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RESEARCH ARTICLE

RELATIONSHIP OF BMI WITH HYPERTENSIVE DISORDERS OF PREGNANCY

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ABSTRACT

Background: Prenatal care needs to be focussed to reduce the adverse effects in pregnancy and improve the outcome. Prepregnancy obesity might be a risk factor for hypertensive disorder of pregnancy which causes fetal and maternal morbidity. **Objective**: To evaluate the relationship of prepregnancy body mass index (BMI) with the occurrence of hypertensive disorders of pregnancy (HDP). **Method:** The descriptive type of observational study was done at a tertiary care centre . Women were included in the study at their first visit before six weeks. The prepregnancy weight was used to calculate the BMI. Blood pressure measurements, routine examination and investigations were done at every visit. 45 women who developed HDP were considered as cases. Equal number of normotensive women were taken as controls. Data collected was analysed. **Results:** Out of 45 cases 57.7% were overweight, 31.1% were normal weight, 11.1% were underweight whereas of 45 controls, 20% were overweight, 55.55% were normal weight and 24.44% were underweight. The associations were statistically highly significant **Conclusion:** Since maternal obesity is a risk factor for it, prepregnancy reduction in weight would significantly help in reducing the risk of developing hypertension in pregnancy.

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INTRODUCTION

Hypertensive disease of pregnancy (HDP) complicates 10% of all the pregnancies worldwide (World Health Organization, 2013). According to Indian census 2017, HDP contributed to 12.3% of all maternal deaths (Census of India. Chapter, 2017). The exact etiology of HDP still remains unknown. Obesity (measured by Body mass index (BMI) the international standard measurement) may be associated with HDP. Asian women have lower BMI compared to western world. Thus, relationship between pre-conceptional BMI and risk of HDP among these Asian women may differ. The objective of the study was to assess pre-conceptional BMI as a risk factor for HDP in our population.

MATERIALS AND METHODS

This was a observational, case control study. Pregnant women with missed period and documented with less than 6 weeks of gestation were enrolled and if continued beyond 20 weeks were included in the study and followed till delivery.

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Women with multiple pregnancy, pre-existing chronic hypertension, chronic renal, heart, liver, pulmonary disease, diabetes mellitus and gestational diabetes mellitus or on drugs affecting weight were excluded from the study. Blood pressure was recorded at each antenatal visit in sitting upright position with mercury sphygmanometer kept at the level of heart of the women up to 2mm of Hg. HDP was diagnosed when a women with no previous history developed hypertension i.e. systolic (>140mm of Hg) and diastolic (>90mm of Hg) after 20 weeks of gestation on two separate readings taken at least 6 hrs apart. Based on study of Kumar *et al*. (2010) 45 women who developed HDP were selected as cases. Equal number of normotensive women from those included in the study were taken as control. Pre-pregnancy BMI was calculated as pre-pregnancy weight (kg) divided by square of height (m^2). It was categorized into three: Underweight-<18.5 kg/m^2 ,normal weight -18.5 to 24.9 kg/m^2, overweight - 25 to 29.9 kg/m^2 . All data was recorded in a predesigned proforma. Statistical analysis was done to correlate the BMI and HDP and conclusions drawn. P value < 0.05 was taken as significant.

RESULTS

In the study, 81.81% of overweight women (BMI 25-29.9 kg/m^2) developed HDP as compared to only 8.33% women with BMI less than 18.5 kg/m^2.

Table 1. Correlation of Hypertensive Disorders of Pregnancy with Body Mass Index

BP	BMI (kg/m^2)			Mean ± SD
	<18.5	18.5-24.9	25-29.9	
	n=12	n=45	n--33	
HDP	1(8.33%)	17(36.96%)	27(81.81%)	24.67 ±2.47
Normotensive	11(91.67%)	28(62.22%)	6(18.18%)	21.92 ±4.15

P value=0.001

Table 2. Correlation of BMI With Severity of HDP

Severity	BMI (kg/m^2)			Total (n=45)
	<18.5	18.5-24.9	25-29.9	
	n=1	n=17	n=27	
Mild HDP	-	9 (52.94%)	14 (51.85%)	23 (51.11%)
Severe HDP	1 (100%)	8 (47.05%)	13 (48.15%)	22 (48.89%)

p-value=0.584

Table 3. Correlation of BMI With Categories of HDP

	BMI (kg/m^2)		
	<18.5	18.5-24.9	25-29.9
	n=1	n=17	n=27
Hypertension	1 (100%)	6 (35.29%)	1 (3.70%)
Preeclampsia	-	10 (58.82%)	23 (85.18%)
Eclampsia	-	1 (5.88%)	3 (11.11%)

p-value=0.003

Of the 45 women with HDP, 60% were overweight, mean BMI 24.67 ± 2.47 kg/m^2 as compared to only 18.18% among normotensive women, mean BMI (21.92 ± 4.15 kg/m^2). All findings were statistically significant, p-value 0.001. Table 1 Severe HDP (blood pressure ≥160/100 mmHg) was observed in 48.15% of women with BMI between 25 to 29.9kg/m^2 as compared to 47.05% in women with BMI 18.5 to 25 kg/m^2 though this difference was not statistically significant Table 2. All women were enrolled in our study at the time of confirmation of pregnancy. They were under regular follow-up and blood pressure was under control. Those who did develop severe HDP had it only in the later weeks of pregnancy. Progression of HDP was correlated with BMI. Among women with BMI >25, 85.18% developed preeclampsia and 14.81% developed eclampsia whereas in women with BMI 18.5 to 25, only 58.82% developed preeclampsia and only 5.88% developed eclampsia. These results were all statistically significant (p-value of 0.003) Table 3

DISCUSSION

Obesity is associated with physiologic and metabolic alterations. Adipose tissue is a hormonally active tissue which produces certain adipokines and cytokines. These mediators have been associated with HDP (Driul, 2008). The advantage of using BMI rather than the weight alone is that it is since it is height dependent, the tall and short people of similar proportion have a similar BMI. Similar to our findings, Kazemian *et al*. (2014) also observed that women who were obese before becoming pregnant were more likely to develop HDP compared with those who had normal prepregnancy BMI. Bodnar *et al*. (2005) studied that HDP risk rose strikingly from a BMI of 15 to 30 kg/m^2. Compared with women with a BMI of 21, the adjusted risk of preeclampsia doubled at a BMI of 26 (odds ratio 2.1) and nearly tripled at a BMI of 30. We observed that severe HDP was associated with higher BMI. Bodnar *et al*. (2005) too observed that as compared to women with BMI 20, women with BMI 25 to 29.9 kg/m^2 had a odds ratio of 1.7 for severe HDP.

Catov *et al* found that 22% of severe PE was associated with the presence of obesity and overweight. We observed more progression of HDP to preeclampsia and eclampsia in obese women than others. Obesity is associated with increased levels of lipids, cholesterol, triglyceride levels. These lead to increased oxidative stress which causes greater endothelial dysfunction leading to preeclampsia and worsonening (Driul, 2008).

Conclusion

There was a strong relationship of Obesity and HDP. Higher occurrence of hypertensive disorders of pregnancy was observed in women with higher body mass index. Also the severity was more and the disease progression to preeclampsia and eclampsia was also more in obese women.

Key Points

- Hypertensive disorders of pregnancy contributes significantly to maternal and fetal morbidity and mortality.
- Management of HDP is usually done at secondary prevention level which includes early detection and screening. However, the aim should be weight reduction in pre-conceptional period to decrease the risk of developing HDP

Conflict of Interest –None

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