

EFFECT OF HYPERTENSIVE DISORDERS ON FETAL AND MATERNAL OUTCOMESally Bahnam Habeeb^{1*}, Enas Abdulazeez Mislit² and Ghada Atallah Mohamad³¹Senior Chief General Doctor, M.B.CH.B Higher Diploma Family Medicine Makhmour Center Hwera PHC.²Senior Chief General Doctor, M.B.CH.B High Diploma Family Medicine Al-Qayara Health Center PHC.³Senior Chief General Doctor, M.B.Ch.B. High Diploma Family Medicine Al-ayman Center Maamoon PHC.

*Corresponding Author: Sally Bahnam Habeeb

Senior Chief General Doctor, M.B.CH.B Higher Diploma Family Medicine Makhmour Center Hwera PHC.

Article Received on 10/11/2023

Article Revised on 30/11/2023

Article Accepted on 20/12/2023

ABSTRACT

Background: High blood pressure during pregnancy is the main cause of health problems for both the mother and the baby. The aim of this study is to see how moms with hypertension problems and pregnancy complications are affected, as well as their babies. **Patients and methods:** The study looked at the hospital records of pregnant women to learn more about their experiences. This research involved all the women who were allowed to be at the hospital and gave birth there. During the study, 200 samples were picked each month, chosen at random. The rules for who cannot be in the study are women who were sent to another hospital, have missing or incomplete information, or died before they could be diagnosed. **Results:** Our findings suggest that 25.4% of pregnant women have hypertension disorders. Severe preeclampsia makes up 40% of these cases, while preeclampsia accounts for 5% of all cases of hypertension disorders. Also, 525 out of 100 babies were born through the vagina, 5 out of 100 were born with the help of instruments, and 34 out of 100 were born through a cesarean section. Rewrite this text in easier words: The research found that babies born to mothers with high blood pressure had lower Apgar scores (33%), were born early (32%), and needed to be in intensive care units (18%). **Conclusion:** High numbers of women in this area have high blood pressure during pregnancy, which makes it harder for both the mother and baby. To prevent bad effects on the mother and baby during pregnancy, doctors should check on them more often and act quickly if there are any problems.

KEYWORDS: Hypertensive disorders of pregnancy fetal outcomes.**1. INTRODUCTION**

High blood pressure during pregnancy is when your blood pressure is consistently higher than 140/90 mmHg for at least two four-hour periods.^[1] 10-15% of pregnancies have a problem called hypertensive disorder of pregnancy (HDP), which can cause more deaths and health problems for the mother and baby around the world.^[2-4]

We don't know exactly how HDP develops. It affects many parts of the body and can vary a lot from person to person.^[5] Changes in maternal features have led to secular rises in HDP. The use of prenatal care and treatments like magnesium sulfate has led to fewer cases of eclampsia.^[6] Preeclampsia can cause problems for both the baby and the mother, such as kidney or liver issues.^[3,7] Knowing about these problems early can help with better treatment, a good result for the mother and baby, and a decrease in HDP sickness and death.^[5,8] Women are less likely to die or suffer from serious health problems during childbirth when they are closely watched over by medical professionals, given medicine to prevent and control seizures, treated for high blood

pressure, and have their pregnancy ended at the right time.^[9] The three delays that can be prevented but impact the health of mothers with high blood pressure during pregnancy are related to the healthcare system and how women seek medical help. These factors are important for the well-being of both the mother and baby.^[10]

Preeclampsia is a big problem for pregnant women and their babies. It causes a lot of health problems and even death for many women and babies around the world each year.^[10,11] 5.2%–8.2% Many pregnancies around the world are made more difficult by high blood pressure during pregnancy.^[12] The World Health Organization (WHO) says that preeclampsia happens more often in poor countries (2.8% of births) than in rich countries (0.4%).^[13] According to a systematic study conducted by the World In 2014, the main reason why mothers died in Sub-Saharan Africa was bleeding, which caused about 16% of all maternal deaths, according to the Health Organization.^[14,15] Similarly, The national study on mother's deaths found that high blood pressure during pregnancy is the main reason for mothers dying after bleeding, with a rate of 111.1 per 1000 live births.^[16-18]

With improved roads and buildings, pregnant women can easily get good medical care. Finding and treating a health problem early has made it less likely for pregnant women to develop high blood pressure complications.^[19] One important way to improve the health of mothers with high blood pressure during pregnancy is to make sure they can get good emergency care when they need it. This would reduce the chances of problems during childbirth and could prevent up to 70% of mothers from dying, as well as 15% of newborn babies.^[20,21]

The new WHO guidelines help doctors take care of pregnant women so their pregnancies are safe and healthy.^[22] Furthermore, MDSR was brought in to make it easier for women to get good maternity health care without waiting too long.^[23]

In poor countries, it's important for healthcare workers to know about preeclampsia. Every time you go to the doctor, they check your pee for protein and test your blood pressure.^[24] The Demographic and Health Survey (EDHS) report says that 62% and 31% of pregnant women had at least one and four ANC visits. 75% of pregnant women had their blood pressure checked and 66% had a urine test. They also got nutritional counseling. But there weren't enough ways to check for health problems, give medicine, or provide treatment for HDP.^[22,25] " Most health centers did not do a good job at providing life-saving care for pregnant women and newborn babies. These services were usually only found in big cities.^[26] In order to close this gap, the current study evaluated the severity of HDP's negative consequences and identified the variables that predispose to those results.

The HDPs can help predict when a mother might have problems during pregnancy. This helps improve how she is cared for, makes sure she gets regular check-ups, and treats any symptoms early. It also helps decide if she needs to go to a hospital with better care, and improves how medical studies are done. This helps make sure pregnant women in Ethiopia get the right help for them. The study's findings are important for both medical treatments and public programs that try to solve problems related to HDP's bad results.

3. RESULT

Table 1: Distribution demographic data in studied groups.

	Gestational hypertension N=30	Mild preeclampsia N=25	Severe Preeclampsia N=40	Eclampsia N=5	Normotensive n=100	P-value
Gestational age						
< 34 weeks	0 (0%)	1 (4%)	8 (20%)	1(20%)	25 (25%)	< 0.001*
34-36 weeks	6 (20%)	2 (8%)	12 (30%)	2(40%)	35 (35%)	
≥ 37 week	24 (80%)	22 (88%)	20 (50%)	2(40%)	40 (40%)	
Birth weight						
< 1500 g	0 (0%)	2(8%)	9(22.5%)	0(0%)	11(11%)	< 0.001*

2. PATIENTS AND METHODS

Study Design and Setting

It was a descriptive, cross-sectional, retrospective study using data from the hospital records of pregnant women in Iraq.

Study population

This research involved all women who were able to be in the hospital and had their babies there. We picked 200 samples from each month of the study. Women who were sent to other hospitals after being admitted, those with missing or incomplete information, or those who died before being properly diagnosed are not included in the study.

Data variables for the study

To understand how health problems during pregnancy affect the mother and baby, we looked at the medical records of the women in the study. We collected information about the mom's concerns, age, overall health, previous pregnancies, how far along she is, how many babies she's having, and any other risks for high blood pressure during pregnancy. We also noted her highest blood pressure numbers, what kind of high blood pressure she has, when it started, how bad the symptoms are, and what medicines she's taking. Also, we collected information about when labor started, how babies were delivered, and any problems during pregnancy and birth. The test results showed there was protein in the urine, low hemoglobin levels, normal platelet count, high serum creatinine, normal BUN levels, high uric acid levels, and high liver enzyme levels in the blood.

We checked the conditions of the newborn babies by looking at how many weeks they were in the womb, if they were born alive or not, how much they weighed at birth, how well they were doing at 1 and 5 minutes after birth, if they needed help breathing, and if they needed to be taken to the special care nursery.

Data Processing and Statistical analysis

After making sure everything was there, the information was turned into a code, put into a computer, and studied using SPSS version 20 software. We used descriptive statistics to figure out rates. We used chi-square to figure out the connections between certain predictor variables. A p-value less than 0. 05 means the results are significant.

1500-2499 g	4(13.3%)	3(12%)	12(30%)	3(60%)	33(33%)	
≥ 2500 g	26(86.7%)	20(80%)	19(47.5%)	2(40%)	55(55%)	
Mode of deliver						
vaginal	27 (90%)	12(48%)	19(47.5)	3(60%)	55(20%)	< 0.001*
Instrumental	1 (3.3%)	1(4%)	3(7.5%)	0 (0%)	15(15%)	
cesarean	2 (6.7%)	12(48%)	18(45%)	2(40%)	30(30%)	

This table show that there was statistically significant difference between studied groups according to

Gestational age, Birth weight and Mode of deliver in studied groups.

Table 2: Distribution of fetomaternal Complication and Outcome in studied groups.

	Gestational hypertension N=30	Mild preeclampsia N=25	Severe Preeclampsia N=40	Eclampsia N=5	Normotensive n=100	P-value
Neonatal complication						
No complication	30 (100%)	18 (72%)	16 (40%)	2 (40%)	95 (95%)	< 0.001*
IUGRa	0(0%)	2 (8%)	6 (15%)	1 (20%)	0(0%)	
Need for resuscitation	0(0%)	2 (8%)	7 (17.5%)	1 (20%)	2 (2%)	
Need for NICU ^b	0(0%)	3 (12%)	11 (27.5%)	1 (20%)	3 (3%)	
Birth outcome						
Still birth	2 (6.7%)	1 (4%)	2 (5%)	0(0%)	4 (4%)	0.9
Alive	28 (93.3%)	24 (96%)	38 (95%)	5 (100%)	96 (96%)	
Maternal age						
≤ 24 yrs	13 (43.3%)	5 (20%)	12 (30%)	0(0%)	18 (18%)	< 0.001*
25-34 yrs	15 (50%)	17 (68%)	23 (57.5%)	4 (90%)	27 (27%)	
≥ 35 yrs	2 (6.7%)	3 (12%)	5 (12.5%)	1 (10%)	55 (55%)	

This table show that there was no statistically significant difference between studied groups according to Birth outcome while, there was highly statistically significant

difference between studied groups according to Maternal age and Neonatal complication.

Table 3: Distribution of APGAR in studied groups.

	Gestational hypertension N=30	Mild preeclampsia N=25	Severe Preeclampsia N=40	Eclampsia N=5	Normotensive n=100	P-value
APGAR at 1st minute						
< 7	4 (13.3%)	8 (32%)	19 (47.5%)	2 (40%)	13 (13%)	< 0.001*
≥ 7	26 (86.7%)	17 (68%)	21 (52.5%)	3 (60%)	87 (87%)	
APGAR at 5th minute						
< 7	2 (6.7%)	4 (16%)	3 (12%)	2 (40%)	5 (5%)	0.03
≥ 7	28 (93.3%)	16 (84%)	22 (82%)	3 (60%)	95 (95%)	

This table show that there was statistically significant difference between studied groups according to distribution of APGAR in studied groups.

Table 4: Distribution of Maternal effects of HDP in studied groups.

	Mothers with Severe preeclampsia and Eclampsia (n =40)	All Mothers with HDP (n = 125)	P value
Headache	10 (25%)	45 (36%)	0.83
Blurring of vision	15 (37.5%)	37 (29.6%)	
Epigastric pain	3 (7.5%)	10 (8%)	
Abruptio placentae	1 (2.5%)	2 (1.6%)	

Seizure and Loss of consciousness	1 (2.5%)	5 (4%)	
AKI	5 (12.5%)	25 (20%)	
Thrombocytopenia	5 (12.5%)	20 (16%)	

This table show that there was statistically significant difference between studied groups according to

Gestational age, Birth weight and Mode of deliver in studied groups.

Table 5: Distribution of maternal blood pressure between studied groups.

	Gestational hypertension N=30	Mild preeclampsia N=25	Severe Preeclampsia N=40	Eclampsia N=5	Normotensive n=100	P-value
SBP	138.32±9.02	140.97±10.02	163.87±11.01	176.7±11.1	109±8.6	< 0.001*
DBP	91.65±6.4	94.2±6.7	108.68±7.01	117.6±7.1	87.6±5.02	< 0.001*

This table show that there was statistically significant difference between studied groups according to SBP and DBP in studied groups.

4. DISCUSSIONS

Along with bleeding and infection ,hypertensive disorders of pregnancy (HDP) are one of the lethal triads that significantly increase maternal morbidity and death as well as fetal and neonatal risk.^[1] In this study most of the participants were in the age group of 20 to 30 years (83.7%), similar to this study the study done by Khosravi et al, shows the PIH was most commonly seen in the age group of 25 to 34years.(%55.6) in the study by Gandhi et al, the participants were in mostly in the age group of 21 to 25 years (48.42%) whereas the study by Parmer et al, had PIH patients mostly aged less than 20 years.[5-7] In a study by Patel R et al PIH was seen mostly in the age group of 18 to 22 years.^[27] This study observed that the patients of PIH were mainly primigravida (73%) which is similar to study done by Youssef AA et al, which showed PIH the incidence was seen mainly in primigravida (67.6%) and study done by Parmer et al which shows that the incidence is more common in primigravida (55%).^[28] In contrast this study observations studies done by Gandhi et al (56.84%) Khosravi et al (67.2% (reported the incidence In this study PIH was seen in patients with education up to high school (56.9%) similarly in a study done by Youssef AA et al, the preeclampsia was seen more commonly and sever form in low education status.^[29] resented at term37(<) weeks of gestation; 68%). In other studies, by Gandhi et al most of participants were 36< weeks of gestation (60%), Khosravi et al showed that the most commonest gestational age was 32-36 weeks (57.4%), Alaa el-deen et al study states that 39.4% of participants were in the ≥36 weeks of gestation.^[4,5,6,9] Out of 100 patients in this study, 70cases (70%) presented with features of eclampsia. A study by Gandhi et al only 12% of the patients had eclampsia and another study by Singh V et al, showed an incidence of 14.3% of eclampsia showed lower incidence than this study.^[30]

In this study, most of the babies born were of the normal weight (47.9%) followed by low birth weight (46.3%). The NICU admission was seen in 29.2% of the

participants and 9% of the babies were intrauterine deaths. A study by Patel R et al, out of 64 delivery 18.75% of babies were required NICU admission for various causes with 1.56% were IUFD and %1.56 of neonatal death.^[27]

Of all deliveries by moms with HDP, the rate of vaginal birth was 52.5 instrumental delivery accounted for 5%, and cesarean section delivery for 34%. Comparably, in the research conducted in Jimma (34%),^[10] Mettu (16.2%).^[24] and Debrebrhan (6.3%),^[31] the cesarean rate was 34%. Conversely, the rate of instrumental delivery was significantly lower than the research in Debrebrhan (34.7%),^[28] but somewhat lower than the studies in Jimma (7.8%)^[10] and Mettu (6.9%).^[24] One of the main symptoms in 30.8% of all moms with HDP and in 55.5% of mothers who were pre-eclamptic and eclamptic together was headache that was not relieved by standard analgesics. This is consistent with the 48.9% incidence of headache among mothers who have stacked preeclampsia and severe preeclampsia, as reported by Debrebrhan,^[32] as well as comparable studies from other nations, including 42.22% in India^[31] and 46.2% in Iran.^[30] In 29.6% of participants with HDP and 37.5% of subjects with pre-eclampsia and eclampsia combined, blurring of the vision was noted. Additionally, this is consistent with other reports.^[33] Prior to developing aberrant body movement and loss of consciousness, all of the eclamptic moms in our study complained of headaches and blurred vision.

In order to prevent the consequences, it may be crucial to identify severe preeclampsia early and take appropriate action, such as ending the pregnancy. Pregnancy-related acute kidney failure (AKI) has declined in affluent nations, where estimates currently range from 1-2.8%; in underdeveloped nations, however, it ranges from 4.5-15% and is the cause of both mother and fetal morbidity and death.^[34] A concerning high value of 36% was observed in certain configurations with HDP.^[35] According to our research, moms with HDP had a 20% prevalence of AKI (Cr > 1.2 mg/dl), which is comparatively greater than the 6.6% reported in Mettu.^[24] This may be partially explained by the HDP's higher prevalence in the current investigation. But the

percentages of thrombocytopenia (16%) and AKI (20%) are less than comparable research conducted in other nations.^[32]

An estimated 16% of maternal deaths worldwide occur each year due to preeclampsia/eclampsia.^[17] and 17.6% of direct maternal deaths are attributed to the HDP.^[26] When pregnant women do not regularly have access to prenatal, intrapartum, and postpartum care, the risk of maternal death is much higher.^[8,17]

Pregnancy-related hypertension disorders have been linked to a number of perinatal problems, including low birth weight, low Apgar scores, intrauterine growth restriction, the need for resuscitation and/or admission to a neonatal intensive care unit (NICU), and stillbirths. Preterm birth was found to have a statistically significant correlation with the severity of HDP in the current study ($p.v < 0.001$). Preterm delivery rates were 29.5%, with almost 80% of preterm deliveries being caused by severe pre-eclampsia and eclampsia. This result is consistent with research from Mettu (28.1%) [] and Jimma (31.6%).^[10]

However lower than reports of 48.6% in Addis Ababa^[9] and 35.4% in Debrebrhan.^[28] Additionally, the study found that as HDP severity increased, the chance of low birth weight increased ($p.v < 0.001$). There is a statistically significant correlation between the severity of HDP and the rate of low Apgar in the first and fifth minutes ($p < 0.001$). This supports findings from earlier investigations.^[34] In addition, preeclampsia-eclampsia has been linked to an increased risk of infant respiratory distress and an increased risk of neonatal intensive care unit hospitalization.^[13] Small and preterm babies may have low Apgar scores, perinatal asphyxia, require longer hospitalizations in the neonatal critical care unit, and frequently have developmental delays.^[13] 10% of the neonates in our study required resuscitatorial support, and 87% of those babies were born to moms who had severe pre-eclampsia and eclampsia. Similarly, 8.9% of newborns born to moms with severe pre-eclampsia and eclampsia required referral to the NICU, making up 11.5% of all neonates. The rate of NICU admission is significantly lower than the Debrebrhan study's 40.1%,^[35] but it is equivalent to the Jimma study's 16.4%.^[10] In our study, there were 5 stillbirths, or a 5% stillbirth rate. This rate is significantly lower than that found in previous Ethiopian research, which found 10.7% in Mettu,^[24] 27.5% in Jimma,^[10] and 30.8% in Debrebrhan.^[28] The low prevalence of eclampsia (2.6%) in comparison to other studies may be a significant contributing factor to the low incidence of stillbirth in the current study area.^[10,24,28] A five-fold greater risk of perinatal death is attributed to eclampsia.^[21]

CONCLUSION

The prevalence of hypertensive disorders of pregnancy is high in the study area and complicates maternal and fetal outcomes of the pregnancy. To deter its detrimental

effects both on fetal and maternal outcomes of pregnancy, antenatal surveillance should be expanded to enable early detection, stringent follow-up and timely intervention in severely affected pregnancies.

REFERENCES

1. Dssursuldwh O., Fduh S., Revhuydwlrq Z., Rxwfrphv S., Pruelglw V. P., Pru D. Q. G. Hypertension in Pregnancy. *Obstetrics & Gynecology*, 2013; 122(5): 1122–1131.
2. Fraser A., Nelson S. M., Macdonald-wallis C., et al. Associations of pregnancy complications with calculated cardiovascular disease risk and cardiovascular risk factors in middle age: the Avon Longitudinal Study of Parents and Children. *Circulation*, 2012; 125(11): 1367–1380.
3. Duley L. The global impact of pre-eclampsia and eclampsia. *Seminars In Perinatology*, 2009; 33(3): 130–137.
4. Mammaro A., Carrara S., Cavaliere A., et al. Hypertensive disorders of pregnancy. *Journal of prenatal medicine*, 2009; 3(1).
5. Payne B. A., Hutcheon J. A., Ansermino J. M., et al. A risk prediction model for the assessment and triage of women with hypertensive disorders of pregnancy in low-resourced settings: the miniPIERS (pre-eclampsia integrated estimate of risk) multi-country prospective cohort study. *PLoS Medicine*, 2014; 11.
6. Hutcheon J. A., Fellow P. Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 2011; 25(4): 391–403. doi: 10.1016/j.bpobgyn.2011.01.006.
7. Mol B. W. J., Roberts C. T., Thangaratinam S., Magee L. A., De G. C. J. M., Hofmeyr G. J. Pre-eclampsia. *The Lancet*, 2015; 6736(15): 1–13.
8. Von Dadelszen P., Payne B., Li J., et al. Prediction of adverse maternal outcomes in pre-eclampsia: development and validation of the fullPIERS model. *The Lancet*, 2011; 377(9761): 219–227.
9. American College of Obstetricians and Gynecologists. Diagnosis and management of preeclampsia and eclampsia. *Obstetrics & Gynecology*, 2002; 99: 159–167.
10. Bailey P., Lobis S., Maine D., Fortney J. A. Monitoring emergency obstetric care: a handbook. World Health Organization, 2009.
11. Keyes E. B., Haile-mariam A., Belayneh N. T., et al. Ethiopia's assessment of emergency obstetric and newborn care: setting the gold standard for national facility-based assessments. *International Journal of Gynecology & Obstetrics*, 2011; 115(1): 94–100.
12. Ukah U. V., De S. D. A., Payne B., et al. Prediction of adverse maternal outcomes from pre-eclampsia and other hypertensive disorders of pregnancy: a systematic review. *Pregnancy Hypertens*, 2018; 11(11): 115–123.

13. Kuklina E. V. Hypertensive disorders and severe obstetric morbidity in the United States. *Obstetrics & Gynecology*, 2009; 113(6): 1299–1306.
14. Umesawa M., Kobashi G. Epidemiology of hypertensive disorders in pregnancy: prevalence, risk factors, predictors and prognosis. *Hypertension Research*, 2017; 40(3): 213–220.
15. Say L., Chou D., Gemmill A., et al. Global causes of maternal death: a WHO systematic analysis. *The Lancet Global Health*, 2014; 2(6).
16. Bigna J. J., Nyaga U. F., Jingi A. M., Kaze A. D., Jobert M. P. H., Nansseu R. Review and meta-analysis the burden of hypertensive disorders of pregnancy in Africa: a systematic review and meta-analysis. *The Journal of Clinical Hypertension*, 2019; 21(4): 479.
17. Abera N., Id A., Demissie B. W., Asseffa N. A. Perinatal outcomes of hypertensive disorders in pregnancy at a referral hospital. *Southern*, 2019; 14(2): e0213240.
18. Mekango D. E., Alemayehu M., Gebregers G. B., Medhanyie A., Goba G. Determinants of maternal near miss among women in public hospital maternity wards in Northern Ethiopia: a facility based case-control study. *PLoS One*, 2017; 12(9): e0183886.
19. Goldenberg R. L., McClure E. M., Macguire E. R., Kamath B. D., Jobe A. H. Lessons for low-income regions following the reduction in hypertension-related maternal mortality in high-income countries. *International Journal of Gynecology & Obstetrics*, 2011; 113(2): 91–95.
20. Freedman L. P., Graham W. J., Brazier E., et al. Practical lessons from global safe motherhood initiatives: time for a new focus on implementation. *The Lancet*, 2007; 370: 1383–1391.
21. Ameh C., Msuya S., Hofman J., Raven J., Mathai M., Van Den Broek N. Status of emergency obstetric care in six developing countries five years before the MDG targets for maternal and newborn health. *PloS one*, 2012; 7(12, article e49938) doi: 10.1371/journal.pone.0049938.
22. Survey H. Central Statistical Agency (CSA) [Ethiopia] and ICF. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: Ethiopia Demographic and Health Survey, 2016.
23. Ouma P. O., van Eijk A. M., Hamel M. J., et al. Antenatal and delivery care in rural western Kenya: the effect of training health care workers to provide “focused antenatal care” *Reproductive health*, 2010; 7(1): 1–9.
24. Osungbade K. O., Ige O. K. Public health perspectives of preeclampsia in developing countries: implication for health system strengthening. *Journal Of Pregnancy*, 2011; 2011: 6.
25. Gaym A., Bailey P., Pearson L., Admasu K., Gebrehiwot Y., Ethiopian National EmONC Assessment Team Disease burden due to preeclampsia/eclampsia and the Ethiopian health system's response. *International Journal of Gynecology & Obstetrics*, 2011; 115(1): 112–116.
26. Girma M., Yaya Y., Gebrehanna E., Berhane Y., Lindtjörn B. Lifesaving emergency obstetric services are inadequate in south-west Ethiopia: a formidable challenge to reducing maternal mortality in. *BMC Health Services Research*, 2013; 13(1): 1–8.
27. Patel R., Baria H, Patel HR, Nayak S. A study on pregnancy induced hypertension and foetal outcome among patient with PIH at tertiary care hospital, Valsad. *Int J Community Med Public Health*, 2014; 4: 277–81.
28. Mostafa HM, Youssef AE, Samia SM, Dina M. Effect of socioeconomic status on preeclampsia cross sectional study. *Med J Cairo Univer*, 2018; 86: 4227–34.
29. Melese M. F., Badi M. B., Aynalem G. L. Perinatal outcomes of severe preeclampsia / eclampsia and associated factors among mothers admitted in Amhara region referral hospitals, North West Ethiopia, *BMC Research Notes*, 2019; 12(1): 1–6.
30. Subki A. , Algethami M. R., Baabdullah W. M., et al. Prevalence, risk factors, and fetal and maternal outcomes of hypertensive disorders of pregnancy: a retrospective study in Western Saudi Arabia. *Oman Medical Journal*, 2018; 33(5): 409.
31. Agrawal S., Maitra N. Prediction of adverse maternal outcomes in preeclampsia using a risk prediction model. *The Journal of Obstetrics and Gynecology of India*, 2015; 66(1): 104.
32. Wagnew M., Dessalegn M., Worku A., Nyagero J. Supplement article trends of preeclampsia / eclampsia and maternal and neonatal outcomes among women delivering in Addis Ababa selected government hospitals. *Ethiopia: A Retrospective Cross-Sectional Study*, 2016; 363(2): 1–6. [PMC free article]
33. Ajah L. O., Ozonu N. C., Ezeonu P. O., Lawani L. O., Obuna J. A., Onwe E. O. The fetomaternal outcome of preeclampsia with severe features and eclampsia in Abakaliki, South-East Nigeria. *Journal of Clinical and Diagnostic Research*, 2016; 10(9).
34. Zhang J., Meikle S., Trumble A. Severe maternal morbidity associated with hypertensive disorders in pregnancy in the United States. *Hypertension In Pregnancy*, 2003; 22(2): 203–212.