

**ORIGINAL ARTICLE****ROLE OF MATERNAL WEIGHT GAIN ON PERINATAL OUTCOME****Madhuri Alwani<sup>1</sup>, Avneet Arora<sup>2</sup>, Ratna Thakur<sup>3</sup>****Author's Affiliations:** <sup>1</sup>Associate Professor, <sup>2</sup>Senior Resident, <sup>3</sup>Professor & Head, Department of Obstetrics and Gynaecology, Sri Aurobindo Medical College and PG Institute, Indore, Madhya Pradesh, India**Correspondence:** Dr. Madhuri Alwani, Email: drmadhuri\_2007@rediffmail.com**ABSTRACT****Background:** this study was designed to study the trends in key pregnancy outcomes that are related to booking weight and maternal weight gain**Material and Methods:** this observational prospective study was carried out on 200 pregnant women booked in 1<sup>st</sup> trimester and pregnancy was continued till 28 weeks. Women with greater than 35 year of age, twin pregnancy or having any systemic disorder were excluded from the study. Patients was followed till the birth and data regarding maternal age, weight Gestational age, weight gain etc were recorded in predesigned proforma.**Results:** we observed that there was a significant association of maternal weight gain with mode of delivery, pre eclampsia, and preterm labor. However no significant association was observed between the premature rupture of membrane and maternal weight gain. We also observed the chance of intra uterine growth retardation increases as the maternal weight gain decreases.**Conclusion:** Maternal weight gain may be a determinant of pregnancy outcomes. Therefore antenatal care are to be offered to all women to help them reach a healthy weight before conceiving and normal weight gain during pregnancy**Keywords:** Maternal Weight gain, Perinatal outcome, Pregnancy**INTRODUCTION**

Antenatal Care today is an integral part of health care delivery system in pregnant women. A lot of emphasis is being given to antenatal health care, so that disease processes affecting the mother and the fetus can be diagnosed early enough to reduce the morbidity and mortality associated with it. Maternal weight gain (MWG) in pregnancy can offer good means of assessing the well being of the pregnant mother and inference of her baby.<sup>1</sup> MWG is an important factor in determining maternal and fetal outcome. Although the need for weight gain during pregnancy is widely acknowledged, there has been a lot of debate on the amount of weight gain required to promote optimal maternal and fetal outcomes.<sup>2</sup>

Inadequate maternal weight gain is a significant risk factor for intrauterine growth restriction, preterm delivery and low birth weight in infants.<sup>3</sup> Ob-

esity and excessive weight gain on the other hand can lead to infant macrosomia and cesarean delivery. These have lead to suggestions for optimal weight gain to ensure the best outcomes<sup>4</sup>. The institute of medicine (IOM) published recommended weight gains by pregnancy BMI which have been the standard for subsequent research.<sup>4</sup>

In earlier researches the relationship between maternal height and weight with pregnancy complications were extensively explored, but in recent times, BMI is widely accepted as a better measure of over or underweight. This study has an aim to find out the independent role of booking weight, BMI and Maternal weight gain as a determinant of pregnancy outcomes. The results will be of public health importance because booking weight, BMI and maternal weight gain are modifiable risk factors of adverse pregnancy outcomes.

**MATERIALS AND METHODS**

This was an observational, prospective study which was conducted in the Department of Obstetrics and Gynecology, Sri Aurobindo Medical College and PG Institute, Indore, India. A total of 200 pregnant women booked in first trimester, pregnancies continued beyond 28 weeks of gestation, singleton pregnancy, maternal age between 18-35 years and patients height between 140-160cm were recruited in the study. Women with short stature, excessive tall stature, diabetes, multiple gestation, hydramnios, fetal death and systemic diseases like kidney disease, lung disease, heart disease, thyroid disease, etc. were excluded.

We considered weight measured during first visit in antenatal clinic as booking weight in place of pre pregnancy weight. Body weight was measured with a calibrated scale accurate to 0.5kg while subjects were wearing lightest possible clothing. Height was measured by using a wooden stadiometer which was attached to a vertical wall against which the patient could stand straight with buttocks and heels against it.

BMI is the most common expression of body weight corrected for height in use today. It is computed as follows  $BMI = wt/ht^2 (kg/m^2)$ . Period of gestation was estimated by calculation from first day of last menstrual period and by early ultra-

sound examination. By repeated checkups gestation hypertension, IUGR, etc were detected. IUGR was considered when growth deficit was of 4 weeks or more for particular period of gestation. Preterm labor was recorded when the pregnancy was terminated before 37 weeks. Any complication during labor and just after delivery was detected and managed accordingly. Mode of delivery, birth weight of baby and weight of placenta were recorded. Before weighing the placenta the cord was trimmed to 2cm length. Prior to study ethical approval was taken from the institutional ethical committee and written informed consent was taken from each patients.

**Statistical analysis:** The significant difference of frequencies of qualitative data between the groups was analyzed using chi square test. One way ANOVA test was used to see the significance of mean difference among the groups.

**RESULTS**

Out of 200 selected cases 131(65.5%) were primiparous while 69(34.5%) were multiparous. Patients were divided into four groups according to quartile of weight gain during pregnancy. Thirty percent patient had gain weight in the range of 8.3-9.7kg. More than 10.4kg weight was gained by 25.5% of the women (table 1).

**Table 1: Incidence of Maternal Complications in Relation to Maternal Weight Gain**

Weight gain category(kg)	Total Number	Pregnancy induced hypertension		Preterm Labor		Premature Rupture of Membrane	
		Present	Absent	Present	Absent	Present	Absent
I(0.0-8.3)	36(18)	0	36(100)	10(27.8)	26(72.2)	9(25.0)	36(75)
II(8.3-9.7)	60(30)	0	60(100)	0(0.0)	60(100)	0(0.0)	60(100)
III(9.7-10.4)	53(26.5)	6(11.3)	47(88.7)	0(0.0)	53(100)	0(0.0)	53(100)
IV(≥10.4)	51(25.5)	11(21.6)	40(78.4)	3(5.9)	48(100)	6(11.8)	45(88.2)
Total	200	17(8.5)	183(91.5)	13(6.5)	187(93.5)	15(7.5)	185(92.5)
p-Value		<0.0001		0.0014		0.131	

**Table 2: Incidence of Fetal Complications in Relation to Maternal Weight Gain**

Weight gain category(kg)	IUGR		Fetal distress	
	Present	Absent	Present	Absent
I(0.0-8.3)	16(44.4)	20(55.6)	7(17.6)	29(82.4)
II(8.3-9.7)	1(1.7)	59(98.3)	6(10.0)	54(90)
III(9.7-10.4)	3(5.7)	50(94.3)	0(0.0)	53(100)
IV(≥10.4)	0(0.0)	51(100)	9(19.4)	42(80.6)
Total	20(10)	180(90)	22(11)	178(89)
p-Value	<0.0001		0.6541	

Pregnancy induced hypertension was also found to be associated with maternal weight gain(p value < 0.001). The incidence of PIH was highest in wom-

en with weight gain of more than 10.4kg. None of patients with weight gain of less than 9.7 kg was diagnosed with PIH. Preterm labor was observed in

patients with weight gain of either less than 8.3kg or more than 10.4 kg. No preterm labor was observed in patients with weight gain in the range of 8.3 to 10.4 kg. Similarly premature rupture of membrane was also not occurred in patients with weight gain from 8.3 to 10.4 kg.

Intrauterine growth retardation and fetal distress was also found more in patients having weight gain less than 9.7 kg(table 2). Mean birth weight of neonates was also found associated with maternal weight gain.

## DISCUSSION

Maternal weight gain is recorded at all antenatal attendances and weight gain is considered to be a significant clinical test in antenatal care. Concern is often expressed if the patient does not gain weight as the pregnancy progresses. The amount of maternal weight gain that is compatible with a normal outcome has been the matter of debate since 1940s<sup>5</sup>.

Thorsdottir<sup>6</sup> and Jensen et al<sup>7</sup> found an association between maternal weight gain and PIH. Thorsdottir<sup>6</sup> also adjusted results for age, parity, height and gestational age. Viswanathan<sup>8</sup> included a detailed summary of the findings of 12 recent studies that considered the relationship of rate of maternal weight gain to preterm birth. There was a consistently increased risk of preterm birth in both the lowest and highest MWG groups. Our study showed increased weight gain had more caesarian or forceps deliveries. Most of the studies demonstrated higher risks of caesarian/instrumental delivery with higher gestational weight gain which is co-relating with our study.

Increased risk of IUGR(44.4%) was demonstrated with low maternal weight gain in our study. Abram et al<sup>9</sup> demonstrated that low maternal weight gain (<5.7 kg) was associated with decreased birth weight ranging from 48-248gms depending on the pattern of weight gain in other trimesters. Similar to Verma<sup>1</sup>, incidence of fetal distress was higher among low weight gain group and low among relatively high weight gain group in present study. Overall results of our study demonstrated an association between higher GWG and birth weight. Incidence of low birth weight ( $2.54 \pm 0.19$  kg) was seen in category I and high birth weight ( $3.16 \pm 0.32$ kg) was seen in category IV. Normal placental growth using human tissue is difficult to ascertain because placenta obtained from early

pregnancy are often result of an abnormal pregnancy outcome. In our study mean placental weight showed an increasing trend with increasing weight gain in pregnancy. This trend was statistically significant ( $p < 0.001$ ).

Our study results taken together with existing literature suggest an independent role of booking weight, BMI and maternal weight gain as a determinant of pregnancy outcomes. The results were of public health importance because booking weight, BMI and maternal weight gain are modifiable risk factors of adverse pregnancy outcomes. So pre-conceptional services and antenatal care are to be offered to all women to help them reach a healthy weight before conceiving and normal weight gain during pregnancy. This may also reduce their obstetric risk, normalize infant birth weight, improve their long term health and thus to be able to conceive again at a healthy weight. Weight monitoring during pregnancy continues to have clinical application for pregnancy complications, mode of delivery and birth outcomes.

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