SOCIO-DEMOGRAPHIC CORRELATES OF MOTHERS GIVEN BIRTH TO NORMAL AND LOW BIRTH WEIGHT BABIES

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ABSTRACT

Objectives: *To observe the pattern of morbidity affecting fetal growth among the low socio economic group women.*

Methodology: *One hundred and fifty pregnant women who were in 2nd and 3rd trimester were selected from government maternity hospital which catered to the low socio economic group. The selected subjects were followed up till delivery. Morbidity profile was monitored every fortnightly throughout pregnancy. The women were grouped into two, based on birth weight of neonates. Those women who had babies with normal birth weight were referred as normal birth weight group (NBW) and those with low birth weight infants were referred as low birth weight group (LBW).*

Results: *Significant differences in the morbidity pattern in the two groups were seen. The major sicknesses among normal birth weight (NBW) group were low back pain, Urinary tract infection, and allergy, while the low birth weight (LBW) groups were found to suffer from urinary tract infection, constipation, allergy, low back pain, diarrhea, and stomach ache.*

Conclusion: *Incidence rate of the common sickness were significantly lower in NBW women as compared to the LBW group.*

Key Words: *Morbidity, Low birth weight, Urinary tract infection.*

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INTRODUCTION

Pregnancy is one of the important events in a women's life. It involves emotional, social, and nutritional factors affecting the health and well being of both the mother and new born. Nutritional status of the mother affects the course of pregnancy and birth weight, this has been documented enormously. Pre-pregnancy body weight and nutrient intake during pregnancy together modulate the course of pregnancy and pregnancy outcome[1]. Nevertheless, family characteristics such as family type, education and occupation also are reported to influence the course of pregnancy. Maternal morbidity is usually considered to encompass any pregnancy related problem during ante partum, intra-partum and post-partum[2]. The frequency of infectious diseases leads to deterioration of nutritional status of pregnant women.

Pregnancy per se is known to reduce immunity which is aggravated by nutritional deficiencies. Common infections and endemic diseases affect pregnant women, this together with pregnancy related discomforts like headache, heartburn, constipation, urinary tract infection etc make pregnant women frequently ill. Urinary tract infection during pregnancy is considered serious in primary care practice, since it increases the risk for fetal and maternal complications like acute pyelonephritis, hypertension, anemia, preterm labor, low birth weight infants and intrauterine growth retardation[3].

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Maternal morbidity is an important public health concern especially in malnourished populations. Other social causes such as gender inequality, improper nutrition, education and medical treatment may affect women's health. Malnutrition, infection, early and repeated child bearing and high fertility have an adverse impact on the maternal health condition. A study from India has reported that for every maternal death, there are 478 morbidities, out of which 328 are serious or life-threatening[4]. Information on maternal morbidity at the community level is scarce in developing countries, most studies on the subject are either hospital or clinic-based.

Therefore knowledge about pattern and frequency of morbidities is useful in developing intervention programs. It was proposed to investigate the factors influencing morbidity among pregnant women and compare incidences in women who had normal and low birth weight babies. Considering the high incidences of low birth weight among low socio economic strata of population, women were selected from government hospitals that catered for low income families. The purpose of this study was to determine morbidity profile among Indian women belonging to low socio economic group during course of pregnancy.

METHODOLOGY

One hundred and fifty healthy women who were in 2nd and 3rd trimester with uncomplicated pregnancies formed subjects for the study. Purposive sampling method was adopted. They were selected from the outpatient clinics of government maternity hospitals in semi-urban areas of Mysore city. The inclusion criteria: family income less than Rs. 10,000/ month, age group between 18-36years, women in 2nd and 3rd trimester those who promptly visited hospital for health care and those intend to attend the same hospital for delivery. Exclusion criteria: Women above 36 years of age and who planned to shift to other places for delivery were excluded from the study. An oral consent to participate in the study was obtained from each subject. The study was approved by the Human Ethical committee of the University of Mysore.

This was a prospective study. One hundred and fifty women were selected during the month of September to December 2010 and followed till delivery. Selection of the subjects was done with the help of the gynecologist. Pretested interview schedules were used to collect information. The information elicited include general information related to age, religion, type and size of the family, family structure, education of the subjects, and their spouse, occupation level and total income of the family. Maternal history schedule included questions about age at marriage, years of married life, number of abortions, and number of children born alive, gestational age, type and place of delivery during previous pregnancies.

Hemoglobin in 24-25th week of gestation was analyzed by cyanmethemoglobin method. Height was measured in cm using a local height scale. Body weights (at 35-36th week) of the subjects were recorded in a glass electronic scale (Essae PS-250). During the follow-up each participant was contacted every fortnightly till the delivery time and morbidity details were recorded.

Morbidity profile schedule had queries for incidences of commonly occurring sickness such as fever, cough, headache, constipation, diarrhea, stomachache, body pain, varicose, and low back pain which occur during pregnancy. The weight of the neonates was recorded within 24 hours after birth, the technique for anthropometric assessment were standard procedure as described by Jelliffee[5]. The women were grouped into two, based on birth weight of neonates, since one of the objective of the investigation was to compare clinical manifestations of nutrient deficiencies and morbidity pattern among women who delivered babies with normal birth weight and low birth weight. Those women who had babied with normal birth weight were referred as normal birth weight group (NBW) and those with low birth weight infants were referred as low birth weight group (LBW)

Descriptive analysis was employed to present the data. 't' test was used where ever means were compared. To elucidate the, association between morbidity with maternal body weight, hemoglobin and birth weight of neonates, Pearson's correlation coefficient was employed. The association between maternal body weight and the presence of nutrient related clinical manifestations were analyzed by Chi square test. The body weights of the pregnant women were neutralized for trimesters. Multivariate analysis was done to examine the association of maternal factors with anthropometric variables and frequency of morbidity. For comparison between normal birth weight and low birth weight groups XL stat version 10.0 was used for all the analysis.

RESULTS

Information about age and other subjective details are presented in table 1. The mean age of women in the two groups was 22.5±3.25 and 21.5±1.98 years. Majority of pregnant women were in 20-29 years of age (76% and 67%) in both the groups. A higher percentage of women in the two groups were Hindus (54 and 62%), followed by Muslims (44 and 36%).

Nuclear family system predominated (28%) and 21% of women were from extended families. A considerably higher percentage [43 and 26%] of women from LBW group had education less than SSLC as compared to NBW group. On the other hand a higher percentage of women from NBW group (54 and 34%) had completed SSLC and PUC as compared to LBW group. An essentially similar percentage of women from the two groups were graduates. All the selected women from the two groups were house wives and did not actively contributed to family income.

Mean age at marriage was found to be 19.2±2.6 years and 19.4±1.7 years in the two groups it can be noted that 56 and 40% respectively from LBW and NBW group were primiparous. Pregnancy losses occurred only among multiparous in LBW (12%).

Table 3 provides information about anthropometric parameters. All the parameters used were significantly different in the two groups. The mean body weight of LBW group was 44.4±3.34 kg, which was significantly lower to 53.2±3.66 kg seen among NBW group. The mean height of LBW group was 160.4±5.22 cms while NBW group were 158.4±3.07 cms tall. The profile for MUAC also showed significant differences between the two groups. (21.36±1.93 and 25.42±4.28).

Women from NBW group exhibited considerably higher measurements for anthropometric parameters than those seen among the LBW group. The abdominal circumference of LBW group was 80.7±7.79, while that in NBW group was 89.5±16.3. Fundal height in two groups ranged between 21.9±4.19 and 25.3±3.33 cms respectively which was nearing acceptable range according to literature.

Mean BMI of women in the two groups differed markedly, in LBW group women had a mean BMI of 17.1±0.70 kg/m^2 indicating chronic energy deficiency. Whereas subjects from NBW group were found to have normal BMI of 21.2 ± 1.63 kg/m^2.

Table 3 presents percentage of occurrence of nutrient deficiency symptoms, in general a higher frequency of deficiency symptoms was seen among LBW group as compared to NBW. Certain manifestations like Pale and dull conjunctivae (31%), (chi square value =9.659) Oral ulcers (19%), (chi square value =35.231) night blindness (16%) and pale tongue (12%) were highly prevalent in LBW group. Chi square test exhibited significant association. Presence of decayed tooth, browning or mottling of teeth occurred to a similar extent in the two groups.

Pearson correlation was performed using maternal factors that are known cause for obstetric problems, they are, hemoglobin, body weight, and morbidity. The results are presented in table 4. A positive association was noted between factors notably fundal height, abdominal circumference, and birth weight. However, morbidity exhibited a significant negative association with BMI and hemoglobin status. It clearly explains the multi array influence of morbidity on course of pregnancy and birth weight of newborn.

Figure 1 reveals the differences in the morbidity pattern among the two groups. The major sicknesses reported by NBW group were low back pain, urinary tract infection, and allergy. While the LBW groups were found to suffer from urinary tract infection (27.07%), constipation (23%), allergy (17%), low back pain (16%), diarrhea (12%) and stomach ache (10%). Occurrence of fever and cough was also noted in a considerable percentage of women in both the groups.

The multivariate analyses of maternal factors are shown in fig 2. The total of Factor loading (F1 and F2) is 65.3% indicating that the factors have significant association. As evident from figure the birth weight BMI and MUAC occupied the right quadrant indicating significant positive association. Birth weight being a dependent variable appears to be highly associated to BMI and MUAC. Fundal height and abdominal circumference are also known to associate with birth weight, the figure also suggests this effect, however, these variable occupied the right lower quadrant suggests it have be less influencing as compared to BMI and MUAC. Morbidity has occupied the left quadrant indicating negative association, hence it is obvious that morbidity negatively influences all the variables compared. Table 5 presents the factor loading; it is clear from this that all the factors included had significant association with each other.

DISCUSSION

There has been a continued effort to improve the health status of pregnant women so as to reduce the incidences of LBW in populations. Our investigations revealed that the body weight of women in LBW group was considerably low indicating the prevalence of chronic energy deficiency. A great proportion of Indian women belonging to low socio economic status are under nourished and continue to be in the state of malnutrition throughout pregnancy. These women start their pregnancy with low pre pregnancy body weight and during pregnancy gain less weight and give birth to babies with mean birth weight ranging from 2.5-3.0kg. The major reason for intra uterine growth retardation is indicat-

Table 1: General profile of selected pregnant women

Characteristics	Normal birth weight (%)	Below normal birth weight (%)	p value
Age (in years)			
<19	22.0	18.0	
20-24	44.0	54.0	0.017
25-29	32.0	13.0	
30-34	2.0	5.0	
Religion			
Hindu	54.0	62.0	0.509
Muslim	44.0	36.0	
Christian	2.0	2.0	
Type of Family			
Nuclear	64.0	40.0	0.0001
Extended	28.0	21.0	
Joint	8.0	39.0	
Education			
<SSLC	26.0	43.0	0.011
SSLC/PUC	54.0	34.0	
Graduates	20.0	23.0	
Parity			
Primi para	40.0	56.0	0.024
Multi para	60.0	44.0	

Table 2: Nutritional profile of the selected women

Measurements	Low birth weight	Normal birth weight	p value
Height (cm)	160.3±5.2	158.4±3.0	0.040
Weight (kg)	44.3±3.3	53.1±3.6	0.0001
BMI (kg/m2	17.1±0.7	21.2±1.6	0.0001
MUAC (cms)	21.3±1.9	25.4±4.2	0.0001
Fundal height (cm)	21.9±4.1	25.3±3.3	0.0001
Abdominal circumference (cm)	80.7±7.7	89.5±16.3	0.0001
Mean birth weight of babies (kg)	2.6±0.13	3.1±0.14	0.0001

Table 3: Nutrient related clinical manifestations

Clinical symptoms	Low Birth Weight (n=100)	Normal birth weight (n=50)	p value
Eyes			
Pale and dull conjunctiva	31.0	24.0	0.001
Night blindness	16.0	--	
Teeth			
Decayed	17.0	12.0	0.865
Brown pigments	20.0	18.0	
Mottled	11.0	10.0	
Tongue			
Pale tongue	12.0	8.0	0.862
Oral ulcers	19.0	14.0	
Nails			
Pale	33.0	36.0	0.470
Flat	13.0	10.0	

Figure 1: Morbidity profile of pregnant women

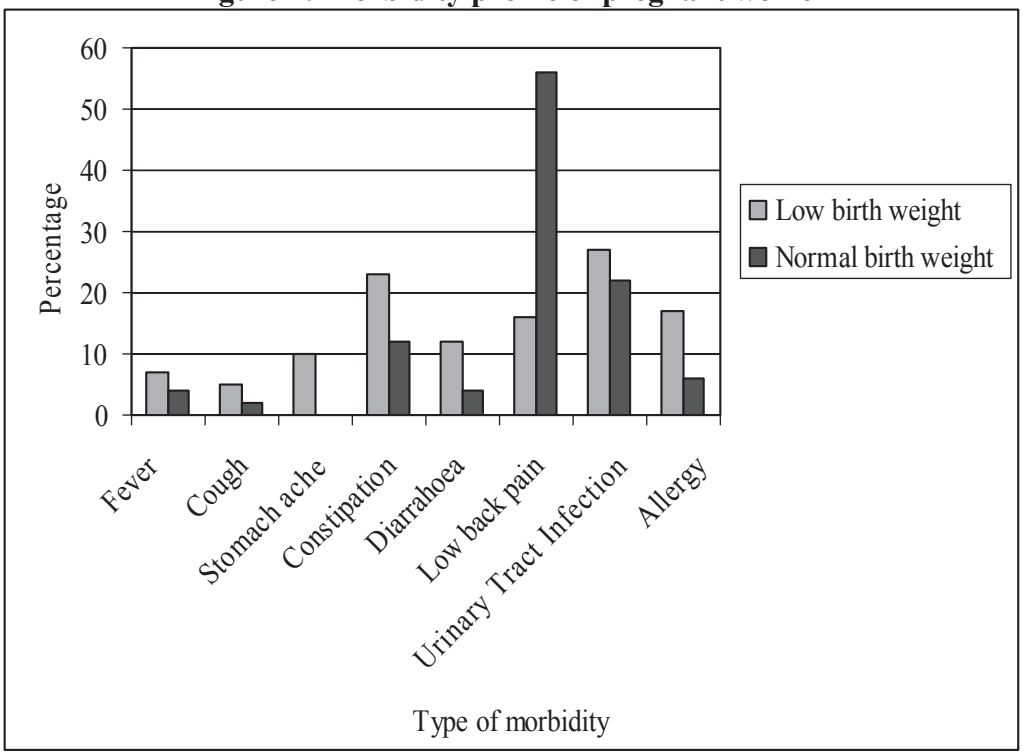

Figure 2: Multivariate analyses of maternal factors

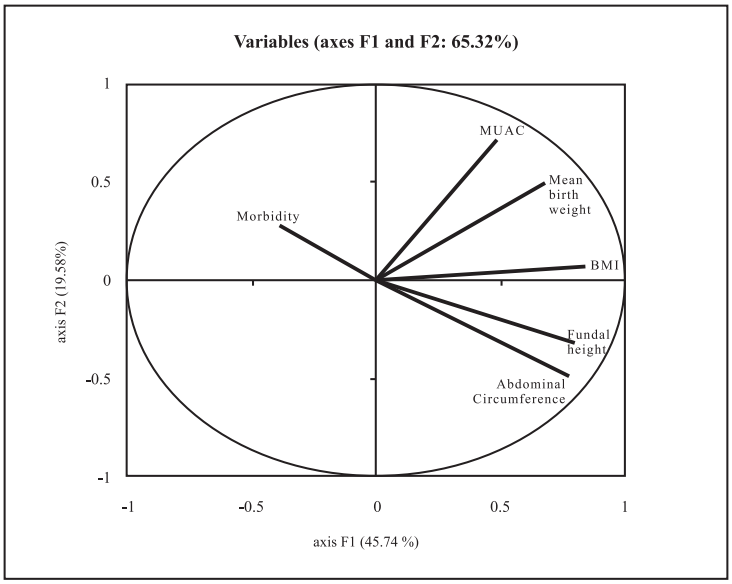

Table 4: Correlation between variables and factors

Variables	Factors	r - value
BMI	Fundal height	0.464
	Abdominal circumference	0.573
	Birth weight	0.560
Morbidity	BMI	-0.282
	Haemoglobin	-0.070

Table 5: Factor loadings- maternal factors and birth weight

Variables	F1	F2
BMI	0.834	0.069
MUAC	0.481	0.714
Fundal height	0.789	-0.318
Abdominal circumference	0.772	-0.482
Mean birth weight	0.672	0.495
Morbidity	-0.387	0.284

ed to be low BMI[6-9]. It is documented in literature that fundal height less than 30cm and abdominal circumference less than 100cm to be associated to low birth weight babies[10 -11]. It is evident from the present findings that women from LBW group had small fundus height and abdominal circumference. Studies conducted by Shobeiri et al[12] have indicated that a maximum increase in fundal height and abdominal circumference takes place at 20th and 32nd week of pregnancy. Hence it is clear that the end of 2nd trimester is an important land mark for completion of maximum changes in fetal development.

Literature has demonstrated adaptive efficiency among pregnant women belonging to low socio economic status since with limited resources the course of pregnancy continue normally with relatively small differences occurring in pregnancy out come. However, differences in maternal anthropometric measurements exhibit large differences. Fundal height and abdominal circumference are considered as crucial indicators of birth weight, their measurements in malnourished women's are reported to be significantly less compared to healthy pregnant women; it is considered as one of the factor affecting low birth weight. Our results also coincide with other reports. Our objective was to identify the most potent influencing factors among the known variables. A mean difference of 4cm in fundal height and 9cm in abdominal circumference was noted among women from LBW group, therefore it is obvious that uterine size exert marked influence regardless of economic condition.

It is worthwhile to mention here that mean body weights of women in LBW and NBW were markedly different. Also a considerably higher MUAC measurement in group with NBW suggests that body weight and energy stores to be most essential maternal components influencing birth weight.

Low immunity during pregnancy is a natural phenomenon for better fetal adaptation; however this makes pregnant women more susceptible to diseases. The morbidity profile among the two groups studied was found to vary enormously. Incidence of infective morbidities like fever, cough, diarrhea, UTI was higher among LBW group women. Stomach ache was seen only in LBW group, the reason is not known. Other morbidities include constipation, allergy and low back pain. Constipation in pregnancy is reported to be due to increased circulating progesterone levels, it could also be due to low fluid and fiber intake[13]. Low fluid intake has been linked to constipation in pregnancy particularly in 3rd trimester. Some medications taken during pregnancy such as iron supplement has also been linked to constipation[13]. Except for low back pain, incidence of diarrhea and allergy was high among LBW women. It could be that low body weights and CED increased the risk of morbidities in LBW group women and morbidities. The multivariate analysis brought about important associations among maternal factors leading to low birth weight. Our results clearly exhibits the association of birth weight to BMI and MUAC indicating maternal energy and protein stores to be crucial for fetal development. Although abdominal circumference and fundal height are important indicators of birth weight, are also under the influence of maternal stores. Our study also demonstrated that, regardless of socio economic limitation, maternal stores are the crucial factor influencing birth weight. However, it is clear from the study that morbidity has a counter effect on BMI & MUAC and thereby influence birth weight. The low infection rate among NBW could be one of the positive effects for better fetal development. A small difference in nutrient reserve especially energy during pregnancy appeared to offer a greater margin of safety for mothers to give birth to normal weight babies

Among the demographic variables included type of family exerts extremely significant effect on birth weight followed by education. It is noteworthy that large families tend to decrease per capita availability of resources making women vulnerable. It is also obvious that education is an important influencing variable.

Micronutrient deficiency in women of reproductive age is recognized as a major public health problem in many developing countries[14-16]. Pregnant

women are particularly vulnerable to nutrient deficiencies because of the increased metabolic demands imposed by pregnancy due to growing placenta, fetus and maternal tissues coupled with dietary deficiencies[15-17]. Chi square test showed a significant association between the maternal body weight and the presence of nutrient related clinical manifestations. Micronutrient deficiencies are therefore likely to be widely prevalent especially those of iodine, zinc, vitamin A, and vitamin B-complex[18]. Maternal micronutrient deficiency in the first trimester could lead to more severe deficiency during postnatal period[19-22]. Hence women with LBW babies had higher incidence of clinical manifestations of nutrient deficiency. More pronounced manifestations were the night blindness, bleeding and spongy gums. Also the relative incidence of pale conjunctiva, tongue, oral ulcers and flat nails were high indicating wide range of nutrient deficiencies.

CONCLUSION

The present investigation brought to light important inferences regarding the focal variables that exert influence on birth weight of babies belonging to low income families. Significant differences were observed in maternal anthropometric parameters, prevalence of nutrient deficiency symptoms and morbidity pattern. Maternal nutrient stores as indicated by BMI and MUAC are crucial influencing factors. Morbidities negatively influence maternal stores leading to higher influence of LBW babies.

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CONTRIBUTORS

KB conceived the idea, planned, supervised and interpreted the data. Both KB and PSN were involved in the write-up of the manuscript of the study. Both the authors contributed significantly to the research that resulted in the submitted manuscript.