

## Analysis of Correlation Between Maternal Weight Gain and Infant's Birth Weight at a Tertiary Care Hospital

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### ABSTRACT

**Background:** The presents study was conducted for assessing the correlation between maternal weight gain and infant's birth weight.

**Materials & Methods:** The sample size was calculated to be 200. All mothers coming to the clinics during the study period were enrolled consecutively until the sample size was attained. Pregnancy weight was collected retrospectively and prospectively. Before 28 weeks of gestation, monthly weight was collected retrospectively from mother's data records and then, mothers were followed-up until the time of delivery to record the BW (birth weight). The weight of mothers was measured. The height of the mother was measured barefoot using height measuring board in a standing position. All the records were noted in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

**Results:** Out of 200 subjects analyzed, majority of the subjects were above 25 years of age. Majority of the subjects were housewives. Maternal weight increased monthly at a mean rate of 2.2 kg in the second trimester, and 1.9 kg in the third trimester. The mean pre-pregnancy body mass index (BMI)

and total pregnancy weight gain was 22.8 kg/m<sup>2</sup>, and 13.9 kg respectively. The mean birth weight was 3512 grams. Weight gain had a significant effect on infant birth weight.

**Conclusion:** Maternal weight gain during pregnancy increases birth weight independent of other factors.


**Key words:** Maternal, Infant, Birth weight.

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### INTRODUCTION

The gestational period determines the quality of human resources and depends on the intra uterine condition. Healthy pregnant women with a good nutritional status certainly improves the outcome of baby. Low birth weight rate in developing countries was higher four times than in developed countries. More than 9 million babies die each year, 98% occur in developing countries and most of them are caused by low birth weight. Therefore, optimal maternal weight gain is essential for better outcome.<sup>1-3</sup>

Several investigators have studied the relationship between maternal weight gain and birth weight either directly or indirectly. Previous authors were primarily interested in post-partum weight retention, but also demonstrated increased birth weight with increased maternal weight gain for women of normal BMI. One of the authors studied this subject focusing on LBW infants, demonstrating similar results. Previous authors studied the effect

of maternal weight gain on birth weight but relied on patient self-reporting of weight with the expected error introduced by this method. Finally, another author demonstrated that advised weight gain during pregnancy did influence final weight gain, so that recommendations for weight gain are clinically useful.<sup>4-7</sup>

Hence; the presents study was conducted for assessing the correlation between maternal weight gain and infant's birth weight.

### MATERIALS & METHODS

The present study was conducted in the Index Medical College Hospital & Research Centre, Indore, Madhya Pradesh (India) for assessing the correlation between maternal weight gain and infant's birth weight.

Women who had singleton pregnancies were included in this study. The sample size was calculated to be 200. All mothers

coming to the clinics during the study period were enrolled consecutively until the sample size was attained. Pregnancy weight was collected retrospectively and prospectively. Before 28 weeks of gestation, monthly weight was collected retrospectively from mother's data records and then, mothers were followed-up until the time of delivery to record the BW (birth

weight). The weight of mothers was measured. The height of the mother was measured barefoot using a height measuring board in a standing position. Maternal weight was measured. All the records were noted in Microsoft excel sheet and were subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) software.

**Table 1: Mean birth weight difference between variables maternal and newborn variables**

Variable		95% CI	p-value
Pre-pregnancy BMI (Kg/m <sup>2</sup> )	Less than 25	2845 to 3412	0.001 (Significant)
	25 to 30	3368 to 3502	
	More than 30	3458 to 3590	
WDDS	Low WDDS	2812 to 3345	0.000 (Significant)
	Medium WDDS	3195 to 3517	
	High WDDS	3712 to 3928	
Pregnancy interval	< 3 years	-565 to -283	0.003 (Significant)
	≥ 3 years	-540 to -284	
Child gender at current pregnancy	Boy	-88 to 121	0.445
	Girl	-89 to 120	

**Table 2: Correlation of maternal factors and birth weight**

Variable	95% CI	p-value
Pregnancy weight gain	78 to 135	0.002 (Significant)
Pre-pregnancy BMI	33 to 61	0.000 (Significant)
Women dietary diversity	-18 to 23	0.881
Age of mother	-9 to 18	0.314

## RESULTS

Out of 200 subjects analyzed, the majority of the subjects were above 25 years of age. Majority of the subjects were housewives. Maternal weight increased monthly at a mean rate of 2.2 kg in the second trimester, and 1.9 kg in the third trimester. The mean pre-pregnancy body mass index (BMI) and total pregnancy weight gain was 22.8 kg/m<sup>2</sup>, and 13.9 kg respectively. The mean birth weight was 3512 grams. Weight gain had a significant effect on infant birth weight.

## DISCUSSION

The subject of maternal weight gain in pregnancy and its effect on birth weight is of tremendous interest, since infants with birth weights at either extreme, low birth weight infants and macrosomic infants, have increased morbidity and mortality. Most studies on this subject since the 70's have focused on poor maternal weight gain in pregnancy and its contribution to producing low birth weight (LBW) infants. Once this became well established, a trend toward recommendation of increased weight gain in pregnancy began. This was in sharp contrast to earlier recommendations, which had emphasized restriction of excessive weight gain.<sup>6-10</sup> Hence, the presents study was conducted for assessing the correlation between maternal weight gain and infant's birth weight.

Out of 200 subjects analyzed, majority of the subjects were above 25 years of age. Majority of the subjects were housewives.

Maternal weight increased monthly at a mean rate of 2.2 kg in the second trimester, and 1.9 kg in the third trimester. The mean pre-pregnancy body mass index (BMI) and total pregnancy weight gain was 22.8 kg/m<sup>2</sup>, and 13.9 kg respectively. The mean birth weight was 3512 grams. Weight gain had a significant effect on infant birth weight. Ludwig DS et al, in a previous study, used Vital Statistics Natality records to examine all known births in Michigan and New Jersey from 1989 to 2003. Their sample included 513,501 women who had more than one singleton pregnancy and their 1,164,750 offspring. They examined how differences in weight gain that occurred during two or more pregnancies for each woman predicted the birth weight of her offspring, using a within-subject design to minimize confounding. They found a remarkably consistent relationship between pregnancy weight gain and birth weight ( $\beta$  7.35 [95% CI 7.10–7.59],  $p < 0.0001$ ). Infants of women who gain more than 24 kg during pregnancy were 148.9 g (CI 141.7–156.0) heavier at birth, compared to infants of women who gained 8–10 kg. The odds ratio of giving birth to an infant greater than 4000 g was 2.26 (2.09 – 2.44) for a woman who gained more than 24 kg during pregnancy, compared to a woman who gained 8–10 kg.<sup>11</sup> Shrestha I et al observed the total weight gained by the pregnant women and the correlation between the weights gained by them with the birth weight of their infants. 98 women who delivered full term single baby at Patan hospital were included after taking their verbal consent. The details of the newborn and the history of the pregnant women were taken from the hospital

records. The information about the family income, dietary habit, birth spacing, and the type of work done by the pregnant women was obtained from the women themselves. The mean weight gain of the mothers was 9.48 (SD = 3.41) kilograms, and the mean birth weight of the infants was found to be 2965.66 (SD = 364.37) grams. Multiple Linear Regression Models showed the effect of Gestational weight gain (GWG), Age and Parity on birth weight of the infant. Step-wise multiple regressions gave rise to models that showed the effect of GWG and age on birth weight of the infants. This study concluded that gestational weight gain has positive linear relationship (correlation) with the birth weight of infants.<sup>12</sup> Abubakari A et al investigated the association between birth weight and maternal factors such as gestational weight gain, pre-pregnancy BMI and socio-economic status. The study was a facility-based cross-sectional survey conducted in two districts in the Northern region of Ghana. These districts were purposively sampled to represent a mix of urban, peri-urban and rural population. Their study included 419 mother-infant pairs who delivered at term (37–42 weeks). Mother's height, pre-pregnancy weight and weight changes were generated from the antenatal records. The mothers were generally well nourished before conception (Underweight 3.82%, Normal 57.76%, Overweight 25.06% and Obesity 13.37%) but approximately half of them could not gain adequate weight according to Institute of Medicine recommendations (Low weight gain 49.64%, Adequate weight gain 42.96% and Excessive weight gain 7.40%). Infants whose mothers had excess weight gain were 431g (95% CI 18–444) heavier compared to those whose mothers gained normal weight, while those whose mothers gained less were 479g (95% CI -682–(-276) lighter. Infants of mothers who were overweight and obese before conception were 246g (95% CI 87–405) and 595g (95% CI 375–815) respectively heavier than those of normal mothers, whereas those whose mothers were underweight were 305g (95% CI -565 –(-44) lighter. The mean birth weight observed was  $2.98 \pm 0.68$  kg. Their findings showed that pre-pregnancy body mass index and weight gain during pregnancy influence birth weight.<sup>13</sup>

## CONCLUSION

Maternal weight gain during pregnancy increases birth weight independent of other factors.

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