Study of the maternal weight gain and various factors associated with it

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Abstract

Background: Maternal weight gain during pregnancy is major determinant of birth weight, primary indicator of infant morbidity and mortality and exerts direct influence on pregnancy outcome. Appropriate weight gain advice is therefore of great importance. Present study was done to assess the maternal weight gain and its association with factors like birth weight of baby, maternal age, socio-economic status and gestational age in the study population. **Methods:** It is a hospital based prospective study. Study duration was from 14-10-1993 to 30-10-1994. Target population was women booked at 12 weeks of gestational period and who delivered at hospital during study period. Details regarding age, income, occupation, education, obstetrical history, menstrual history was collected from study subjects. After the delivery, the newborn baby was weighed, within 30 minutes of the birth, without clothing, on a lever type of weighing machine and weight was recorded in grams. All the above data were recorded and appropriate statistical tests were performed. Mean birth weight was analyzed in relation with the maternal weight gain. Multiple linear regression analysis was done to analyze relation of maternal age, socio-economic status and gestational age with maternal weight gain. **Results:** A cohort of 500 pregnant women was included in present study. Mean birth weight increased with the increase in maternal weight gain. The overall mean birth weight was 2728.9 grams. There was a difference of 335.1 grams in the birth weight at the two extremes of maternal weight gain. Maximum number of women i.e. 220 (44%) had weight gain of 5-7 Kg. (Mean Birth Weight 2628.9 grams), 145 (29%) had weight gain of 8-9 kg. (Mean birth weight 2704.8 grams). Multiple linear regression analysis showed that maternal age, socio-economic status and gestational age showed significant association with maternal weight gain. **Conclusion:** Pregnant women should receive appropriate weight gain advice, according to individual maternal characteristics. Better understanding of the influence of various maternal factors on weight gain values may strengthen the credibility and perhaps the influence of dietary advice to pregnant women.
Keywords: Maternal weight gain, birth weight, socioeconomic status.

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INTRODUCTION

Maternal weight gain is one of the important indicators to monitor and evaluate nutritional status of a pregnant woman. Recently, studies have shown that maternal weight gain during pregnancy is related to the low birth weight and macrosomia [1]. It is a determinant of health and nutrition of mothers and offspring. However, many factors associated with it are not completely understood [2]. Present study was done to assess the maternal weight gain and its association with factors like birth weight of baby, maternal age, socio-economic status and gestational age in the study population.

METHODS

It is a hospital based prospective study conducted at the Department of Obstetrics and Gynaecology of the Government Medical College and Hospital, Nagpur. Study duration was from 14-10-1993 to 30-10-1994. Target population was women booked at 12 weeks of gestational period and who delivered at the hospital during the study period. The patients able enough to state the exact date of the last menstrual period were only taken-up in the study group. The gestational period was calculated from the first day of the last menstrual

period. Detailed information regarding age, income, occupation, education, obstetrical history, menstrual history and other information quoted in the proforma, were collected from study subjects. After admission to labour ward, a detailed history, complete general, physical examination and obstetrical examination were performed and recorded. Gestational age was assigned by the obstetrician, delivering the women on the basis of the best estimate from menstrual data, physical examination i.e. uterine size measurements in weeks, and ultrasound was done, whenever needed for confirmation of gestational age. After the delivery, the newborn baby was weighed, within 30 minutes of the birth, without clothing, on a lever type of weighing machine and weight was recorded in grams. All the above data were recorded and appropriate statistical tests were performed. For the purpose of our present study following criteria were used for estimation of maternal weight gain: No manipulation of diet, abnormal pregnancies excluded by following throughout pregnancy and weight gain being recorded for at least the last two thirds of pregnancy. Multiple linear regression analysis was done to analyze relation of maternal age, socio-economic status and gestational age with maternal weight gain. The multiple linear regression analysis was performed on a Personal Computer (P.C.) using minitab statistical Package with maternal weight gain as a continuous outcome (dependent)variable, and the various predictor (independent) variables being – Age, Education, Socio-economic Status, Height, Pre pregnancy weight, Parity, Tobacco Chewing, Gender, and Gestational age, after testing for the various assumptions made in the analysis.

RESULTS

A cohort of 500 pregnant women was included in present study. Mean birth weight increased with the increase in maternal weight gain. The overall mean birth weight was 2728.9 grams. There was a difference of 335.1 grams in the birth weight at the two extremes of maternal weight gain. Maximum number of women i.e. 220 (44%) had weight gain of 5-7 Kg. (Mean Birth Weight 2628.9 grams), 145 (29%) had weight gain of 8-9 kg. (Mean birth weight 2704.8 grams). Multiple linear regression analysis showed that maternal age, socio-economic status and gestational age showed significant association with maternal weight gain.

Table 1: Distribution according to Maternal Weight gain and Birth Weight

Maternal Weight gain in kg	Birth Weight (grams)					Mean Birth Weight (grams)	SD
	<2500	2501-3000	3001-3500	< 3501	Total		
5-7	108 49.10%	96 43.63%	16 7.27%	0 0%	220 100%	2628.9	305.6
8-9	50 34.50%	61 42.06%	24 16.55%	10 6.89%	145 100%	2704.8	408.0
10-11	15 13.63%	85 77.27%	9 8.20%	1 0.90%	110 100%	2788.6	250.9
>11	0 0%	20 80.0%	0 0%	5 20.0%	25 100%	2964.0	420.9
Total	173 34.6%	262 52.4%	49 9.8%	16 3.2%	500 100%	2728.9	347.2

χ^2=100.8, Degree of Freedom=9, (p<0.00001)

The overall 'F" Test was statistically highly significant (P = 000) rejecting the null hypothesis, that all the predictor variables could not explain a significant variation in maternal weight gain. R-sq was 16.8% indicating that nearly 17% of variation in maternal weight gain could be explained by various predictor variables in regression equation. The significant variables were maternal age, socio-economic status and gestational age with P values of P = 0.009, P = 0.000 and P= 0.000 respectively.

DISCUSSION

In the present study it was observed that maternal age, socio-economic status and gestational age showed significant association with maternal weight gain. Also, mean birth weight increased with the increase in maternal weight gain. On stepwise multiple regression analysis, three significant variables i.e. maternal age, gestational age and socio-economic status were selected for the analysis. The variables entered in respective steps were, socio-economic status (explaining 10% of variance), gestational age (explaining in additional 5% of variance), and maternal age (explaining about 2% of the variance). Univariate analysis was done to predict the birth weight from maternal weight gain. It was observed that the t-ratio for co-efficient of maternal weight gain was highly significant P = 0.000, indicating that 48.4 gms increase in

mean birth weight per unit change of maternal weight gain. Maternal weight gain was found to have significant association with birth weight. Seidman Daniel. S. *et al* [3] 1989 found a significant positive linear relationship between maternal weight gain and birth weight for all levels of pre pregnancy body mass, age, parity and education (by multiple regression analysis). Makhija K *et al* [4] 1989 observed that parity, utilization of antenatal care facilities, literacy status of the fathers and sex of the new born, were found to have a significant influence on the birth weight. Maternal age and literacy and place of residence were found to have minimal influence. (Stepwise multivariate regression analysis). In our present study the mean birth weight was increased with increase in maternal weight gain and there was significant association observed between maternal weight gain and birth weight (p < 0.00001). This finding was very similar to the study of Ahuja Nirmal *et al* [5] 1974. Our findings were also consistent with the study of Nicholson J. *et al* [6] 1968.

CONCLUSION

Pregnant women should receive appropriate weight gain advice, according to individual maternal characteristics. Better understanding of the influence of various maternal factors on weight gain values may strengthen the credibility and perhaps the influence of dietary advice to pregnant women.

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