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A Study on Health Status of Urban Pregnant Women of Bangladesh with Respect to Body Mass Index and Weight Gain

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Standard weight gained during pregnant period is an important indication of good health of pregnant women. This study tries to point out health status of urban pregnant women of Bangladesh with respect to weight gained during pregnant period and Body Mass Index (BMI) of pregnant women. The analysis shows that health status of study population is satisfactory in context of Bangladesh though lag behind compared to neighbour country like India and other developed countries. This study also shows that the overall relative change of BMI with respect to gestational age is significant though it is insignificant in first trimester and significant in both second and third trimester.

Key words: Pregnant women, Body Mass Index (BMI), weight gained, trimester, simple linear regression

INTRODUCTION

Maternal weight gain during pregnancy is an essential component of the normal growth and development of the mother and her fetus. Over the past 100 years, the medical profession has adopted acceptable or optimal weight gain guidelines (Shils *et al.*, 1994). Studies conducted in USA and UK among well nourished women who did not have any economic constraints coming in the way of dietary intake and who were eating to appetite have shown that there was no increase in dietary intake during pregnancy in high socio-economic group. The habitual dietary intake of this group varied from 1500-2000 kcal day⁻¹ and these women gained on an average about 10-12 kg during pregnancy and delivered infants whose mean birth weight was about 3.3 kg (Prema, 1989). Among well nourished women, moreover, excessive weight gain during pregnancy, followed by only a brief period of lactation, will be associated with postpartum overweight, increasing the risk of chronic disease later life (Merchant and Martorell, 1988).

Studies from India have shown that women from high-income group consume 2000-2500 kcal day⁻¹ during pregnancy. In this group women do not perform hard physical labor during pregnancy and work activity shows a reduction during pregnancy. The pre-pregnancy weight in this population group ranges from 45-55 kg and mean pregnancy weight gain is about 11 kg. The mean birth weight of infant is 3.1 kg. Their findings are similar to those reported from women in developed countries. Studies from India have shown that women from the weight gained about 11 kg during pregnancy (Prema, 1978).

In India, dietary intakes of urban women from low socio-economic group ranges from 1200-1600 kcal day⁻¹. These women weight on an average 43 kg prior to pregnancy and gain 6 kg during pre-pregnancy and the mean birth weight of their infants is 2.7 kg (Khanum and Umapathy, 1976).

This weight gain represents two major components: (I) the products of conception: fetus, amniotic and the placenta and (ii) maternal accession of tissues; expansion of blood and extra cellular fluid, enlargement of uterus and mammary glands and maternal stores (adipose tissue). This gain in weight takes place almost entirely in the last 6 months. The rate of weight gain is not uniform through out pregnancy. Approximately 5% of the total weight is usually gained in the first quarter and the remainder is gained fairly evenly throughout the rest of pregnancy. Weight gain in pregnancy has three phases; first trimester very slight gain, second trimester-considerable linear

increase due to growth of the fetus, placenta amniotic fluid together with the continuing lying down of maternal tissue and stores. Of the total weight increase about 10% and extra cellular fluid for 13%, fat contributes 30% and protein 8% (Hyttten and Chamberlain, 1980). Gains in maternal body fat are not constant during pregnancy, nor are such gains distributed uniformly. The fetus accounts for about 25% of the total weight gained (Taggart *et al.*, 1967).

The amount and composition of the weight during pregnancy are major determinants of the extra energy and nutrient needs and the amount of weight gain significantly influences pregnancy outcome. A greater gain is needed in women with a low pre-pregnancy Body Mass Index (BMI) to achieve a desirable birth weight. There are also various socio-demographic characteristics (maternal age, diet, physical activity, genetic differences etc.) that are significantly affects gestational weight related factors: (I) how much weight did she put on during her pregnancy and (ii) what was the initial height-weight relationship (BMI) when she began her pregnancy. In its pre-natal care, if a woman has a BMI of less than 20 her weight gain target should be 1.1 lb of weight gain per week during the second and third trimester, in comparison to the women whose BMI is greater than 26, with a weight gain target of only 0.7 lb week⁻¹ (Khanum and Umapathy, 1976).

Low weight gain is associated with increased risk of intrauterine growth retardation and prenatal mortality. On the other hand high weight gain is associated with high birth weight and secondarily with increased risk of complications related to fetopelvic disproportion. The target range for desirable weight gain in each pregnancy weight for height category is that associated with delivery of a full term infant weighting between 3 and 4 kg (Brown, 1990).

The anthropometrical measurements can be made which are both dependent on and independent of these changes. In this case these anthropometrics measurements are discussed together with their public health relevance in predicting risk of fetal growth retardation maternal nutritional status during pregnancy is most frequently evaluated by weight gain and dietary intake. Weight gain during pregnancy is strongly correlated with birth weight in both industrialized and developing societies (Hasan, 1971).

MATERIALS AND METHODS

The present study is based on data collected from Dhaka metropolitan area of Bangladesh. Study area has been divided into three categories i.e., posh area, medium standard area and low medium standard area. From each

area two maternity hospitals or clinics (one from government and other from non government) have been selected on personal judgement. A sample of 350 pregnant women has been interviewed from these six maternity hospitals or clinics purposively during the period of two weeks.

Body Mass Index (BMI): In recent years, the BMI has become the medical standard used to measure overweight and obesity. It is a height-weight system of measurement that applies to both sexes. It's not a perfect system, because for example, very muscular people may fall into the overweight category when they are actually healthy and fit. But it's a useful pointer for most of the people.

BMI is found by the following mathematical formula:

$$\text{BMI} = \frac{\{\text{Person's weight (in kg)}\}}{\{\text{Person's height (in meter)}\}^2}$$

Regression analysis: This analysis try to investigate the influence on BMI in the pregnant period. For this we run the four simple linear regression models and in all cases dependent variable is BMI and independent variables are first trimester, second trimester, third trimester and entire duration of pregnancy, respectively.

RESULTS AND DISCUSSION

The mean height 160.83 cm of the participants was higher (8.6%) than the average height (148.0 cm) of the adult women of Bangladesh (Anonumous, 1975-76). The average height of the study population was 2.8% lower than the average height (1.55 m) of the adult Indian women belonging to high socio-economic group (Srikantia, 1971).

In this study it was unable to estimate the pre-pregnancy weight of Bangladeshi women. The pre-pregnancy weight of mothers studies conducted in Bangladesh indicates that it is 4 8.5 kg for high socio-economic population group (Kawsar, 1998).

In this study the mean weight in third trimester was 56.46 kg. Thus the weight gain during pregnancy was about 7.96 kg and the mean weight of the entire duration of pregnancy was 54.51 kg thus the weight gain during pregnancy was about 6.01 kg (Table 1). This weight gain is not similar to the weight gain of the women of the other developed countries. Where women weight gain on average about 10-12 kg and deliver infants whose mean birth weight is about 3.3 kg (Malony *et al.*, 1981). The BMI (kg m⁻²) is also a useful index for assessing health

Table 1: Descriptive statistics of the participants

Variable	Mean	SD	Minimum	Maximum
First trimester				
Height (m)	1.51	0.07	1.35	1.60
Weight (kg)	53.90	10.96	42.00	89.00
BMI (kg m ⁻²)	23.76	4.67	16.94	38.32
Second trimester				
Height (m)	1.75	0.006	1.22	1.75
Weight (kg)	52.66	7.360	39.00	86.00
BMI (kg m ⁻²)	23.44	0.058	1.35	34.68
Third trimester				
Height (m)	1.50	0.06	1.21	1.62
Weight (kg)	56.46	9.16	40.00	85.00
BMI (kg m ⁻²)	24.97	3.71	18.15	40.03
Entire duration of pregnancy				
Height (cm)	1.61	0.06	1.21	1.66
Weight (kg)	54.51	8.64	39.00	89.00
BMI (kg m ⁻²)	24.71	3.56	13.35	40.03

Table 2: Simple linear regression of BMI on first trimester

Variable	Coefficient	SE	t	Sig.
First trimester				
(in month)	-1.551	1.175	-1.321	0.202
Constant	26.577	2.349	11.313	0.000
F-statistics	1.744			0.202

Table 3: Simple linear regression of BMI on second trimester

Variable	Coefficient	SE	t	Sig.
Second trimester				
(in month)	0.575	0.353	1.629	0.105
Constant	20.418	1.865	10.948	0.000
F-statistic	2.654			0.105

Table 4: Simple linear regression of BMI on third trimester

Variable	Coefficient	SE	t	Sig.
Third trimester				
(in month)	1.260	0.331	3.805	0.000
Constant	15.067	2.617	5.757	0.000
F-Statistic	14.480			0.000

Table 5: Simple linear regression of BMI on entire duration of pregnancy

Variable	Coefficient	SE	t	Sig.
Entire duration of pregnancy				
(in month)	0.442	0.100	4.442	0.000
Constant	21.405	0.653	32.803	0.000
F-statistic	19.556			0.000

status of adult population. Naido and Rao (1994) reported that women having BMI between the range 18.5 to 40.0 during at third trimester of pregnancy, delivered infant whose mean birth weight was above 2800 g.

BMI of the participants (who were in the third trimester) was found 18.15 to 40.03 kg m⁻², but in the entire duration of pregnancy the range of BMI of all the participants was found 13.35 to 40.03 kg m⁻² (Table 1).

The effect of the first trimester is insignificant on BMI (Table 2). BMI is significantly dependent on second trimester, although the significant level is relatively high (11%). The duration of pregnancy at the second trimester is the most influencing factor of BMI in the pregnant period and in this case BMI increases 0.575 kg m⁻² when

the duration of pregnancy increases one month at the second trimester (Table 3).

It was found that the Third trimester and the Entire duration of pregnancy is highly significant on BMI and in both cases the regression coefficients have positive sign. This means that the BMI is influenced by not only the duration of pregnancy at the third trimester but also the entire duration of pregnancy. The regression coefficient indicates that the estimated BMI increases 1.26 kg m^{-2} when duration of pregnancy increases one month at the third trimester (Table 4). In this case third trimester is highly significant on BMI. Finally, it was found that the entire duration of pregnancy is also highly significant on BMI (Table 5).

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