

**Original article:**

## **Correlation between maternal body mass index and incidence of pregnancy induced hypertension**

**<sup>1</sup>Dr Vinod , <sup>2</sup>Dr Motilal C Tayade<sup>3</sup>, Dr Ramchandra G Latti**

<sup>1</sup>Assistant Professor, Department of Physiology, M R Medical College, Gulbarga, Karanataka, India

<sup>2</sup>Assistant Professor and PhD Scholar, Department of Physiology, Rural Medical College, Pravara Institute of Medical Sciences, Loni, Tal. Rahata, Dist. Ahmednager, Maharashtra , India

<sup>3</sup>Professor and HOD, Department of Physiology, Rural Medical College, Pravara Institute of Medical Sciences, Loni, , Tal. Rahata, Dist. Ahmednager, Maharashtra, India

**Corresponding author:** Dr Vinod

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### **Abstract:**

**Introduction:** This study was aimed at assessing the relation between maternal body mass index and pregnancy induced hypertension.

**Materials & methods:** Our study included 90 cases of PIH and 90 cases of normal pregnancy. Body Mass Index was calculated using the formula weight/height<sup>2</sup>. Adjusted odds ratio (OR) and 95% confidence interval (CI) were used for statistical analysis. A P-value of less than 0.05 was regarded as statistically significant.

**Results:** It was found that BMI was significantly associated with PIH.

**Conclusion:** Due to the association of Maternal overweight and obesity with pregnancy induced hypertension, there is a need for pre-pregnancy counseling and control over weight gain in this group of women.

**Key words:** Body mass index, Pregnancy induced hypertension, Obesity

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### **Introduction:**

Obesity has become one of the major public health concern due to its role in development of various chronic diseases. Incidence of obesity is rapidly increasing.<sup>1, 2</sup>WHO projected that approximately 2.3 billion adults will be overweight and more than 700 million adults will be obese by 2015.<sup>3</sup> Developed and also the developing countries are facing the problems of maternal obesity<sup>4</sup> Rising incidence of obesity during pregnancy is considered as one of the serious problem.<sup>2, 5, 6,7,8,9</sup> Pregnancy Induced Hypertension is one of the major pregnancy complication with a significant cause of maternal and fetal morbidity and mortality. "PIH" is restricted to hypertension in pregnant women who have no preexisting overt

chronic hypertension or renal diseases and no high blood pressure or proteinuria before 20 weeks' gestation, and in whom hypertension and proteinuria occur for the first time during the second half of pregnancy (after 20 weeks), during labor, or during the puerperium, and subside after delivery. "PIH" herein includes gestational hypertension (hypertension without proteinuria), preeclampsia (hypertension plus proteinuria), and eclampsia (preeclampsia plus convulsion). Etiopathogenesis of PIH is not yet clearly understood,<sup>10</sup> hence increasing the rate of its complications and the need for identification of risk factors associated with it. Several risk factors have been identified including obesity.<sup>11</sup> Overweight, obesity and underweight are

defined differently in various reports. Earlier studies have extensively explored the relationship between maternal height, maternal weight and pregnancy complications, while Body Mass Index (BMI) is widely accepted as a better measurement of maternal overweight or underweight in more recent reports <sup>2, 12,13,14,15</sup>. Hence the objective of this study was to examine the association between BMI and PIH.

**Material and methods:**

A total of 180 cases were enrolled and included in the study. Among them 90 cases were of PIH which was the study group and 90 cases of normal pregnancy taken as a control group. Study was approved by the institutional ethical committee. Study protocol was briefed to the subjects and written consent was obtained. Height of the subject was measured using a measuring scale whose least count is 0.1 cm. Height of each subject was converted in unit of metres. Weight was measured using weighing machine whose least count was 0.5 kg. BMI of each subject was calculated using

Quetelet's index:  $BMI = \frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m)}}$ . Based on their BMI, subjects were categorized into three groups specified as (i) normal: BMI in the range of 18.5 kg/m<sup>2</sup> -24.9 kg/m<sup>2</sup> ;( ii) overweight: BMI in the range of 25 kg/m<sup>2</sup> - 29.9 kg/m<sup>2</sup> (iii) obese: BMI greater than 30 kg/m<sup>2</sup>. The Adjusted odds ratio (OR) and 95% confidence interval (CI) were used for statistical analysis. A P-value of less than 0.05 was regarded as statistically significant.

**Results:**

The incidence of PIH in the three BMI groups is depicted in Table 1.

Table.2 shows the number of cases of PIH in different categories of BMI compared with Control group. In Table.3 the risk of PIH in the BMI groups was compared with the Control group, which indicated that PIH was observed to be more prevalent among overweight and obese women compared to other groups

**Table No. 1** Showing the incidence of PIH in the three BMI groups

BMI	PIH n=90
18.5 kg/m <sup>2</sup> -24.9 kg/m <sup>2</sup>	21
25 kg/m <sup>2</sup> - 29.9 kg/m <sup>2</sup>	32
30 kg/m <sup>2</sup>	37

**Table No. 2** showing the number of cases of PIH in different categories of BMI compared with Control Group

BMI	Control n= 90	PIH n=90
18.5 kg/m <sup>2</sup> -24.9 kg/m <sup>2</sup>	34	21
25 kg/m <sup>2</sup> - 29.9 kg/m <sup>2</sup>	27	32
30 kg/m <sup>2</sup>	29	37

**Table.3** Showing the association between BMI and PIH.

BMI	Control n= 90	PIH n=90	Odds Ratio	Significance (p – value)	
18.5 kg/m <sup>2</sup> -24.9 kg/m <sup>2</sup>	34	21	1.1		NS
25 kg/m <sup>2</sup> - 29.9 kg/m <sup>2</sup>	27	32	0.99		S
30 kg/m <sup>2</sup>	29	37	1.2	<0.05	S

**Discussion:**

On observation, in this study the risk of PIH increases with increasing BMI. It occurs frequently in overweight and obese women. High Body mass index at the time of pregnancy is at high risk due to increased effects of obesity on maternal and perinatal complications.<sup>16,17,18,19,20,21</sup> Certain features like oxidative stress<sup>22,23</sup> and circulating inflammation markers are seen in Obesity along with elevated plasma levels of C-reactive protein, inflammatory cytokines, tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukin-6 (IL-6) and interleukin-8 (IL-8)<sup>23,24</sup>. Oxidative stress<sup>25</sup> and circulating markers of inflammation<sup>26, 27</sup> these same features are also associated with Preeclampsia. A study on meta-analysis on the risk of preeclampsia, associated with

maternal BMI<sup>26</sup>, indicated that the risk of preeclampsia doubled with each 5-7 kg/m<sup>2</sup> increase in pre-pregnancy BMI. Furthermore, the risk of preeclampsia during pregnancy doubled in overweight women (25-29.9 kg/m<sup>2</sup>), while it was 4.5 times higher in obese women (30-39.9 kg/m<sup>2</sup>). A study by Krishnamoorthy<sup>28</sup> suggested that Obesity plays a major role in the development of pregnancy complications, hence all pregnancies in obese women should be considered as a high risk and it's important that the expecting mothers should undergo counseling and get advice on nutrition and weight gain control along with proper antenatal care. According to the guidelines of *American Gynecological & Obstetrical Society* on the clinical status of pregnant women, it is recommended that

BMI be calculated in all these women during their first prenatal visit.<sup>29,30</sup>

#### **Conclusion:**

On observing the results obtained from this study, obese pregnant women should be considered for proper antenatal care along with a check on weight

gain and management of the complications. Due to the effects of obesity on pregnancy, it's important that the expecting mothers should get counseling and advice on weight gain control and nutrition. Research on similar studies should be continued for the proper understanding and management.

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