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Impact of Maternal Factors on Birth Parameters in
Urban Affluent Pregnant Women

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Abstract: The objective of this study was to determine the effect of maternal nutritional factors on birth parameters among urban affluent pregnant women. A cross sectional study was carried out in Pune city of Maharashtra state among 156 singleton healthy pregnant women. Face to face interview method was undertaken of the pregnant women who were visiting for their monthly check up. During each interview, information was sought concerning the demography background of pregnant women and 24 h diet recall and also food frequency questionnaire. Each 1gr increase in maternal protein intake is associated with a 31.47gr increase in birth weight (95% CI, 5.36-57.59gr) and 0.158 cm increase in birth length (95% CI, 0.046-0.27 cm). Also there is positive contribution between percent of energy derived from protein and birth weight. In addition birth length predicted positively by % of energy derived from fat. In addition it exist the negative weakly association between energy intake with birth weight and also negative association between birth length and maternal carbohydrate intake. The study support that maternal dietary composition has an effect on fetal growth and pregnancy outcome.

Key words: Pregnant women, birth weight, birth length, dietary composition

INTRODUCTION

Pregnancy is one of the most critical and unique period in a women's life cycle. It is regarded as 'welcome event' for successful womanhood (Vijayalaxmi and Asna, 2009).

Size at birth reflect the product of the fetus trajectory of growth, set at an early stage in development and the materro-placental capacity to supply sufficient nutrients to maintain that trajectory (Kramer, 1993). Birth parameters especially birth weight are considered as one of the important and reliable parameters in the evaluation of pregnancy and neonatal well being. A numbers of factors influence the pregnancy outcomes such as age of mother, educational status, food habits and maternal gravidity etc. hence, the present cross sectional study was undertaken to know the impact of certain factors on birth parameters.

MATERIALS AND METHODS

A cross sectional study was conducted to assess the impact of maternal factors on birth parameters in urban affluent pregnant women. In the present study a total sample of 156 singletons healthy pregnant women were collected. All women provided written informed consent and the study was approved by medical manager of jehangir hospital and Gupte hospital and of the Research Recognize Committees of university of Pune.

Sampling was completed during three months period (June -July- August 2009) and also according to the criteria of sample selection i.e. those pregnant women who fulfill the criteria of inclusion that is healthy singleton pregnant women and exclusion that are; any family history of congenital disease, suffering from chronic disease, any complicated position during pregnancy and also on the basis of their willingness to participate in the study. The respondents were met in last trimester of pregnancy and majority of them were in last month of pregnancy. The area of sampling was in two hospitals, Jehangir hospital and Gupte hospital in Pune city of Maharashtra state of India. The data were collected through personal structured interview schedule by use of a set of predetermined questions. The information includes the demographic background of pregnant mothers; comprising of maternal medical history, educational and social circumstances, religion state and maternal dietary habits etc. Furthermore, the birth measurements were recorded from birth record files in the obstetric department of the hospital were considered infant head circumference, birth height and birth weight. Dietary assessment was accomplished by 24 h diet recall and FFQ (food frequency questionnaire) method was formulated based on the pattern of Indian food stuffs. Data processing and statistical analysis were performed by using SPSS 16.

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RESULTS AND DISCUSSION

The mean age of the respondent is 28 years and SD, 3.77. The maternal age minimum and maximum are 19, 38 years old respectively. Table 1 shows the majority of the respondents are in second group category i.e. (25-30 yrs old). Owing to variability of data and inconsistency, therefore it was planned to classify family member based on their frequency into < 5 member and > 5 member. The result shows that 42.3% are in first group and 57.7% are in second group. Maximum women belonged to Hindu (87.7%) and the rest were Chiristian (6.2%), Muslim (5.2%).

90.6% of the respondents are in the high income category and rest of them is in lower category. Table 2 displays the frequency of women in different education levels. On an average majority of the women were in bachelor level (51.9%) and the rest in master, precollage, 35.9%, 12.2% respectively. More than half of the respondents i.e. 51.3% had normal pre-pregnancy BMI. Also majority of them were Primpara (Table 1). Multiple linear regression models are applied to investigate the relation between maternal macronutrients intake during pregnancy as predictor variables and birth characteristics of the baby included as dependent variables from the regression result Table 2, shows that the protein intake has the highest significant positive contribution towards birth length and birth weight. While there is no significant association with birth head circumference. Each 1gr increase of protein in maternal consumption is associated with a 31.47gr increase in birth weight (95% CI, 5.36-57.59gr), however Godfrey *et al.* (1996) found out that the birth weight fell by 3.1gr for each decrease in meat protein intake in late pregnancy. In our study also there is seen the positive relation between protein intake and birth weight. Cuco *et al.* (2006) concluded a 1 gr increase in maternal protein intake during preconception and during pregnancy leads to a significant increase of 7.8-11.4 gr in birth weight. Our findings show that each 1 gr enhance in protein consumption is related to 0.158 cm rise in birth length (95% CI, 0.046-0.27cm). No association between the percentage of maternal energy derived from carbohydrate during pregnancy and birth size of the baby were evident among all participants. Johnson *et al.* (1994) shows dietary intake is not significantly correlated with pregnancy outcomes. Furthermore the percentage of energy derived from protein is associated positively with birth weight more strongly than the negative association with head circumference. Likewise, head circumference is negatively predicted by the content of energy derived from protein during conception periods. Each 1% increase in energy derived from protein is associated with 261.97 gr increase in birth weight of the offspring (95% CI, 24.93-499.01gr). The result shows a very poor negative significant association between maternal energy intake and birth weight and there is no association with birth length and head circumference.

Table 1: Characteristics of pregnant women

Characteristics	Frequency No.	Valid (%)
Age (Year)		
<25 year	30.00	19.23
25-30 year	82.00	52.56
>30 year	43.00	27.56
Family member		
<5	65.98	42.30
>5	90.01	57.70
Family type		
Nuclear family	73.00	46.80
Extended family	83.00	53.20
Religion		
Hindu	136.81	87.70
Christian	10.30	6.60
Muslim	8.11	5.20
Education		
<Precollege	19.00	12.18
Bachelor	81.00	51.92
Master	56.00	35.89
Family income		
5000-10000 Rs/month	4.00	2.70
10001-2000 Rs/month	10.00	6.70
>2000 Rs/month	135.00	90.60
Pre-pregnancy BMI		
<19.8	42.00	27.30
19.8-26	79.00	51.30
>26-29	24.00	15.60
>29	9.00	5.80
Parity status		
Primpara	90.00	57.70
Multipara	66.00	42.30

Table 2: Maternal dietary composition in pregnancy and birth dimensions of the baby

Dietary component	Birth weight(g)		Birth length(cm)	
	B	P	B	P
Energy (kcal/d)	-1.520	0.530	0.003	0.363
Carbohydrate (g/d)	-4.970	0.250	-0.024	0.038
Protein (g/d)	31.470	0.020	0.158	0.006
Fat (g/d)	9.600	0.630	-0.185	0.069
Energy from carbohydrate (%)	37.377	0.590	0.216	0.137
Energy from protein (%)	261.972	0.036	-0.043	0.247
Energy from fat (%)	164.098	0.207	0.833	0.009

Supporting our result Godfrey *et al.* (1996) reported that birth weight is increasingly related to energy intake in early pregnancy. Moreover, Anahita Houshiar-Rad *et al.* (1998) found out no significant correlation between the food energy and nutrient intake of the Iranian pregnant women and infant birth weight. Rao *et al.* (2001) also found energy and protein intakes were not associated with birth size, but higher fat intakes at 18th week is associated with birth length and weight. Some studies suggest that the nutritive status of women during gestation and ever prior to pregnancy has a great impact on the health of both mother and newborn and pregnancy outcome (Panwar and Punia, 1998; Dava *et al.*, 1980; Antal *et al.*, 1997). It is remarkable to note that, a perspective cohort study set in England conducted that maternal nutrition in well- nourished population does not exert a strong influence upon fetal growth and also they reported that birth weight and infant head circumference at birth were unrelated to nutrient intake in the first or third trimester of pregnancy (Langley-Evans, 2003).

Conclusion: From this study it is concluded that maternal macronutrient intake and the percentage of energy derived from macronutrients has potential role as predictor variable on birth measurements of the newborn.

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