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ASSOCIATION BETWEEN MATERNAL NUTRITIONAL STATUS AND NEONATAL BIRTH WEIGHT

Community Medicine

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ABSTRACT

Background: Globally more than 15.5% of all births are low birth weight and 95.6% them being in developing countries

Aim and objectives: To assess the maternal nutritional status in terms of pregnancy body mass index. To assess neonatal birth weight after delivery and to find association between maternal pregnancy body mass index and neonatal birth weight.

Methodology: observational study conducted among 97 pregnant women in urban area.

Result: study findings indicates that 49.48% were in less than 18.5 early pregnancy body mass index and 50.52% were having early pregnancy body mass index more than or equal to18.5. 41.24% pregnant women gave birth to less than 2.5 kg babies while 58.76% pregnant women gave birth to above 2.5 kg babies. Significant association was found between the early pregnancy body mass index and birth weight of their babies.

KEYWORDS

neonate, birth weight, body mass index, nutrition

BACKGROUND:

Globally more than 20 million infants representing 15.5% of all births, are born with low birth weight and 95.6% them being in developing countries. The percentage of low birth weight in developing countries is more than double the percentage of low birth weight in developed countries.[1] Low birth weight, birth weight less than 2500gm(WHO, 1992)[2] and peri-natal mortality are important public health problems in developing countries particularly in Indian subcontinent, where low birth rate is 30%[3]. Of all neonatal deaths nearly 82% occur in low birth weight babies[4]. The biological support that the mother gives to the child during its growth and development through pregnancy and lactation, in turn, depends on her own nutritional status. Birth weight is an important determinant of infant's well being.

Maternal BMI is one of predictor of nutritional status of mother. Low maternal BMI ($<18.5kg/m^2$) shows imbalance between energy intake and energy expenditure, might be a general marker of minimal tissue reserve. A malnourished mother gives birth to undernourished infant who struggle to thrive.

A low BMI status, indicative of Chronic Energy Deficiency [CED], is a particularly important aspect of the nutritional risk of women in a community during the reproductive years. This risk can be exacerbated by early marriage.

Nutrient intake and weight gain during pregnancy are the two main modifiable factors influencing maternal and foetal outcomes.[5]

Several factors such as mother's genetic characteristics, socio cultural, demographic, behavioural factors, pre pregnancy body mass index, gestational weight gain etc contribute to foetal wellbeing.[6]

AIM:

To find the association of early pregnancy body mass index with neonatal birth weight.

OBJECTIVES:

1. To study the socioeconomic and demographic profile of the pregnant women.
2. To assess the maternal nutritional status in terms of early pregnancy body mass index.
3. To assess neonatal birth weight after delivery and to find association between maternal early pregnancy body mass index and neonatal birth weight.
4. To evolve recommendations to improve maternal nutritional status during pregnancy

METHODOLOGY:

Community based Observational prospective study was performed among 97 pregnant women registered in first trimester in antenatal clinic of Naigaon maternity hospital, Mumbai for the period of 10 months, April 2016 to January 2017. The sample size was calculated by using the formula as follows:

Prevalence of pregnant women registering in this antenatal clinic is 10 %. Data collection period will be 2 months so total population will be 100. Therefore by using formulae, sample size estimated to be –

$n = 4pqN / (N-1) e^2 + 4pq$

$n = 97$

Where e = error = 10% of p, p – prevanlence of disease = 10%, q – hypothetical prevalence = 100 – p =90, N – total population Pregnant women registered within 12 weeks of pregnancy in antenatal clinic of Naigaon maternity hospital were included in the study.

A pre-validated semi-structure questionnaire was prepared in accordance with the study objectives. Total 97 pregnant women registered during first trimester in ANC clinic were interviewed by convenient sampling method. After establishing rapport the interviews were conducted in the commonest spoken local language in that area. Information regarding socio-demographic characteristics, Nutrition, weight and height was obtained from participants on a predesigned questionnaire. Body mass index was calculated by using the formula weight/height in metres[2] during 1st trimester visit. Then after delivery birth weight of the neonate was recorded. Maternal Body mass index was correlated with the neonatal birth weight at the end of study.

RESULTS:

Among 97 pregnant women 21(21.6%) were below 21 years, 63(64.9%) were between 21 to 25years and 13(13.4%) were above 25 years.

Table 1: Age wise distribution of study subjects

Age of the pregnant women	No. of pregnant women
<21	21
21-25	63
>25	13

Table 2: Distribution of study subjects according to the education

Education	No of Subjects
Illiterate	7
1-10th std	41
7-10th std	35
>10th	14

Table 3: Occupation wise distribution of study subjects

Occupation of pregnant women	No. of pregnant women
Housewife	81
Working	16

Table 4: Per capita income of study subjects

Per capita income	No of subjects	Percentage
<=3000	41	42.3%
3001-6000	53	54.6%
6001-9000	3	3.1%

Table 5: Dietary intake of study subjects

| Dietary intake	Calorie intake	Protein intake
Average	1867.78 Kcal	68.09 gram
Average deficit (86)	489.94 Kcal	11.69 gram
Average excess (11)	283.64 Kcal	4 gram

Average protein intake was 68.09 gram with average deficit of 11.69 gram and average calorie intake was 1867.78 kcal with average deficit of 489.94 calories.

Figure 1: Early pregnancy body mass index of the pregnant women:
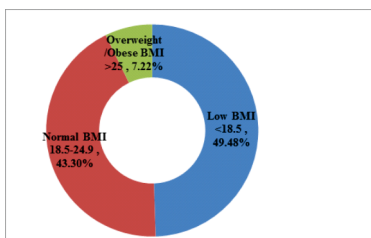
48(49.48) pregnant women were in less than 18.5 early pregnancy body mass index,42(43.3%) were having early pregnancy body mass index between 18.5 to 24.9 while 7(7.22%) were having more than 25 body mass index.

**Figure 2: Birth weight of the neonates:**
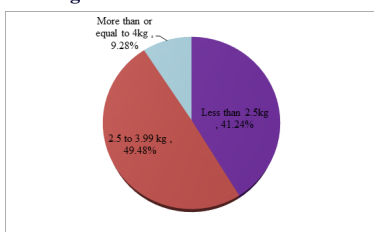
40(41.24%) pregnant women gave birth to less than 2.5 kg babies while 57(58.76%) pregnant women gave birth to above 2.5 kg babies.

Table 6: Early pregnancy body mass index of the pregnant women and neonatal birth weight:

	Early pregnancy body mass index	
Birth weight of baby	Less than or equal to 18.5	More than 18.5
Less than 2.5kg	26(54.2%)	14(28.6%)
More than or equal to 2.5kg	22(45.8%)	35(71.4%)

Significant association was found between the early pregnancy body mass index of pregnant women and birth weight of their babies with Chi square value – 6.556, Degree of Freedom 1, P value = 0.01

Figure 3: Correlation between early pregnancy body mass index of the pregnant women and neonatal birth weight
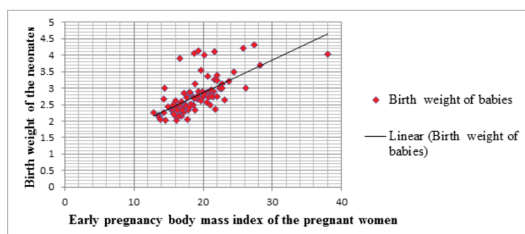
Pearsons correlation coefficient=0.676

DISCUSSION:
A community based observational study was conducted among 97 pregnant women registered in antenatal clinic of Naigaon maternity hospital. In our study we found that majority pregnant women belong to age group 21-25, educated up to 10th std. we found majority pregnant women with low first trimester body mass index. Out of 97 pregnant women 48 were having low early pregnancy body mass index. In study by **Rengaraj Varsha et al** they found 29.62% Low early pregnancy BMI[7]

In our study 41.24% neonates were low birth weight(less than 2.5kg), in studies by Agrawal Rashmi and Singh Anita- 26% neonates were low birth weight[8] while in study by Joshi Sumedha M and Pai N P incidence of low birth weight was 32.5%[9]

In our study strong association was found between maternal early pregnancy body mass index and neonatal birth weight. Similar results found by Agrawal Rashmi and Singh Anita- 69%low birth weight in low pre-pregnancy body mass index group with strong positive correlation between pre pregnancy body mass index and neonatal birth weight. In Rengaraj Varsha et al study also early pregnancy body mass index was positively associated with neonatal birth weight.

CONCLUSION:
In conclusion we say that majority pregnant women were in low early pregnancy body mass index. Majority pregnant women with low early pregnancy body mass index were having Calorie and protein deficit. Significant positive correlation was observed between maternal dietary deficit and early pregnancy body mass index. Incidence of low birth weight was high. There was strong positive association of early pregnancy body mass index and neonatal birth weight. Mother's with low early pregnancy body mass index is an add on social risk factor adversely impacting the neonatal birth weight

Recommendation:
As there was strong association between maternal nutritional status and neonatal birth weight we need to improve the nutritional health of the woman with low pre pregnancy body mass index in order to confirm that they do not enter pregnancy in a nutritionally disadvantaged state.

Health education and counselling about importance of proper diet and BMI before entering pregnancy should be provided to not only adolescent and newly married women but also to the family members including husbands, mother in law.

Dietary interventions should be provided at national and regional levels for pregnant women to bridge the food gap.

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