

Case control study to assess the determinants of pregnancy induced hypertension among the antenatal mothers in Rajiv Gandhi women and children hospital at Puducherry

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Abstract

Background: Hypertensive disorders of pregnancy are a major health problem to the world and is found to be the major cause of maternal morbidity and mortality accounting for nearly 10-15% Of maternal deaths. **Objective:**To assess the determinants of Pregnancy induced hypertension. **Methods:** A case control study was conducted among pregnant women at Rajiv Gandhi Women and Children Hospital, Puducherry. 63 women with PIH were selected as cases and 63 normotensive pregnant women were taken as controls. The cases were selected by purposive sampling and the controls by simple random sampling. The tool consists of a self structured questionnaire which consists of the socio demographic factors and various other determinants assumed as a risk factor for PIH and some required information was also obtained from the case records. **Statistics:** The odds ratio and Chi-square test was used to determine the risk and association between PIH and the determinants respectively. **Results:** Primigravida (OR=2.826), multiple pregnancy (OR=2.629), presence of pedal edema (OR=54.836), family history of diabetes (OR=2.969), family history of hypertension (OR=5.5) Overweight (OR=2.12) and obesity (OR=6.52) were found to be significant risk factors of PIH. There was statistically significant association with history of abortion, parity, presence of pedal edema, use of contraceptives, family history of diabetes, family history of hypertension, prepregnancy Body mass index and PIH.

Keywords: Hypertensive disorders, Pregnancy induced hypertension, determinants, risk factor.

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Introduction

Pregnancy induced hypertension (PIH) includes preeclampsia, eclampsia and transient hypertension are gestational hypertensive disorders [1]. Pregnancy induced hypertension (PIH) includes hypertension with blood pressure $\geq 140/90$ mm of Hg without proteinuria developed due to the gravid state after 20 weeks of pregnancy, pre-eclampsia which is gestational hypertension with proteinuria, and eclampsia defined as pre-eclampsia with convulsions[2].

Intrauterine growth retardation, preterm birth, and maternal and perinatal deaths are the complications of preeclampsia[3], whereas the complications associated with gestational hypertension are less frequent and less severe.

About 5–7% of all pregnancies get affected with preeclampsia and is a leading cause of maternal deaths in developing countries[4,5]. Every year over half a million women die due to pregnancy related causes worldwide and in the developing countries alone 99% of these deaths occur[6].

The factors that influence the risk of pregnancy induced hypertension among the mothers include primiparity, personal or family history of pre-eclampsia, diabetes, obesity, multiple pregnancy and chronic hypertension. In developing countries, evidence on the association between these factors and pregnancy induced hypertension is scarce[7-9]. So, the study of determinants of PIH can be used to assess the risk of PIH at ante natal booking. As there is no evidence of data on risk factors of PIH in the Union territory of Pondicherry, India, this study aimed to find out which of the risk factors or determinants are associated with the development of PIH among the antenatal women.

Materials and Methods

This case control study was conducted between January 2016 to February 2016 among antenatal women admitted in antenatal ward at Rajiv Gandhi Women and Children Hospital at Puducherry. Pregnancy induced hypertension was defined as hypertension with blood pressure of 140/90 mm of Hg or more that was developed in a pregnant woman for the first time during pregnancy after 20 weeks of gestation who was normotensive before 20 weeks of gestation with or without proteinuria. The Sample size selected for this study was 63 antenatal mothers with PIH with or without proteinuria as cases and 63 normotensive antenatal mothers as controls. Both cases and controls were selected from the antenatal ward, and the cases were selected by purposive sampling technique and for each case selected one control was

Results

Table 1: Mean and standard deviation of age, gestational weeks and BMI

Variables	Cases (n=63)		Control (n=63)	
	Mean	S.D	Mean	S.D
Age	26.41	3.99	25.79	3.64
Gestational age in weeks	36.62	3.62	38.83	1.04
BMI	24.21	4.60	21.67	4.00

Table 1:The mean age of cases (26.41±3.99) was more than the mean age of the controls (25.79±3.64), the mean gestational age in weeks of the cases was (36.62±3.62) and the mean gestational age in weeks of the controls was (38.83±1.04) and the mean BMI of the cases (24.21±4.60) was high when compared to the mean BMI of the controls (21.67±4.0).

Table 2:Pregnant women with history of abortion were 5 times at risk (OR=5.021) and with past obstetric

selected by simple random sampling. The pregnant women included for the study have completed 20 weeks of gestation and the antenatal women with diabetes, coronary artery disease, renal disease and other disorders of pregnancy were excluded.

Data was collected using a self-structured questionnaire developed by the researcher after extensive review of literature and tool validity and reliability was tested. Before administering the questionnaire the study subjects were informed about the purpose of the study and written consent was obtained. The researcher has taken 30 minutes for in person interview with each subject to complete the questionnaire and to record the biophysical and biochemical parameters. The questionnaire included information related to socio – demographic factors, maternal factors like past and present obstetrical history and past health history, use of contraceptives, history of abortion, gravidity, gestational age, multiple pregnancies, number of antenatal visits, any pregnancy complications, presence of pedal edema, Hereditary factors like family history of diabetes, hypertension, renal disease and cardiac disease, family history of obstetrical complications and PIH, Nutritional factors like details of consumption of Non-vegetarian and junk foods and Bio-Physical and Bio- Chemical determinants like blood pressure measurement, BMI and Urine for albumin. Data was analyzed using Odds ratio to determine the measure of association between exposure and occurrence of disease and Chi –Square test was used to determine the association between PIH and the determinants.

history of PIH were 4 times at risk (OR= 4.203) for developing PIH. There is a statistically significant risk for primi gravid women (OR =2.826) to develop PIH than Multi gravid women, Pregnant women with multiple pregnancy have 2.6 (OR = 2.629) times more risk to develop PIH and with presence of pedal edema the women were at greater odds (OR= 54.836).for developing PIH compared to pregnant women without pedal edema.

Table 3: In pregnant women with family history of diabetes the risk was 2.9 times for developing PIH (OR = 2.969) and with family history of hypertension the risk was 5.5 times in contributing to PIH (OR =5.500).

Table 4: For pregnant women whose prepregnancy BMI shows underweight (BMI <18) was a protective factor (OR=0.17), women with pre pregnancy normal BMI (18 – 24.9)was also a protective factor(OR=0.71) and women under the overweight category (BMI=25 – 29.9)the risk was 2 times(OR=2.12) and for women who were obese (BMI= \geq 30) the risk was 6 times (OR=6.52) in developing PIH. In pregnant women with presence of albumin in urine there was a significant risk of 6.5 times for developing PIH (OR = 6.526).

Table 2: Past and present obstetrical history: Past history of abortion and usage of contraceptives were significantly associated with PIH. Parity and presence of pedal odema were also significantly associated with PIH.

Table 3: Family history: Family history of diabetes and hypertension has a significant association with PIH.

Table 4: Bio- physical parameter: There was a statistically significant association found between BMI and PIH among antenatal women.

Discussion

PIH complicates approximately 6% of pregnancies globally and is the most important cause of maternal and neonatal morbidity and mortality[2].The rate of maternal death in developing regions is 14 times higher than that in developed regions. One of the easiest ways to continue to reduce the rate of maternal mortalities is to improve access to reproductive health[10].The variations can be attributed to racial differences, socioeconomic status and some other parameters like parity and age[11].

The aim of this study was to assess the determinants of Pregnancy induced hypertension related to the socio-

demographic factors, past and present obstetric history, family history and bio-physical parameters of the study subjects. This case-control study indicates that pre-pregnancy BMI, history of abortion, past obstetric history of PIH, use of contraceptives, presence of pedal edema and family history of diabetes and hypertension, primigravida and multiple pregnancy are associated with a significantly increased risk of PIH in the antenatal women. Various other studies have also supportive data for the present study and given association between gravidity, multiple pregnancy, obesity and pre-pregnancy BMI. In a prospective cohort study by Helena SalonenRos et al the risk factors associated with preeclampsia were type 1 diabetes, gestational diabetes, obese women (body mass index > 29)and twin birth¹². In a case control study conducted by Ramesh. K et alfamily h/o pre eclampsia, family h/o Diabetes, family h/o hypertension and previous h/o PIH were found to be significant risk factors of pre eclampsia[13].

ElhamKazemian et alin a case-control study stated that maternal obesity and energy intake are risk factors of Pregnancy-induced Hypertension among Iranian women. Patients with pre-pregnancy BMI more than 30 kg/m² had a nearly 4.5-fold risk of developing gestational hypertension, compared to pregnant women whose pre-pregnancy BMIs were in the normal range [14]. In another case-control study by Ganga BhavaniGuduri et alagainbody mass index (BMI) > 25 was observed in 22 % of the cases and found to be a significant risk factor[15].

Chun Ye et al conducted a multicenter cross-sectional retrospective study and identified that twin pregnancy, age of 35 years, overweight and obesity, primipara, history of hypertension as well as family history of hypertension and diabetes were the risk factors for Hypertensive disorders of pregnancy[16].

Jaap Jan Nugteren et al in a population based prospective cohort study identified that Multiparous women were at lower risk for both PIH and preeclampsia. Overweight and obese mothers had increased risks of PIH and preeclampsia[17].

Table 2: Past and present Obstetrical history of cases and controls

Maternal Determinants	Cases (n=63)	Controls (n=63)	Odds Ratio	p-value
Past Obstetrical History				
History of abortion			5.021	0.001
Yes	16	4		
No	47	59		
User of contraceptives (oral contraceptives/ Implants)			-	0.05
Yes	4	0		
No	59	63		
History of PIH/Chronic hypertension			4.203	No significance
Yes	4	1		
No	59	62		
History of gestational diabetes			-	No significance
Yes	1	0		
No	62	63		
Present Obstetrical History				
Gravidity			2.826	0.001
Primi gravid	39	23		
Multi gravid	24	40		
Elderly primi	-	-		
Multiple pregnancy			2.629	No significance
Present	5	2		
Absent	58	51		
Presence of pedal oedema			54.836	0.001
Yes	52	5		
No	11	58		

Table 3: Family history of cases and controls

Hereditary Determinants	Cases (n=63)	Controls (n=63)	Odds Ratio	p-value
Family history of				
Diabetes			2.969	0.05
Yes	18	8		
No	45	55		
Hypertension			5.500	0.001
Yes	28	8		
No	35	55		

Table 4: Bio-physical and Bio-chemical factors of cases and controls

Bio-Physical and Bio-Chemical Determinants	Cases (n=63)	Controls (n=63)	Odds Ratio	p-value
BMI				0.01
<18	2	10	0.17	
18 - 24.9	37	42	0.711	
25 - 29.9	18	10	2.12	
≥30	6	1	6.52	
Urine Albumin				No significance
Present	6	1	6.526	
Absent	57	62		

Conclusion

PIH prevention interventions should start before pregnancy and target women of childbearing age should be reinforced the adoption of healthy life style practices (i.e., dietary changes and exercise). Necessary attention must be given to prepregnancy and pregnancy related educational programs where potential mothers would be educated on the effects of prepregnancy weight and excessive weight gain during pregnancy. Timely prenatal care during pregnancy will allow for early detection and treatment of unfavourable nutritional practices that lead to excessive weight gain and biochemical alterations.

References

- Bobak, Jensen (1993). Maternity and Gynecologic care. 5th edition. Mosby publication. p: 814-826
- Sharma A, Mahendra P, Bisht S. Management of pregnancy induced hypertension. IJRAP. 2010;1(2): 390-98.
- Naeye RL. Maternal blood pressure and fetal growth. Am J ObstetGynecol 1981;141:780-7.
- Page EW, Christianson R. Influence of blood pressure changes with and without proteinuria upon outcome of pregnancy. Am J Obstet Gynecol 1976;126:821-33.
- ACOG practice bulletin. Diagnosis and management of preeclampsia and eclampsia. Obstet Gynecol. 2002; 99:159-67.
- Huppertz B. Placental origins of preeclampsia: challenging the current hypothesis. Hypertension. 2008; 51:970-5.
- Sibai B, Dekker G, Kupferminc M. Preeclampsia. Lancet. 2005; 365:785-99.
- Lee CJ, Hsieh TT, Chiu TH, Chen KC, Lo LM, Hung TH. Risk factors for pre-eclampsia in an Asian population. Int J Gynaecol Obstet. 2000;70:327-33.
- Eskenazi B, Fenster L, Sidney S. A multivariate analysis of risk factors for preeclampsia. JAMA. 1991;266:237-41.
- Mahomed K, Williams MA, Woelk GB, Jenkins-Woelk L, Mudzamiri S, Madzime S, et al. Risk factors for preeclampsia-eclampsia among Zimbabwean women: Recurrence risk and familial tendency towards hypertension. J ObstetGynaecol. 1998;18:218-22.
- Danadovey (2015.) Medical daily
- Manjusha Sajith, Vandana Nimbargi, Amit Modi, Ronak Sumariya, Atmaram Pawar. Incidence of pregnancy induced hypertension and prescription pattern of antihypertensive drugs in pregnancy. International Journal of Pharma sciences and Research. 2014;5(4): 163-170.
- Helena SalonenRos, Sven Cnattingius,1 and Loren Lipworth, Comparison of Risk Factors for Preeclampsia and Gestational Hypertension in a Population-based Cohort Study, American journal of epidemiology, 1998;147(11): 1062 – 1070.
- Ramesh.K ,Sangeetha Gandhi, VishwasRao, Risk Factors of Pre-eclampsia: A Case Control Study, Journal of Clinical and Diagnostic Research. 2014; 8(9): JC01-JC04
- Kazemi A, Ahmadi P, Relationship between physical activity during the first 20 weeks of gestation and hypertension in pregnancy. Shahrekord Univ Med. Sci J 2007; 9: 20-7.
- Ganga Bhavani Guduri, Devi Madhavi Bhimarasetty, Sunita Sreegiri, Teja Naveen.

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- B, Socio-demographic determinants for hypertension in pregnancy, *International journal of Research in Health Sciences*, Jan – Mar 2015; 3(1): 93 – 98.
16. Chun Ye¹, Yan Ruan, LiyingZou, Guanghui Li, Changdong Li, Yi Chen¹, ChaoxiaJia, Ian L. Megson, Jun Wei, Weiyuan Zhang, Hypertensive Disorders of Pregnancy in China, *PLOS ONE*, June 2014;9(6): e100180.
17. Jap Jan Nugteren, Claudia A. Snijder, Albert Hofman, Vincent W. V. Jaddoe, Eric A. P. Steegers, Alex Burdorf, work related maternal risk factors and the risk of Pregnancy Induced Hypertension and Preeclampsia during pregnancy. The generation R study. *PloS ONE* 2012; 7(6): e39263.

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