattern of presentation and fetomaternal outcome of patients in NAUTH, Nnewi, Nigeria. Thus, this may assist in identification, detection and adequate intervention to reduce the prevalence, morbidity and mortality associated with eclampsia in our environment.

Materials and Methods

Study Design

This is a retrospective cross-sectional analytical study.

Study Site and duration

Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Nigeria from 1st January 2017 to 31st December, 2021.

Study population

Patients with eclampsia managed at NAUTH, Nnewi, Nigeria.

Inclusion criteria:

Pregnant women with eclampsia, in the labour ward or referred to us, during the study period.

Exclusion criteria:

We excluded women with chronic hypertension in pregnancy alone. The cases of missing or incomplete data were also excluded from the study.

Sample size determination

The sample size was an all population based study.

Sample technique: Non-random sampling approach. All available case files were examined.

Study Outcome Measures

Prevalence rate, clinical presentations, maternal outcomes and fetal outcomes of eclampsia and maternal case fatality rate.

Procedure

A structured proforma was used to collect the socio-demographic and clinical data of the subjects which was reviewed and analyzed. The proforma contained clinical parameters like; patient's biodata, presenting complaints and examination findings, risk factors and type of eclampsia, mode of delivery and fetomaternal outcomes of patients managed for eclampsia in NAUTH within the study period.

Data Analysis

The data obtained was analysed using Statistical Package for Social Sciences (SPSS) version 25 (IBM, Armonk, NY, USA). Mean, mode and standard deviation were employed where applicable and results were presented in tables and chart. Chi-square and Fischer exact test were used to perform statistical comparison. Level of significance was accepted when the P-value is less than 0.05.

Ethics approval

The present study was approved by the hospital's ethics Committee. Informed consent was waived, because the present study is based on retrospective collection of data.

Results

During the period of this study, there were 4363 deliveries, in which 72 cases of eclampsia were managed, giving a prevalence rate of 1.65% of all deliveries. However only 60 case notes could be recovered, thus 60 cases were used in the analysis. The age of

the studied population ranged from 18 to 41 years with mean and standard deviation given as 26.97 ± 4.61 years.

Table 1 shows the sociodemographic statistics of the patients managed for eclampsia at NAUTH. The ages of the women ranged from 18 to 41 years with mean age and standard deviation given as 26.97 ± 4.61 years. Majority of the women affected were within the age group of 20-29years (58.3%). The parity ranges from 0 to 5. Nulliparity accounted for 47.4% of the studied group.

Variable	Options	Frequency (n=60)	Percentage (%)
Age (years)	<20 20-29 30-39 ≥40	4 35 18 3	6.7 58.3 30.0 5.0
Parity	Nullipara Primipara Multipara	25 15 20	41.7 25.0 33.3
Level of education	No formal Primary Secondary Tertiary	17 15 23 5	28.3 25.0 38.3 8.3
Occupation	House wife Trader Civil servant Student	5 36 3 16	8.3 60.0 5.0 26.7
Husband's Age	<20 20-29 30-39 ≥40	0 22 29 9	0 36.7 48.3 15.0

Table 1: Sociodemographic characteristics of the patients managed for eclampsia at NAUTH.

Majority of the women (38.3%) had at least a secondary education among the study group and about 60% of them were mostly traders. The majority 41 (95%) of the pregnant women were unbooked, with about 50% of the women presenting at gestational ages of 28-33weeks. Headache was the most common prodromal symptom associated with eclampsia seen in 42 (70%) of the women in this study.

Antepartum eclampsia was the most common clinical type occurring in 38 (63.3%) of cases, 9 cases (15%) were intrapartum eclampsia and 13(21.7%) were postpartum eclampsia. Only 8 (13.3%) of the women had vaginal delivery and the remaining 52 (86.7%) had caesarean section as their mode of delivery.

Table 2 shows the analysis of some of these obstetric variables of the patients managed for eclampsia at NAUTH, Nnewi. The risk factors identified in the women with eclampsia were depicted in table 3.

Variable	Options	Frequency (n=60)	Percentage (%)
GA at presentation	<28 28-33 34-36 Term	2 30 19 9	3.3 50.0 31.3 15.6
Booking status	Booked Unbooked	3 57	5.0 95.0

Presenting complaints	Altered sensorium	19	31.7
	Dizziness	8	13.3
	Headache	42	70.0
	Visual disturbances	25	41.7
	Epigastric pain	6	10.0
	Vomiting	8	13.3
Type of eclampsia	Antepartum	38	63.3
	Intrapartum	9	15.0
	Postpartum	13	21.7
Mode of delivery	Vaginal	8	13.3
	Caesarian section	52	86.7

Table 2: Analysis of some obstetric variables of patients managed for eclampsia at NAUTH, Nnewi.

Risk factor	Frequency (n=60)	Percentage (%)
Primigravida	15	25.0
Previous history of eclampsia	12	20.0
10 years or more since last baby	1	1.7
Family history of hypertension	18	30.0
Multiple pregnancy	2	3.3
Pre-existing hypertension	17	28.3
Pre-existing Renal disease	2	3.3
Pre-existing Diabetes mellitus	3	5.0

Table 3: Risk factors identified in patients managed for eclampsia at NAUTH, Nnewi.

Table 4 depicts the maternal complications following eclampsia. It was observed that 11 (18.3%) of the women had Acute kidney injury, 4 (6.7%) had Disseminated intravascular coagulopathy, 2 (3.3%) had puerperal sepsis, 6 (10%) had HEELP syndrome, 6 (10%) had Abruptio placenta. There were 4 (6.7%) maternal deaths within the study period from eclampsia.

Outcome/complication	Frequency (n=60)	Percentage (%)
Maternal complication		
Acute kidney injury	11	18.3
Cerebrovascular accident (CVA)	4	6.7
Disseminated intravascular coagulopathy	4	6.7
Puerperal sepsis	2	3.3
HEELP syndrome	6	10
Abruptio placenta	6	10
Maternal death	4	6.7
HELLP: Haemolysis Elevated Liver Enzymes Low Platelet		

Table 4: Maternal complications identified in patients managed for eclampsia at NAUTH.

Table 5 shows fetal complications identified among patients managed for eclampsia. Twenty-eight women (46.7%) delivered babies that had birth asphyxia, 24 (40%) of the babies required admission into the special care baby unit (SCBU), 22 (36.7%) of the babies were delivered premature, 7 (11%) had intrauterine fetal death prior to delivery, and 3 (5%) were delivered as still births. Four (6.7%) of the babies of women with eclampsia during the study period died within the neonatal period.

Outcome/complication	Frequency (n=60)	Percentage (%)
Intrauterine growth restriction	6	10
Prematurity	22	36.7
Birth asphyxia	28	46.7
Need for SCBU	24	40
Intrauterine fetal death	7	11.7
Still birth	3	5
Neonatal death	4	6.7
SCBU: Special Care Baby Unit		

Table 5: Fetal complications identified in patients managed for eclampsia at NAUTH.

Discussion

Hypertensive disorders during pregnancy are a major cause of maternal and fetal mortality and morbidity worldwide [13]. This study revealed an eclampsia prevalence rate of 1.65%. This is similar to the findings of 1.67% by Osazee et al in Benin [14], but lower than the finding of Onyekpa in Enugu [15], and higher than the findings of 0.97% by Adelola e tal in Sagamu [12], Oriji in Yenogoa [16] and Geidam [17]. This can be attributed to late referral of Preeclamptic/eclamptic cases for expert management by caregivers in nearby primary and secondary health facilities especially after progression to eclampsia.

Similar to the results of a population-based study [18], the majority were between the ages of 20 and 24. Many women are having their first pregnancies in this age group, and nulliparity is a known risk factor for eclampsia. About 41.7% of the women with eclampsia in this study were nulliparous; similar findings were also reported in other studies [12-14]. The finding from this study shows that nulliparous women in their early twenties were the most vulnerable group. Thus, it is important to provide adequate health education and antenatal care services about this condition to this group of women to enhance their health-seeking behavior especially at preconception, pregnancy and puerperium.

The majority (95%) of the eclamptic patients in this study were unbooked; similar findings have been found in investigations from other parts of the nation [12,14,16]. But a small percentage of the women (5%) were booked. This finding of the majority of eclamptic women being left unbooked may be due to inadequate monitoring or noncompliance of pregnant women during antenatal clinic, late detection and management of cases of preeclampsia without use of magnesium sulphate among women with severe preeclampsia prior to presentation at the study centre when the woman is already fitting, and poor compliance of pregnant women during antenatal clinic.

In this study, antepartum eclampsia was the most typical clinical form of the condition. Similar investigations have been conducted in the nation and other developing nations [12,14,16,18]. This is not unexpected for a low and middle-income nation like Nigeria, where healthcare utilisation is low and prenatal care and birth outcomes have not been optimal. The prevalence of postpartum eclampsia is seen to be higher in industrialised nations, in contrast [19]. This lower prevalence of antepartum and intrapartum eclampsia in the Western world is attributable to optimal prenatal care, early preeclampsia detection, prompt delivery of women with severe preeclampsia, and widespread preventive MgSO4 use [20].

In this study, the most typical clinical manifestations seen were hypertension, headaches, blurred vision, and sensorium changes. This is consistent with the findings that showed headaches, which are most usually described as the most common symptom in about 60% to 70% of women [21], are the neurologic symptoms that women present with most frequently. These are the prodromal signs of impending eclampsia that are most frequently reported before convulsions start. This calls for additional assessment and management and suggests that regularly monitoring pregnant women with these symptoms may provide an early signal for eclampsia [12].

In this study, majority of the women were delivered through cesarean section. This is similar to the study by Okoror where the most common route of delivery was the abdominal route in eclamptic women [22]. However, in most studies across the world, caesarean section delivery has been repeatedly reported to be higher in women with eclampsia [23,24]. The definitive treatment for pre-eclampsia/eclampsia is delivery through the safest and fastest route, which can either be via abdominal or vaginal delivery, thus following maternal stabilization, timely delivery improves outcomes [22, 23]. It is therefore important to aid the provision of more comprehensive emergency obstetrics care centers with

adequate skilled manpower where eclampsia could be adequately managed so as to prevent mortality and morbidity associated with the condition.

The most common maternal complications of eclampsia were acute renal injury, abruptio placenta, and HELLP syndrome (haemolysis, elevated liver enzymes, and low platelet count). This is consistent with the findings of Irene et al. who found that the most frequent maternal consequences in eclamptic women were stroke, acute kidney injury (AKI), and HELLP syndrome (haemolysis, elevated liver enzymes, and low platelet count) [25].

The most frequent fetal problems in this study included intrauterine fetal death, birth asphyxia, prematurity, and intrauterine growth restriction. Around 6.7% of the infants also died before birth. This is consistent with a study's findings, which found that the most frequent problems for babies born by eclamptic women were low birth weight, NICU admission, preterm delivery, IUGR, and neonatal and fetal deaths [26]. The majority of the women in our study were delivered preterm, which may have contributed to the high rate of prematurity and requirement for SCBU. This is consistent with research showing an increased risk of iatrogenic preterm birth in pregnant women with hypertensive Disorders of Pregnancy [16,26].

It is worth mentioning that majority of the women in our study with eclampsia were unbooked, and were mostly referred parturient with severe hypertensive disease. It is therefore important to improve routine antenatal care among this various referral centers to enable detection of pregnant women with hypertensive disorders and minimize the fetomaternal complications through adequate supervision during antenatal care with maternal blood pressure monitoring and control and permit good fetal surveillance when necessary, aimed to improve good foetomaternal outcome in women with eclampsia.

Our study has a number of limitations. This was a retrospective study with a relatively small sample size as some of the case notes of the women managed for eclampsia during the time of study could not be retrieved from the medical records department as some cases notes were not available, some badly damaged or grossly incomplete, thus caution is required in relating the data to all women managed for eclampsia within the study period and area.

Conclusion

Eclampsia is a leading cause of maternal and perinatal morbidity and mortality especially in low and middle-income countries like Nigeria. In this study, the prevalence rate of eclampsia is 1.65%, with majority of the women unbooked. Therefore, women should be adequately counseled on preconception care, early booking and regular antenatal care visits, with proper monitoring and control of blood pressure. Prompt diagnosis and management are key in preventing the maternal and perinatal morbidity and mortality that are associated with these disorders. Adequate health education to young women of reproductive age, proper counselling on preconception care prior to conception. As the women get pregnant, there should be early booking and identification of risk factors for preeclampsia and eclampsia. There should be adequate and regular antenatal care visits and proper monitoring of blood pressure. There should be prompt diagnosis of hypertensive disorders, adequate management, and early referral when the need arises. There should be correct use of magnesium sulphate and antihypertensive to manage women with preeclampsia to reduce the progression to eclampsia. Finally, there should be adequate government policies to help equip the health facilities to ensure optimum care to women with hypertensive disorders to ensure improved fetomaternal outcomes.

References

1. Sakurai S, Shishido E, Horiuchi S. (2022) Experiences of women with hypertensive disorders of pregnancy: a scoping review. BMC Pregnancy Childbirth. 22: 146.

2. Tukur J, Muhammad Z. (2018) Management of eclampsia at AKTH: Before and after magnesium suphate. Nigeria J Med 20: 105-8

3. Burkman RT. (2006) Hypertensive disorder of pregnancy. In: DeCherney AN, Nathan I, editors. Current Diagnosis and Treatment Obstetrics and Gynaecology. 10th ed. New York: McGraw Hill. P576-97.

4. Eke AC, Ezebialu IU, Okafor C. (2015) Presentation And Outcome Of Eclampsia At a Tertiary Centre In South East Nigeria- A 6-Year Review. Hypertension In Pregnancy 30: 125-132.

5. Moodley J. (2019) Treatment Of Eclampsia. British Journal of Obstetrics And Gynaecology 99-101.

6. Gibson P, Carson MP (2021) Hypertension and Pregnancy: Emedicine Journal.

7. Berhan Y, Berhan AJ. (2015) Obstetrics Gynaecology Res 1: 831.

8. Chaun F, Chares G, Boye R, Rasiah R. (2019) Population pharmacokinetics of magnesium in preeclampsia. Am J Obstet Gynecol. Sep 185(3):593-9.

9. Shah A, Rajamani K, Whitty J. (2018) Eclampsia: a neurological perspective Neuro Sci. 271(1-2): 158.

10. Mekoya D, Tiahun K. (2020) Fetomaternal outcomes of hypertensive disorders: BMC Cardiovascular Disorders. 20(1), 1-10.

11. Yisfa G, Efaet F, Adamu T, Jereme Z. (2021) Incidence and determinants of adverse outcomes among women managed for eclampsia: BMC pregnancy and childbirth.21(1), 1-12.

12. Odelola O, Akadri A, Akinpelu Eegbede M, Ogunyemi J, Popoola M. (2020) Eclampsia: A five-year retrospective review in Sagamu, Nigeria. Niger J Med 29:450-4

13. Sutton ALM, Harper LM, Tita ATN (2018) Hypertensive Disorders in Pregnancy. Obstet Gynecol Clin North Am 45: 333-347.

14. Kehinde Osazee, Peter Waibode Alabrah, Valentine Chinweike Nweke. (2022) Clinical Attributes and Socio-Demographic Characteristics of Patients Managed for Eclampsia in a Tertiary Hospital in Nigeria. Sch Int J Obstet Gynec. 5(7): 345-351

15. Onyekpa IJ, Odugu BU, Ofonere CN. (2022) Audit of cesareann deliveries in ESUT Teaching Hospital (ESUTH) Enugu: A 3-year review. World Journal of Advanced Research and Reviews. 15(2):088-93.

16. Oriji PC, Allagoa DO, Ubom AE, Kattey AK, Briggs DC, et al. (2021) Hypertensive disorders in pregnancy at the FederalMedical Centre, Yenagoa, South-South Nigeria: a 5-year review. Int J Res Med Sci; 9: 2923-9.

17. Geidam AD, Audu BM, Usman A. (2022) Case fatality and factors associated with maternal mortality in patients with eclampsia: A retrospective review of 761 cases in a tertiary institution in Nigeria. Trop Doct 53: 26-30.

18. Tejera, E, Sánchez, M.E, Henríquez-Trujillo A.R., et al. (2021) A population-based study of preeclampsia and eclampsia in Ecuador: ethnic, geographical and altitude differences. BMC Pregnancy Childbirth.21. 116

19. Chames MC, Livingston JC, Ivester TS, Barton JR, Sibai BM (2002) Late postpartum eclampsia: a preventable disease? Am J Obstet Gynecol 186: 1174-7.

20. Sunita Jamwal, Ajay Wakhloo, Natasha Gupta. (2021) Demographic Profile of Eclampsia Patients in a Tertiary Care Centre- A Prospective Observational Study. Annals of the Romanian Society for Cell Biology. 8722–8730

21. Hauspurg A, Jeyabalan A. Postpartu. (2021) Preeclampsia or eclampsia: defining its place and management among the hypertensive disorders of pregnancy. American Journal of Obstetrics and Gynecology. Jul 7.

22. Okoror, C. E. Maternal and perinatal outcome in women with eclampsia: A retrospective study at the University of Benin Teaching Hospital.Int J Reprod Contracept Obstet Gynecol. 2019: (1),108–114

23. Rabiu KA, Adewunmi AA, Ottun TA, Akinlusi FM, Adebanjo AA, et al. (2018). Risk factors for maternal mortality associated with eclampsia presenting at a Nigerian tertiary hospital. Int J Womens Health. 10:715

24. Saeed G, Wajid R, Dar AY, (2017) Maternal mortality in eclampsia after cesarean section versus vaginal delivery. Ann King Edward Med Univ. 23(4):451–5.

25. Irene K, Amubuomombe PP, Mogeni, R. (2021) Maternal and perinatal outcomes in women with eclampsia by mode of delivery at Riley mother baby hospital: a longitudinal case-series study. BMC Pregnancy Childbirth. 21: 439

26. Mohamadzadeh V, Atiyeh H, Mohaddeseh P, Leila Ai, Sedigheh M, et al, (2022).Maternal and fetal complications in pregnancies with eclampsia in Ghaem Hospital: June 2018 to June 2020. The Iranian Journal of Obstetrics, Gynecology, and Infertility. 25 (1). pp. 20-28