Gynecology and Obstetrics Clinical Medicine 3 (2023) 119–123

Contents lists available at ScienceDirect

Gynecology and Obstetrics Clinical Medicine

journal homepage: www.keaipublishing.com/en/journals/gynecology-and-obstetrics-clinical-medicine

Prevalence of hypertensive disorders of pregnancy, associated factors and pregnancy complications in a primigravida population

Rachel Mathew *, Benita P. Devanesan, Srijana, N.S. Sreedevi

Department of Obstetrics and Gynaecology, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, 689101, Kerala, India

ARTICLE INFO

Keywords:
Hypertensive disorders of pregnancy
Maternal outcome
Perinatal outcome
Primigravidae

ABSTRACT

Background: Hypertensive disorders of pregnancy (HDP) are among obstetrics' most intriguing and yet unsolved problems. It is one of the major causes of maternal and perinatal morbidity and mortality. This study estimates the prevalence of hypertensive disorders of pregnancy, their associated risk factors and pregnancy complications in primiparous women.

Methods: All primigravida who gave birth in our hospital from December 2020 to December 2021 were included in the study. The prevalence, risk factors, mode of delivery, and maternal and fetal outcomes of hypertensive disorders of pregnancy in primigravidae were collected from the patient's medical records. Statistical analysis was done using the SPSS 18.0 software package. The Chi-square test was used to analyse the association between the risk factors and hypertensive disorders of pregnancy in primigravida.

Results: A total of 807 women were included in the study, and the mean age was 26.34 ± 3.84 years. The prevalence of hypertensive disorders of pregnancy in primigravidae was found to be 18.6%. Among the prevalent population, 79.3% of women had gestational hypertension. The findings indicate that hypertension in pregnancy has a significant relationship with risk factors such as increased maternal age ($p < 0.004$), family history of hypertension in pregnancy ($p < 0.001$), body mass index >30 kg/m^2($p < 0.001$), hyperglycaemia in pregnancy ($p < 0.001$), IVF pregnancy ($p < 0.004$) and polycystic ovary syndrome ($p < 0.001$). The most reported adverse maternal and perinatal outcomes were placental abruption ($p < 0.001$), postpartum haemorrhage ($p < 0.001$), prematurity ($p < 0.001$), and fetal growth restriction ($p < 0.001$).

Conclusion: The study emphasises the importance of knowledge and timely assessment of risk factors of HDP. It also highlights the need for pre-conceptional counselling, which includes early detection, careful monitoring and treatment of HDP for preventing morbidity and mortality related to this disorder and it should be followed up even in the postpartum period.

1. Introduction

Hypertensive disorders of pregnancy (HDP) are among obstetrics' most intriguing and yet unsolved problem. HDP is blood pressure greater than or equal to 140/90 mmHg, with each measurement usually corroborating within 4 hours.[1] According to the World Health Organization (WHO), the lethal trifecta of pregnancy are haemorrhage, HDP, and infection, which contribute significantly to maternal mortality and morbidity and claim the lives of at least one woman every 7 min.[2] These complicate up to 5%~10% of pregnancies worldwide.[3] Globally, the incidence of HDP has increased from 16.30 million to 18.08 million from 1990 to 2019, a total increase of 10.9% over two decades.[4] The High Blood Pressure Education Program (2000) has classified HDP as gestational hypertension, preeclampsia, eclampsia syndrome, and superimposed preeclampsia on chronic hypertension.[5] Mehta et al.[6] in his study found an incidence of HDP of 6.9% in the Indian population. The incidence of preeclampsia in hospital practice in India varies from 5% to 15%, and that of eclampsia is about 1.5%.[7] In India, over the years, from

* Corresponding author. Department of Obstetrics and Gynaecology, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, 689101, Kerala, India
E-mail address: rachelwills07@gmail.com (R. Mathew).

Publishing services by Elsevier on behalf of KeAi

https://doi.org/10.1016/j.gocm.2023.01.002
Received 2 September 2022; Received in revised form 9 January 2023; Accepted 18 January 2023
Available online 27 January 2023

1976 to 2014, the risk of eclampsia ranges from 0.179 to 5%, with the average being 1.5%.[8] Every year, over 5.2 million women die from pregnancy-related complications worldwide. [9] With an estimated 62, 000–77,000 deaths each year, HDP account for approximately 18.1% of maternal mortality.[10–12] Pregnant women in third-world countries are at a higher risk of developing hypertension and its consequences for various reasons. If those at risk for HDP are detected early in the prenatal period, effective treatment can be given, and complications can be prevented.

Despite Kerala being a state of India that has a high literacy rate and health indicators, we see that HDP complications account for most maternal near-miss cases (an event in which a pregnant woman comes close to maternal death but does not die) and very few research has been conducted in Kerala to determine the relationship between risk factors and the development of HDP. This study aims to estimate the prevalence of HDP in primiparous women and compare the prevalence of associated risk factors and pregnancy complications in primiparous women with and without HDP in a tertiary care centre in South Kerala, India. The current research is necessary since it is a realistic, cost-effective, simple and convenient way to reduce the scarcity of information about this topic in our population.

2. Materials and methods

A retrospective analytical study was carried out at Pushpagiri Institute of Medical Sciences and Research Centre in Kerala, India, for 12 months, from December 2020 to December 2021. After taking permission from the institutional ethics committee, the study was ethically conducted as per the Declaration of Helsinki. Primigravidae of all ages who consented to the study and gave birth in the hospital during the study period were included. Women with multiple pregnancies, chronic hypertension, and missing clinical history (without proper antenatal records) were excluded from the study.

We have collected the prevalence, risk factors, pregnancy outcomes, and maternal and foetal outcomes from the patient's medical records. The variables analysed were the presence of hypertension, type of hypertension and potential risk factors: maternal age, educational status, income level, occupation, body mass index (BMI) at the first antenatal visit, family history of hypertension, history of smoking, in-vitro fertilisation (IVF) pregnancy, polycystic ovary syndrome (PCOS), and associated medical disorders (hyperglycaemia in pregnancy, renal disease, cardiac disease, collagen vascular disease, hypothyroidism). The pregnancy outcomes were evaluated by analysing the gestational age, mode of delivery and maternal and perinatal outcomes such as premature baby (a baby who delivers before 37 weeks).

The study utilised the SPSS 18.0 software package to analyse the data. The association between the risk factors and HDP in primigravida was measured in terms of the ODDS ratio with a 95% confidence interval and tested for significance using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

3. Results

A total of 807 primigravidae were included in the study, with 18.6% (150) having HDP. The mean age of participants was found to be 26.34 ± 3.84 years. Among the prevalent population, the study results showed that 79.3% (119) of women had gestational hypertension, 19.3% (29) had preeclampsia, and 1.3% (2) had eclampsia.

3.1. Association between socio-demographic factors and HDP

We compared the association of socio-demographic characteristics such as age, education, income level, occupation of the study subjects and social habits like smoking with HDP (Table 1). The results found that HDP was significantly associated with age group older than 40 ($p < 0.004$). Ages 18–39 years, income level, occupation, and smoking history were not associated with hypertensive disorders in pregnancy since the p-value was greater than 0.05.

3.2. Risk factors associated with HDP

The study analysed the association between specific risk factors such as familial history, BMI of the mothers, IVF, disease conditions and HDP (Table 2). The findings indicate that HDP has a significant relationship with risk factors such as a family history of hypertension in pregnancy (of participant's mother or sisters) ($p < 0.001$), BMI of 18.5 kg/m^2 ($p < 0.002$), BMI >30 kg/m^2 ($p < 0.001$), IVF pregnancy ($p < 0.004$), hyperglycaemia in pregnancy($p < 0.001$) and PCOS ($p < 0.001$).

3.3. Association of HDP with the mode of delivery and gestational age at delivery

The study also analysed the association of HDP with the mode of delivery and the gestational age at delivery (Table 3). While investigating the mode of delivery, it was found that preterm vaginal delivery ($p < 0.003$), preterm lower segment caesarean section(LSCS) ($p < 0.001$), and full-term LSCS ($p < 0.007$) have a significant relationship with the prevalence of HDP. In our study participants, the gestational age of delivery from 28 weeks to 36 weeks (preterm)was statistically significant for HDP with a p-value <0.001.

Table 1
Association between socio-demographic factors and HDP.

Socio-demographic variables		HDP n(%)		Total	OR (95% CI)	*p* value
		Yes	No			
Age(Yrs)	<18	1(33.3)	2(66.7)	3	2.19(0.19–24.40)	<0.001*#
	19–29	98(15.1)	553(84.9)	651	0.35(0.23–0.52)	0.112
	30–39	46(31.9)	98(68.1)	144	2.52(1.67–3.79)	0.511
	>40	5(55.6)	4(44.4)	9	5.62(1.49–21.22)	0.004*#
Education	Primary School/Middle School	7(11.1)	56(88.9)	63	0.52(0.23–1.17)	0.112
	High School/Graduate	113(21)	425(79)	538	1.66(1.11–2.49)	0.613
	Post Graduate	30(14.6)	176(85.4)	206	0.68(0.44–1.05)	0.085
Income level	APL	77(18.1)	348(81.9)	425	0.93(0.65–1.33)	0.717
	BPL	73(19.1)	309(80.9)	382		
Occupation	Housewife	82(19.3)	342(80.7)	424	1.11(0.77–1.58)	0.563
	Govt Sector	20(18.7)	87(81.3)	107	1.00(0.59–1.69)	0.976
	Private Sector	48(17.4)	228(82.6)	276	0.88(0.60–1.29)	0.529
History of smoking	Yes	60(42)	83(58)	143	4.61(3.09–6.87)	<0.151
	No	90(13.6)	574(86.4)	664		

* p-value significant. # p-value shows significance, but the sample size is less to predict the exact relationship.
Note:HDP: Hypertensive disorders of pregnancy; APL: Above Poverty Line; BPL: Below poverty line; Yrs: years.

Table 2
Risk Factors associated with HDP.

Variables		HDP n(%)		Total	OR (95% CI)	p-value
		Yes	No			
Family history of hypertension in pregnancy	Yes	87(37.3)	146(62.7)	233	4.83(3.32–7.01)	<0.001*
	No	63(11)	511(89)	574		
BMI	<18.5	4(8.3)	44(91.7)	48	0.38(0.13–1.07)	0.341
	18.5–24.9	58(14.3)	348(85.7)	406	0.56(0.39–0.80)	0.06
	25–29.9	44(16.7)	220(83.3)	264	0.82(0.56–1.21)	0.328
	>30	44(49.4)	45(50.6)	89	5.64(3.55–8.87)	<0.001*
IVF pregnancy	Yes	5(55.6)	4(44.4)	9	5.62(1.49–21.22)	0.004*
	No	145(18.2)	653(81.8)	798		
Hyperglycaemia in pregnancy	Yes	75(28.6)	187(71.4)	262	2.51(1.75–3.61)	<0.001*
	No	75(13.8)	470(86.2)	545		
Pre-existing renal disease	Yes	0	1(100)	1	1.22(1.18–1.27)	0.633
	No	150(18.6)	656(81.4)	806		
Pre-existing cardiac disease	Yes	1(9.1)	10(90.9)	11	0.43(0.05–3.41)	0.415
	No	149(18.7)	647(81.3)	796		
Pre-existing collagen vascular disease	Yes	3(42.9)	4(57.1)	7	3.33(0.73–15.04)	0.097
	No	147(18.4)	653(81.6)	800		
Hypothyroidism	Yes	47(26.9)	128(73.1)	175	1.88(1.27–2.80)	0.211
	No	103(16.3)	529(83.7)	632		
PCOS	Yes	150 (57)	111(43)	261	2.51(1.75–3.61)	<0.001*
	No	34 (6.3)	512 (93.7)	546		

*p value significant; Note: BMI: Body mass index, IVF: In vitro fertilisation, PCOS: Polycystic ovary syndrome.

Table 3
Association of HDP with mode of delivery and gestational age at delivery.

Variables		HDP n(%)		Total	OR (95% CI)	p value
		Yes	No			
Mode of delivery	FTVD	61(11.8)	457(88.2)	518	0.30(0.20–.0.43)	0.522
	PTVD	15(35.7)	27(64.3)	42	2.59(1.34–5.00)	0.003*
	Assisted birth	6(15.8)	32(84.2)	38	0.81(0.33–1.98)	0.65
	Full term LSCS	42(25.9)	120(74.1)	162	1.74(1.15–2.61)	0.007*
	Preterm LSCS	26(55.3)	21(44.7)	47	6.35(3.46–11.64)	<0.001*
Gestational age at delivery	<28 Weeks	0	6(100)	6	1.23(1.19–1.27)	0.24
	28–33 Weeks	11(47.8)	12(52.2)	23	4.25(1.83–9.83)	<0.001*
	34–36 Weeks	30(51.7)	28(48.3)	58	5.61(3.23–9.74)	<0.001*
	≥37 Weeks	109(15.1)	611(84.9)	720	0.20(0.12–0.32)	0.084

*p value significant.
Note: FTVD: Full term vaginal delivery, PTVD: Preterm vaginal delivery, LSCS: Lower segment cesarian section, Assisted birth: A forceps or a ventouse suction cup are used to help delivery the baby.

3.4. Adverse maternal and perinatal outcomes associated with HDP

All maternal complications of HDP studied in our study subjects like placental abruption ($p < 0.001$), postpartum haemorrhage ($p < 0.001$), thrombocytopenia/coagulopathy ($p < 0.001$), liver dysfunction ($p < 0.001$), renal dysfunction ($p < 0.001$), pulmonary oedema ($p < 0.003$), HELLP (Haemolysis, elevated liver enzymes, low platelet count) ($p < 0.001$) were found to have a statistically significant complication. Prematurity ($p < 0.001$) and FGR (fetal growth restriction) ($p < 0.001$) were among the most reported perinatal outcome (Table 4).

3.5. Association of PCOS and HDP

The study observed that PCOS is one of the risk factors for HDP, and

Table 4
Adverse maternal and perinatal complications associated with Hypertensive disorders of pregnancy.

Complications	HDP n(%)		Total	OR (95% CI)	p value
	Yes	No			
Placental Abruption	5(100)	0	5	5.50(4.74–6.36)	<0.001*
Postpartum Haemorrhage	9(75)	3(25)	12	13.91(3.72–15.05)	<0.001*
Thrombocytopenia/Coagulopathy	3(100)	0	3	5.46(4.72–6.33)	<0.001*
Liver Disfunction	3(100)	0	3	5.46(4.72–6.33)	<0.001*
Renal Disfunction	3(100)	0	3	5.46(4.72–6.33)	<0.001*
Pulmonary Oedema	2(100)	0	2	5.43(4.70–6.29)	0.003*
HELLP	3(100)	0	3	5.46(4.72–6.33)	<0.001*
PREMATURITY	35(48.6)	37(51.4)	72	5.10(3.08–8.43)	<0.001*
FGR	25(27.5)	66(72.5)	91	1.79(1.08–2.95)	0.021*
IUFD	3(37.5)	5(62.5)	8	2.66(0.62–11.26)	0.167
NND	1(25)	3(75)	4	1.46(0.15–14.16)	0.741

*p value significant.
Note: HELLP: Hemolysis, elevated liver enzymes, and low platelets; FGR: Fetal growth restriction; IUFD: intrauterine fetal demise; NND: neonatal death. All maternal complications are statistically significant and in perinatal outcomes FGR and prematurity were clinically significant.

Table 5
Pregnancy complications in PCOS and Non PCOS women.

Pregnancy complication	Total Patients	PCOS n(%)	Non-PCOS n(%)	*p* Value
Gestational hypertension	80	53 (66)	27 (34)	<0.001*
Preeclampsia	86	57 (66)	29 (34)	<0.001*
Eclampsia	2	1 (50)	1 (50)	0.44
Gestational diabetes mellitus	196	150 (77)	46 (23)	<0.001*

*p value significant, PCOS: Polycystic ovary syndrome.

among PCOS patients, pregnancy outcomes like gestational hypertension ($p < 0.001$), preeclampsia ($p < 0.001$), and hyperglycaemia in pregnancy ($p < 0.001$) were significant (Table 5).

4. Discussion

HDP is one of the most common complications of pregnancy and it increases the risks for both mother and foetus. Hence, assessment of risk factors and proper follow-up help to predict HDP, thereby modifying maternal and perinatal outcomes. This study compared primigravidae with and without HDP, and HDP was found to be present in 18.6% of the study population, which is almost comparable to the study conducted by Magee LA et al., in 2019 which showed an incidence of 10.3% in India.[13] This increase in the incidence of HDP in our population could be because the study represents a cross-section of high-risk pregnancies referred to this tertiary centre with anticipated complications for mother and foetus. Of the study population with HDP, the prevalence of gestational hypertension was 79.3%, preeclampsia was 19.3% and eclampsia was 1.3%. The prevalence of gestational hypertension and preeclampsia was higher in our study compared to a similar study done in 2020 in Odisha by Pradhan et al.,[14] which was 60% and 12.8%. This may be due to the health-seeking behaviour of our population, which helps in regular antenatal visits and BP monitoring. It was also seen that the prevalence of eclampsia is less in our study than in the study mentioned above due to the early detection and prevention of adverse outcomes following gestational hypertension in our population.

Among the risk factors analysed in our study, age less than 18 years and more than 40 years were found to be statistically significant for predicting HDP, which is also reported in the studies done by Parmer et al.[15] and Li et al.[16] which proves that extremes of age are a non-modifiable risk factor. Our study corroborated with the study conducted by Bezzara et al.[17] on family history and preeclampsia, which revealed that a family history of hypertension in pregnancy for a mother or sister is a risk factor that points toward worsening maternal outcomes, especially in developing eclampsia, HELLP and chronic hypertension.

In our study, BMI> 30 kg/m^2 was statistically significant, as similar was observed by Alba et al.[18] in their retrospective cohort study about maternal overweight and obesity as a risk factor for hypertensive states of pregnancy. That is, BMI is a significant and independent risk factor for HDP. With the onset of artificial reproductive techniques, the number of IVF pregnancies has also increased. A study done by Toshimitsu[19] et al. states that IVF is a risk factor for HDP, especially at extremes of age, which is similar to the results in our study. HDP was statistically significantly higher in pregnancies conceived via IVF technique. Among the medical disorders seen during pregnancy, hyperglycaemia was a statistically significant risk factor for HDP. The study by Lee W et al.[20] also reinstates that gestational hypertension and gestational diabetes mellitus (a component of hyperglycaemia of pregnancy) have a conjoint association, hence becoming predictors of each other. Another novel finding from our study was that our population had a significant association between PCOS and HDP. Similarly, a study by Zhous S et al.[21] also stated the increased incidence of HDP among PCOS patients. This should alert the medical practitioner to identify PCOS in the medical history of expectant mothers to predict HDP as pregnancy advances.

From our study, 27% of mothers with HDP delivered preterm due to various complications following HDP, similar to results studied by Vats et al.[22] in Delhi which states that preterm deliveries are one of the anticipated maternal outcomes. The need for preterm deliveries due to the progressive worsening of maternal conditions following HDP is reflected in the increase in demand for preterm operative deliveries among our study participants. In our study, 55.3% of primigravidae with HDP required preterm LSCS to reduce maternal and foetal morbidity and mortality. The study by Toshimitsu et al.[19] states an increased risk of operative deliveries in patients with HDP. Similar results were observed in the study conducted by Hemapriya et al.[23] in 2001–2005 in Mysuru, India, where the rate of caesarean section was relatively high at 69%. From our study, out of the 28 who developed complications, the most common complication following HDP was postpartum haemorrhage (31%), followed by placental abruption (17%) and all maternal complications were statistically significant. Our study's most common perinatal outcomes were preterm birth resulting in prematurity (54%) and FGR (39%), which were clinically significant. This was comparable to the study by Un Nisa S et al.[24] at Sukkur in 2018, which stated that there is a higher incidence of iatrogenic prematurity, often resorted to as a method of reducing perinatal mortality following complications of HDP.

A limitation of our study was its retrospective design and that the study group was limited to primigravidae. Similarly, the majority of study participants lived in cities and were above the poverty line, resulting in better health seeking behaviour and a sampling bias. Also, this study was carried out as a single-centre study. Therefore, a large study including multiple centres is needed to generalise these results.

5. Conclusion

In summary, our study looked at the risk factors and pregnancy outcomes following HDP and found that the risk factors studied, like extremes of age, family history of HDP, increased BMI, IVF pregnancy, hyperglycaemia in pregnancy and PCOS, have a substantial correlation with HDP.

HDPs are on the rise in India, and they contribute to maternal and perinatal morbidity and mortality in a significant way. From this study, we emphasise the importance of knowledge and timely assessment of risk factors of HDP. Proper interventions with the right treatment can help reduce maternal and perinatal mortality and morbidity and their long-term effects. However, there are currently no well-established measures for predicting or preventing HDP. So, the study highlights the need for pre-conceptional counselling, which includes early detection, careful monitoring and treatment of HDP to prevent morbidity and mortality related to this disorder. It should be followed up even in the postpartum period.

Ethics approval

Local Institutional Review Board approval was obtained from Pushpagiri Institute of Medical Sciences and Research Centre Ethical Committee with PIMSRC/E1/388A/84/2021 registration number. This study was performed in accordance with ethical standards as settled down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Consent to participate

The patients gave informed consent and the patient anonymity preserved.

Consent to publish

All authors of the original manuscript have read and approved the manuscript. We confirm that the inclusion of each author in the authorship list is based only 1) On substantial contributions to a) concept

and design or analysis, and interpretation of data and b) drafting the manuscript or revising it critically for important intellectual content and 2) Final approval by each author of the version of the manuscript.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Author contributions

RM made a substantial contribution to the concept of design of the article; BPD was responsible for the acquisition, analysis or interpretation of data for the article and drafted the article or revised it critically for important intellectual content. SM helped in the concept of design and drafted the article for important intellectual content. NSS approved the version to be published.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

The authors would like to thank all the doctors in the Department of Obstetrics and Gynaecology, Pushpagiri Institute of Medical Sciences & Research Centre, for their support. The authors would also like to express their sincere thanks to Dr.Rahul R for his support in conducting the study.

References

1. Queensland Clinical Guidelines. *Hypertension and Pregnancy*; 2021. *Available* from: http://www.health.qld.gov.au/qcg [Last accessed on August 8, 2022].
2. Maternal health. World health organization. *Available* from: www.who.int/health-topics/maternal-health. [Last accessed on August 8, 2022].
3. Cunningham FG, Leveno KJ, Bloom SL, et al. *Williams Obstetrics[M]*. 25th ed. New York: McGraw-Hill Education; 2019.
4. Wang W, Xie X, Yuan T, et al. Epidemiological trends of maternal hypertensive disorders of pregnancy at the global, regional, and national levels: a population-based study. *BMC Pregnancy Childbirth*. 2021;21(1):364. https://doi.org/10.1186/s12884-021-03809-2.
5. Report of the national high blood pressure education Program working group on high blood pressure in pregnancy. *Am J Obstet Gynecol*. 2000;183(1):s1–s22. https://doi.org/10.1067/mob.2000.107928.
6. Mehta B, Kumar V, Chawla S, et al. Hypertension in Pregnancy: A Community-Based Study. *Indian J Community Med*. 2015;40(4):273–278. https://doi.org/10.4103/0970-0218.164403 .
7. Upadya M, Rao ST. Hypertensive disorders in pregnancy. *Indian J Anaesth*. 2018;62(9):675–681. https://doi.org/10.4103/ija.IJA_475_18.
8. Nobis PN, Hajong A. Eclampsia in India through the decades. *J Obstet Gynaecol India*. 2016;66(S1):172–176. https://doi.org/10.1007/s13224-015-0807-5.
9. Corrigan L, O'Farrell A, Moran P, et al. Hypertension in pregnancy: prevalence, risk factors and outcomes for women birthing in Ireland. *Hypertens Pregnancy*. 2021;24:1–6. https://doi.org/10.1016/j.preghy.2021.02.005.
10. Berhan Y, Endeshaw G. Maternal mortality predictors in women with hypertensive disorders of pregnancy: a retrospective cohort study. *Ethiop J Health Sci*. 2015;25(1):89. https://doi.org/10.4314/ejhs.v25i1.12.
11. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, et al. WHO analysis of causes of maternal death: a systematic review. *Lancet*. 2006;367(9516):1066–1074. https://doi.org/10.1016/S0140-6736(06)68397-9.
12. Abalos E, Cuesta C, Grosso AL, et al. Global and regional estimates of preeclampsia and eclampsia: a systematic review. *Eur J Obstet Gynecol Reprod Biol*. 2013;170(1):1–7. https://doi.org/10.1016/j.ejogrb.2013.05.005.
13. Magee LA, Sharma S, Nathan HL, et al. The incidence of pregnancy hypertension in India, Pakistan, Mozambique, and Nigeria: a prospective population-level analysis. *PLoS Med*. 2019;16(4), e1002783. https://doi.org/10.1371/journal.pmed.1002783.
14. Pradhan S, Mallick S, Barik N. Gestational hypertension and fetal outcome: a prospective study in a tertiary care centre. *Indian J Obstet Gynecol Res*. 2020;7(4):595–599. https://doi.org/10.18231/j.ijogr.2020.126.
15. Parmar MT, Solanki H, Gosalia V. Study of Risk Factors of Perinatal Death in Pregnancy Induced Hypertension (PIH). *Natl J Community Med*. 2012;3(4):703–707.
16. Li X, Tan H, Huang X, et al. Similarities and differences between the risk factors for gestational hypertension and preeclampsia: a population based cohort study in south China. *Hypertens Pregnancy*. 2016;6(1):66–71. https://doi.org/10.1016/j.preghy.2015.11.004.
17. Bezerra PCFM, Leão MD, Queiroz JW, et al. Family history of hypertension as an important risk factor for the development of severe preeclampsia. *Acta Obstet Gynecol Scand*. 2010;89(5):612–617. https://doi.org/10.3109/00016341003623720.
18. Fernández Alba JJ, Mesa Páez C, Vilar Sánchez Á, et al. Overweight and obesity at risk factors for hypertensive states of pregnancy: a retrospective cohort study. *Nutr Hosp*. 2018;35(4):874–880. https://doi.org/10.20960/nh.1702.
19. Toshimitsu M, Nagamatsu T, Nagasaka T, et al. Increased risk of pregnancy-induced hypertension and operative delivery after conception induced by in vitro fertilisation/intracytoplasmic sperm injection in women aged 40 years and older. *Fertil Steril*. 2014;102(4):1065–1070.e1. https://doi.org/10.1016/j.fertnstert.2014.07.011.
20. Lee KW, Ching SM, Ramachandran V, et al. Prevalence and risk factors of gestational diabetes mellitus in Asia: a systematic review and meta-analysis. *BMC Pregnancy Childbirth*. 2018;18(1):494. https://doi.org/10.1186/s12884-018-2131-4.
21. Zhou S, Ji Y, Wang H. The risk factors of gestational hypertension in patients with polycystic ovary syndrome: a retrospective analysis. *BMC Pregnancy Childbirth*. 2021;21(1):336. https://doi.org/10.1186/s12884-021-03808-3.
22. Vats K, Paul M. Study of fetal outcome in hypertensive disorders of pregnancy in a tertiary care maternity hospital of Delhi. *Int J Reprod Contracept Obstet Gynecol*. 2016:3773–3777. https://doi.org/10.18203/2320-1770.ijrcog20163494. Published online.
23. Hemapriya L. ABND. Maternal complications of hypertension in pregnancy – a five year study. *Indian J Obstet Gynecol Res*. 2020;5(3):349–352. https://doi.org/10.18231/2394-2754.2018.0080.
24. Un Nisa S, Shaikh AA, Kumar R. Maternal and fetal outcomes of pregnancy-related hypertensive disorders in a tertiary care hospital in Sukkur, Pakistan. *Cureus*. 2019;11(8), e5507. https://doi.org/10.7759/cureus.5507.