



ORIGINAL RESEARCH PAPER

Obstetrics And Gynaecology

CORRELATION OF BODY MASS INDEX AND GESTATIONAL WEIGHT GAIN WITH PREGNANCY INDUCED HYPERTENSION

KEY WORDS: Body Mass Index, Gestational Weight Gain, Pregnancy Induced Hypertension.

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ABSTRACT

AIM To find relation of body mass index and gestational weight gain with pregnancy induced hypertension. **MATERIALS AND METHOD** The present study is a prospective observational study conducted in tertiary care centre, Assam. The study period is from 1st June 2019 to 31st May 2020. Data of the two hundred patients who registered in 1st trimester without known medical complications like hypertension, diabetes were collected in a proforma from time to time. In the first visit their baseline height and weight were measured in first trimester. Weight was measured on analog weighing machine. Height was measured accurately by stadiometer. BMI was calculated as weight (kg) divided by square of height (m). **RESULTS** There is strong association of PIH and overweight and obese BMI category (p value -0.027) and high weight gain is also strongly associated with risk of PIH (p value- 0.006) which was also observed in most of the similar studies. There is an association between mode of delivery (caesarean) and BMI category (p value-0.044). Both extreme of BMI categories i.e. underweight and obese patients more numbers of babies with birth weight less than 2.5kg which is statistically highly significant as p value is 0.001. Babies of overweight and obese cases had more NICU admission 22.9% and 62.5% respectively (p value-0.001) **CONCLUSION** The main contributory factors for developing PIH observed were young age, nulliparity, low socioeconomic status, high maternal BMI and excessive gestational weight gain. Women with high BMI should be monitored more closely for development of hypertensive disorders of pregnancy. Continued emphasis should be placed on normalization of maternal weight because higher maternal BMI were associated with higher risk of pregnancy induced hypertension.

INTRODUCTION

Hypertensive disorders of pregnancy is one of the most common medical complication of pregnancy. The incidence of hypertensive disorders in pregnancy in developing countries varies between 5-10%.¹ Although maternal mortality is lower in developed countries than in developing countries, 16% of maternal deaths can be attributed to hypertensive disorders.^{1,2} Classical risk factors for pregnancy induced hypertension are nulliparity, advanced maternal age, high BMI, gestational diabetes, multiple gestation, assisted reproduction and pre existing medical condition like chronic hypertension, antiphospholipid antibody syndrome and renal disease.^{3,4}

The body mass index (BMI) is the parameter used for defining anthropometric height/weight characteristics in adults and for categorising them in groups. The common interpretation is that BMI represents an index of fatness of an individual. Obesity represents one of the most common medical condition in women of reproductive age. Obesity (pregravid BMI ≥ 30) during pregnancy has adverse consequences for both mother and child in both short term and long term. Recent studies have reviewed that globally more than 1.9 billion adults are overweight and 650 millions are obese.⁵ Approximately 2.8 million deaths are reported as a result of being overweight or obese. In India more than 135 million individuals are affected by obesity.⁶ Due to consumption of energy dense food, sedentary lifestyle, lack of health care services, the developing countries are facing high risk of obesity and adverse outcomes. Over the past 2 decades, large epidemiologic studies have clearly established that obesity is a major risk for hypertensive disorders of pregnancy. The risk of preeclampsia gradually doubles with each 5-7kg/m² increase in prepregnancy BMI.^{7,8} The mechanisms have only been partially explored like increased cytokine mediated inflammation and oxidative stress, increased shear stress, dyslipidemia and increased sympathetic activity have been proposed as possible pathways.

The interest in the effect of obesity as risk factor for hypertensive disorders in pregnancy seems to be in rising trend in the beginning of 1990s⁹ and it became a kind of pandemic since beginning of the 21st century.^{7,10,11} Similarly preeclampsia is associated to obesity with increased risk of cardiovascular diseases and other metabolic disease for mother.

OBJECTIVES

1. To find occurrence of PIH in overweight and obese patients
2. To find relation of Gestational weight gain and occurrence of PIH

METHOD

The present study is a prospective study conducted in tertiary care centre, Assam. The study period is from 1st June 2019 to 31st May 2020. Data of the two hundred patients who registered in 1st trimester without known medical complications like hypertension, diabetes were collected in a proforma from time to time. In the first visit their baseline height and weight were measured in first trimester. Weight was measured on analog weighing machine. Height was measured accurately by stadiometer. BMI was calculated as weight (kg) divided by square of height (m).

Inclusion Criteria

Antenatal patients who are booked before or at 12 weeks gestation at Gauhati Medical College and Hospital(GMCH) attending Antenatal Out Patient Department.

Exclusion Criteria

1. Pregnant women who are unbooked
2. Pregnant women who are registered after 12 weeks gestation
3. Patients with chronic hypertension
4. Patients with any other medical disorders like diabetes, renal disease, heart disease, multiple pregnancy

A proforma was used to record information on age, parity,

socioeconomic status (Modified Kuppuswamy Scale,2020), blood pressure, BMI, Gestational Weight Gain, mode of delivery, birth weight, NICU admissions.'

Investigations and management were carried out in accordance with the standardised department protocol.

All the collected data was tabulated and analysed

RESULTS

This study was conducted among antenatal patients who attended the Antenatal OPD in Gauhati Medical College and Hospital, Guwahati from 1/6/2019 to 30/5/2020. Two hundred patients who attended OPD were selected and were followed throughout antenatal, intrapartum and immediate postpartum period.

During this time period of study, the total number of patients followed up were 200, out of which 30 patient developed PIH. In our study, the incidence of PIH was 15%. The high occurrence of PIH as our institute is a tertiary center with maximum number of referral cases with better NICU facility. In our study incidence of PIH was found to be 36.7% in age group < 19 years, 30% in age group 19-24 years, 20% in age group 25-29 years and 13.3% in age >30 years (p value - 0.002). The occurrence of PIH was higher in primigravidas (66.7%) as compared to multigravidas (33.3%) (p value - 0.046). Out of 30 PIH patients, 10 patients (33.3%) belonged to lower income group, 10 patients (33.3%) belonged to lower middle group, 5 patients belonged to upper middle group (16.7%) and 5 patients (16.7%) belonged to upper group (p value-0.001).

1. TABLE SHOWING RELATIONSHIP OF BMI CATEGORY WITH PIH

BMI CATEGORY	PIH PRESENT		PIH ABSENT		TOTAL	FISCHER'S EXACT VALUE	P-VALUE
	NUMBER	%	NUMBER	%			
UNDERWEIGHT(<18.5)	2	6.5%	29	93.5%	31 (100%)	8.673	0.027
NORMAL WEIGHT(18.5-24.9)	17	13.5%	109	86.5%	126 (100%)		
OVERWEIGHT(24.9-29.9)	7	20%	28	80%	35 (100%)		
OBESE(>30)	4	50%	4	50%	8 (100%)		
TOTAL	30		170		200		

Out of 31 underweight cases, only 2 cases developed PIH (6.5%). Out of 126 cases in normal BMI category, 17 cases developed PIH (13.5%). Out of 35 overweight cases, 7 cases developed PIH (20%) and out of 8 obese patients 4 developed PIH (50%). PIH prevalence increases with increase in BMI. It is seen that there is strong association between BMI and PIH (p value-0.027).

2. TABLE SHOWING RELATIONSHIP BETWEEN GESTATIONAL WEIGHT GAIN AND PIH

GESTATIONAL WEIGHT GAIN	PIH PRESENT		PIH ABSENT		TOTAL	CHI SQUARE VALUE	P-VALUE
	NUMBER	%	NUMBER	%			
INADEQUATE WEIGHT GAIN	11	9.8%	101	90.2%	112 (100%)	10.264	0.006
ADEQUATE WEIGHT GAIN	10	16.1%	52	83.9%	62 (100%)		

EXCESSIVE WEIGHT GAIN	9	34.6%	17	65.4%	26 (100%)		
TOTAL	30		170		200		

Out of total 112 cases with inadequate weight gain, 11 cases developed PIH (9.8%). In 62 cases with adequate weight gain, 10 cases developed PIH (16.1%). In 26 cases with excessive weight gain, 9 cases developed PIH (34.6%). There is strong association noted between gestational weight gain and PIH (p value 0.006 which is significant). It was reported that there is direct association between excessive weight gain and risk of PIH.

3. TABLE SHOWING RELATIONSHIP BETWEEN MODE OF DELIVERY AND BMI

It was found that rate of LSCS increases from underweight cases to overweight and obese cases. There is an association between mode of delivery (caesarean) and BMI category (p value-0.044).

BMI CATEGORY	MODE OF DELIVERY						TOTAL	FISHER'S EXACT VALUE	P-VALUE
	NVD		CAESAREAN		IVD				
	N	%	N	%	N	%			
UNDERWEIGHT	24	77.4%	5	16.1%	2	6.5%	31 (100%)	11.829	0.044
NORMAL WEIGHT	76	60.3%	45	35.7%	5	4%	126 (100%)		
OVERWEIGHT	18	51.4%	15	42.9%	2	5.7%	35 (100%)		
OBESE	2	25%	5	62.5%	1	12.5%	8 (100%)		
TOTAL	120		70		10		200		

4. DIAGRAM SHOWING RELATION OF BABY BIRTH WEIGHT WITH BMI

BABY BIRTH WT	BMI CATEGORY								FISCHER'S EXACT VALUE	P-VALUE	
	UNDERWEIGHT		NORMAL		OVERWEIGHT		OBESE				
	N	%	N	%	N	%	N	%			
<2.5 KG	11	35.5%	18	14.4%	14	40%	5	62.5%	48	29.168	0.001
2.5-3.5 KG	20	64.5%	108	85.6%	21	60%	2	25%	151		
>3.5 KG	0	0%	0	0%	0	0%	1	12.5%	1		
TOTAL	31	100%	126	100%	35	100%	8	100%	200		

It was found that both extreme of BMI categories i.e. underweight and obese patients more numbers of babies with birth weight less than 2.5kg which is statistically highly significant as p value is 0.001.

5. TABLE SHOWING RELATIONSHIP BETWEEN NICU ADMISSION AND BMI

BMI CATEGORY	NICU ADMISSION		NO NICU ADMISSION		TOTAL	FISHER'S EXACT VALUE	P-VALUE
	NUMBER	%	NUMBER	%			
UNDERWEIGHT	6	19.4%	25	80.6%	31 (100%)	32.233	0.001
NORMAL WEIGHT	3	2.4%	123	97.6%	126 (100%)		
OVERWEIGHT	8	22.9%	27	77.1%	35 (100%)		
OBESE	5	62.5%	3	37.5%	8 (100%)		
TOTAL	22		178		200		

It was found in our study that babies of overweight and obese cases had more NICU admission 22.9% and 62.5% respectively (p value-0.001) which is highly significant. Babies from mother of normal BMI had 2.4% NICU admission.

DISCUSSION

In our study it was observed that 6.5% patients under UW BMI had PIH, 13.5% patients with normal BMI had PIH, 20%

patients under overweight category had PIH and 50% patients under obese category had PIH. Ehrental DB et al (2011) found in their study that 3.8% patients with UW BMI had PIH, 4.7% patients with normal BMI had PIH, 9.1% patients under overweight category had PIH and 44.1% patients under obese category had PIH.¹²Tanaka T, et al (2014)) found in their study that 1.6% patients under UW BMI had PIH, 2.2% patients with normal BMI had PIH, 5.3% patients under overweight category had PIH and 12% patients under obese category had PIH.¹³ Enomoto K et al (2016) observed in their study that 3.3% patients with UW BMI had PIH, 23.3% patients with normal BMI had PIH, 35.5% patients under overweight category had PIH and 41.1% patients under obese category had PIH.¹⁴ In our study it was reported that patients with inadequate GWG had 9.8% prevalence of PIH, 16.1% patients with adequate GWG developed PIH whereas 34.6% with excessive GWG had PIH. Tanaka T et al (2014) found that 2.1% patients with inadequate GWG had PIH, 3.7% patients with adequate GWG developed PIH whereas 6.8% with excessive GWG had PIH.¹³Miao Miao et al (2017) observed that 1.6% patients with inadequate GWG had PIH, 2.8% patients with adequate GWG developed PIH whereas 3.8% with excessive GWG had PIH.¹⁵

CONCLUSION

Maternal and fetal outcomes were observed to be worse in PIH patients and both extremes of BMI i.e. underweight and obese. It also suggests that risk of adverse outcomes begins in overweight range and well before women meet criteria for obesity. Our study also demonstrated adverse effect of low BMI on fetus. Continued emphasis should be placed on normalization of maternal weight because higher maternal BMI were associated with higher risk of pregnancy induced hypertension. Women with high BMI should be monitored more closely for development of hypertensive disorders of pregnancy. Obese and overweight women in reproductive age group should be encouraged to practice a healthy lifestyle and dietary modifications from early life which can be helpful in achieving the goal we all strive for- a healthy mother and a healthy baby.

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