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Risk Factors for Hypertensive Disorders in Pregnancy:- A Case Control Study

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Abstract: Hypertensive disorders of pregnancy are the most common but a leading cause of maternal and perinatal morbidity and mortality. The present study was done to identify the possible risk factors for the hypertensive disorders of pregnancy. This hospital based case-control study was done on 250 normotensive and 250 women with hypertensive disorders of pregnancy were included after obtaining informed consent. Data were collected on socio-demographic profile, obstetric history, history of hypertension in previous pregnancy, family history, pre pregnancy weight, height and BMI. Data were entered in the MS Excel sheet and statistically analysed. Odds ratio with 95% confidence interval was used to calculate impact of different variables on the risk of presenting hypertension. The occurrence of hypertensive disorders in pregnancy was found significantly higher in the age group ≥ 30 years, nulliparity or Primipara, family history of hypertension and history of hypertension in previous pregnancy. Women with history of stillbirth were 5 times more at risk of having hypertensive disorders of pregnancy. No statistically significant relationship was found between hypertensive disorders in pregnancy with educational status, religion, residence and socioeconomic status, gravidity and history of abortion. Identifications of risk factors for hypertensive disorders during pregnancy will help in planning treatment of hypertension and preventing complications through regular antenatal check-up.

Keywords: Hypertensive disorders of pregnancy, normotensive, risk factors.

INTRODUCTION

Hypertensive disorders of pregnancy remain a major health issue for women and their infants in developed as well as developing countries. It is the most common medical problem encountered during pregnancy, complicating up to 10% of pregnancies and remains a leading cause of maternal and perinatal morbidity and mortality[1-3]. Pregnancies complicated by hypertension are associated with increased risk of adverse foetal, neonatal and maternal outcomes, including preterm birth, intrauterine growth restriction, perinatal death, acute renal or hepatic failure, antepartum haemorrhage, postpartum haemorrhage and maternal death[4-6].

A number of risk factors for preeclampsia have been identified. There is 2-fold increase risk for preeclampsia if a patient has a first degree relative with

history of hypertension and 7-fold increase if preeclampsia complicated a previous pregnancy. The risk of developing hypertensive disorders is increase with maternal age older than 40 years, obesity, multiple pregnancies [7-9]. In the UK, the National Institute for Clinical Excellence (NICE) has issued guidelines on routine antenatal care recommending that at the booking visit a woman's level of risk for PE, based on factors in her history, should be determined and the subsequent intensity of antenatal care should be based on this risk[10]. Very few studies have been done in the state of Rajasthan to identify the risk factors for hypertensive disorders of pregnancy. The aim of the present study was to identify the possible risk factors for the hypertensive disorders of pregnancy.

MATERIALS AND METHODS

This was a hospital based case- control study done in the Department of Obstetrics and Gynaecology, S.M.S. Medical College, Jaipur. Women with hypertensive disorders of pregnancy were those who had a systolic BP equal to more than 140 mm of Hg and diastolic BP equal to more than 90 mm of Hg on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with previously normal blood pressure. 250 women with hypertensive disorders of pregnancy were included in the study after obtaining written informed consent. For each case of hypertension in pregnancy one woman with normal BP was included as control after obtaining informed consent.

Data were collected on socio-demographic profile, obstetric history, history of hypertension in previous pregnancy, family history, pre pregnancy weight, height and BMI. Data were entered in the MS Excel sheet and statistically analysed. Odds ratio with 95% confidence interval was used to calculate impact of different variables on the risk of presenting hypertension. The difference was considered significant if the p-value was less than 0.05.

RESULTS

The occurrence of hypertensive disorders in pregnancy was found significantly higher in the age group ≥ 30 years as compared to < 30 years age group with an Odd ratio of 2.05 (95% CI 1.1945-3.519, p 0.008). However, no statistically significant relationship

was found between hypertensive disorders in pregnancy with educational status, religion, residence and socioeconomic status (Table 1).

The occurrence of hypertensive disorders in pregnancy was found to be significantly higher in nulliparous or primiparous (OR 1.8; 95%CI 1.0995-2.9823; p 0.01) and women with history of hypertension in previous pregnancy (OR 1.86; 95%CI 1.3027-2.6637; p 0.0007), and family history of hypertension (OR 3.8; 95%CI 1.3889-10.4064; p 0.009). However, no statistically significant relationship of hypertensive disorders in pregnancy was found with gravidity (OR 0.69; 95%CI .4405-1.1106; p 0.12) and history of abortions (OR 0.8; 95%CI 0.4201-1.5390; p 0.13). Women with history of stillbirth were 5 times more at risk of having hypertensive disorders of pregnancy (OR 5.08; 95%CI 0.5894-43.8133; p 0.13) (Table 2).

It was found that mean age and mean BMI were significantly higher in hypertensive pregnant women as compared to nonhypertensive pregnant women. There was no significant difference between mean height and weight of hypertensive pregnant women and normotensive pregnant women. Mean S. Homocysteine levels were significantly higher in women with hypertensive disorders as compared to normotensive women and Mean S. Vitamin B₁₂ levels were significantly lower in women with hypertensive disorders as compared to normotensive women (Table 3).

Table-1: Association of sociodemographic variables with hypertensive disorders of pregnancy

Sociodemographic variables	PIH		Normtensive		Total		OR95%CI p value
	No	%	No	%	No	%	
Age							2.05
<30 years	207	47.7	227	52.3	434	100	(1.1945-3.519)
>30 years	43	65.2	23	34.8	66	100	0.008
Educational Status							1.123
Illiterate	84	46.7	96	53.3	180	100	(0.8545-1.7761)
Literate	166	51.8	154	48.2	320	100	0.2
Religion							1.15
Hindu	199	50.8	193	49.2	392	100	(0.7522-1.7654)
Muslim	51	47.2	57	52.8	108	100	0.5
Residence							0.93
Rural	96	51.1	92	48.9	188	100	(0.6504-1.3415)
Urban	154	49.3	158	50.7	312	100	0.7
Socioeconomic Status							0.72
Lower + lower middle+ middle	175	47.8	191	52.2	366	100	(0.4841-1.0731)
upper middle + upper	75	55.9	59	44.1	134	100	0.1

Table-2: Association of independent variables with hypertensive disorders of pregnancy

Variables	PIH		Normtensive		Total		OR 95%CI p value
	No	%	No	%	No	%	
Gravida							0.69 (0.4405-1.1106)
≥3	38	42.7	51	57.3	89	100	
<3	212	51.2	199	48.8	411	100	0.12
Parity							1.8 (1.0995-2.9823)
≤1	221	52.2	202	47.8	423	100	
≥2	29	37.3	48	62.7	77	100	p 0.01
History of abortions							0.80 (0.4201-1.5390)
Yes	18	45	22	55	40	100	
No	232	50.4	228	49.6	460	100	p 0.5
History of still-birth							5.08 (0.5894-43.8133)
Yes	5	83.3	1	16.7	6	100	
No	245	49.6	249	50.4	494	100	p 0.13
Hypertension in previous pregnancy							1.86 (1.3027-2.6637)
Yes	129	58.6	91	41.4	220	100	
No	121	43.2	159	56.8	280	100	0.0007
History of paternal hypertension							3.80 (1.3889-10.4064)
Yes	3	37.5	5	62.5	8	100	
No	247	50.2	245	49.8	492	100	0.009

Table-3: Comparison of quantitative parameters in hypertensive disorders of pregnancy and normotensive women

Quantitative parameters	Subjects with PIH	Normotensive Subjects	p value
Age (years)	24.8±5	23.6±3.825	0.002
Weight (Kg)	62.612±6.49	62.096±6.57	0.3
Height (cm)	153.58±5.47	153.932±2.27	0.3
BMI	26.59±2.26	26.14±2.79	0.04
S. Homocysteine	13.611±5.336	11.182±4.325	<0.0001
S. Vitamin B ₁₂	262.74±31.215	310.406±42.583	<0.0001

DISCUSSION

In our study, the occurrence of hypertensive disorders in pregnancy, in the age group ≥30 years was found significantly higher (65.2%) as compared to <30 years age group (47.7%) with an Odd ratio of 2.05 (95% CI 1.1945-3.519, p 0.008). Our results were in accordance with that observed by Owiredu *et al.* [11] and Bharti Mehta *et al.* [12]. Parazzini *et al.* [13] in their study observed that the risk of developing PIH increases with increase in maternal age. Assis *et al.* [14] found that age above 30 years was associated with a risk for preeclampsia super-imposed on chronic hypertension (OR: 5.218; 95% CI: 1.873 to 14.536). A similar result was also reported by Suzuki *et al.* [15] who found that, in singleton pregnancies, the developing pre-eclampsia was associated with maternal age 35 years or above.

Occurrence of hypertensive disorders of pregnancy was slightly more in literate (51.8%) as compared to illiterate (46.7%) with odd ratio of 1.1 though the difference was statistically not significant. (p-0.2). our results were similar to that observed by

Sachdeva *et al.* [16] and Owiredu *et al.* [11]. In contrast to our observation Tebeu PM *et al.* [17] in their study found that illiteracy was associated with about 2 fold risk for presenting hypertensive disorder in pregnancy (OR: 1.7; 95% CI: 1.1-2.4).

The occurrence of hypertensive disorders in pregnancy was found to be significantly higher in nulliparous or primiparous (OR 1.8; 95%CI 1.0995-2.9823; p 0.01). Assis *et al.* [14] identified primiparity as a risk factor for gestational hypertension (OR: 5.435; 95% CI: 1.9-15.4). Various studies done in the past by Conde-Agudelo A, Belizán JM [18], Suzuki *et al.* [15], Jacob DJ *et al.* [19] and Kimbally KG *et al.* [20], observed that absence of previous deliveries is a risk factor for hypertensive disorders in pregnancy.

History of hypertension in previous pregnancy was a significant risk factor in women with hypertensive disorders of pregnancy (OR 1.86; 95%CI 1.3027-2.6637; p 0.0007). Our findings were similar to that observed by Tebeu PM *et al.* [17] (OR: 7.6; 95%CI: 3.4-16.9; p< 0.0001). Assis *et al.* [14], Nisar *et al.*

al. [21] and Tebeu et al. [22] observed significant association between history of hypertension during previous pregnancy and hypertension in current pregnancy.

Family history of hypertension was associated with 3.8 –fold increase for the risk of hypertensive disorder of pregnancy (OR 3.8; 95%CI 1.3889-10.4064; p 0.009). Our findings were similar to that observed by Tebeu PM et al. [17] (OR: 3.0; 95%CI: 1.7-5.4; p< 0.0001), Qiu C et al. [23] and Shey Wiysonge CU et al. [7].

No statistically significant relationship of hypertensive disorders in pregnancy was found with gravidity (OR 0.69; 95%CI .4405-1.1106; p 0.12), history of abortions (OR 0.8; 95%CI 0.4201-1.5390; p 0.13) and history of stillbirth (OR 5.08; 95%CI 0.5894-43.8133; p 0.13). Women with history of stillbirth were 5 times more at risk of having hypertensive disorders of pregnancy in subsequent pregnancy. Our observations were in accordance to that observed by Bharti Mehta et al. [12].

Mean age and mean BMI were significantly higher in hypertensive pregnant women as compared to nonhypertensive pregnant women. Conde-Agudelo A, Belizán JM [18]. and Luealon P, Phupong V [24] observed that pre pregnancy body mass index > or = 30 kg/m² was significantly associated with increased risk of preeclampsia

Mean S. Homocysteine levels were significantly higher in women with hypertensive disorders as compared to normotensive women and Mean S. Vitamin B₁₂ levels were significantly lower in women with hypertensive disorders as compared to normotensive women. Shahid A. Mujawar [25] observed that in preeclampsia there was significant increase in serum homocysteine (p<0.001) whereas, folic acid and vitamin B₁₂ levels showed significant decrease (p<0.001)

CONCLUSION

Our study shows that women's age ≥30 years, nulliparity or primiparity, Family history of hypertension, history of hypertension in previous pregnancy were important risk factors for hypertensive disorders of pregnancy. Identifications of these factors during pregnancy will help in treatment of hypertension and preventing complications through regular antenatal check-up.

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