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Original Research Article

Relationship of the Nutritional Status of Mother Influence Neonatal Outcomes

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Abstract

Background: Birth weight is an indicator of the health status of a country. LBW remains a leading public health problem especially in developing country causes of childhood morbidity and mortality. **Objectives:** The objective of this study was to determine the relationship of nutritional status of mother influence neonatal outcome and the pregnant population admitted in labour ward of a tertiary level of public Hospital. ***Methods & Materials:*** It was a randomized cross-sectional study, conducted in Dhaka Medical College and Hospital of the Department of Obstetrics & Gynaecology over a period of six months from January 2010 to June 2010. All women who were admitted to labour room with term pregnant (>37 wks), which was confirmed by early USG or LMP. The indicator low birth weight <2.5 kg of the infant was examined as an outcome variable in association with different socio-economic status, educational qualifications and occupation of mother and health-related other variables. ***Results****:* More than 53% of LBW neonates were born to mothers who were illiterate, whereas 18.5% of LBW neonates were born to mothers who were educated up to the primary level. Maternal education, as well as higher socio-economic condition, reduces the incidences of LBW which was statistically significant. Poor ANC was associated with LBW babies after adjusting for maternal age and parity. Most of the multi gravid women present with moderate anaemia and greater than 60% of anaemic patients were not regular ANC and a total of 23% no ANC at all. The adverse fetal outcomes in this study were 44.2%. Low birth weight 28.3% and NICU admission 5.8% were the most common adverse birth outcome overall study period. ***Conclusion & Recommendation:*** Every mother with poor nutritional status should be screened during the antenatal check-up and should be considered a high-risk pregnancy. For these mother's special emphasis should be given to provide health and nutrition education.

Keywords: High risk pregnancy, Bangladesh, maternal nutrition, LBW, LMP, gynaecological problem.

INTRODUCTION

Malnutrition is childhood and pregnancy has many adverse consequences for child survival and long-term well-being [1]. Poor maternal nutrition which is highly prevalent in Bangladesh, especially among adolescent girls, 5% of pregnant women and 40% of non-pregnant/non-lactating women suffer from anemia, 57% of non-pregnant/non-lactating women are zinc deficit and 22% of non-pregnant/non-lactating women are different in B12 [2]. In addition, 10% women (15-49) yrs. underweight (3A1<18.5). Among adolescent girls aged 15-19 yrs. 31% are underweight. Adolescent pregnancy associated with a 50% increased risk of

stillbirths a neonatal death and an increased risk of low birth weight, which is very high in Bangladesh at 23% [3], pre-mature birth, fetal hypoxia, and mortality [4]. In addition, the risk of stenting is 36% weight among firstborn. Children of girls 18 yrs. in South Asia and as such early motherhood are a key driver of malnutrition [5]. The relationship between maternal nutrition and fetal growth is more complex than might he at first assumed. Low birth weight increases the risk of early morbidity and mortality and attempts to improve fetal outcomes in developing countries need to address the problem of compromised fetal growth. This paper examines the links between birth weight and women's nutritional status in both biomedical and programmatic contexts [6]. It is estimated that between 15% and 20% of all births worldwide are LBW (defined by the World Health Organization as <2500 g) or very low birth weight (<1500 g), representing a minimum of 20 million infants around the world. The 2500 g cut point is drawn from epidemiologic studies showing that infants with birth weights less than 2500 g are approximately 20 times more likely to die in infancy [7]. It is estimated that about 36% of total infants were born with LBW, with 29% prevalence in urban areas [8, 9]. Preterm birth (short gestation), growth restriction or a combination is the main biological causes of LBW. However, studies also show significant causal relationships with maternal, paternal, and passive smoking and drug use, as well as nutritional and micro-nutritional, notably anaemia [10]. Additionally, maternal characteristics including age, maternal anthropometric measurements as well as the availability and uptake of ANC facilities are commonly associated with LBW [11, 12]. By contrast, in most developing countries, early pregnancy resulting from early marriage is frequently identified as a significant causal factor in the birth of infants with LBW [9, 10, 12, 13].

MATERIAL & METHODS

It was a cross-sectional study, conducted in the Department of Obstetrics & Gynaecology in Dhaka Medical College and Hospital, Bangladesh, during the months of January 2010 to June 2010. The respondent of this study was female in the reproductive age group of 15-49 yrs., who attended in OPD of Obstetrics & Gyanecology Department. A total of 120 pregnant women at term pregnancy (37 to 42 completed weeks of gestational age) were randomly selected in the study. The participants who were suffering from hypertension, pre-eclampsia, eclampsia, diabetes mellitus, thyroid dysfunction, and nephritis were excluded. Moreover, major congenital anomalies of the fetus and multiple pregnancies were also excluded from the study. The semi-structured questionnaire used for interviewing women. Ethical clearance was taken from the concerned authorities of the hospital. The necessary information was collected. The weight & height of the participants and neonates were measured immediately after birth. Anthropometric measurement instruments: a. Mothers' weight was measured by a valid & reliable weighing machine; b. Mothers' height was measured with a height measuring scale; c. A valid and neonatal weighing machine determined the neonatal weight. Measure MUAC (cm) by measuring tap & skin fold thickness by slide calipers. Collected data was compiled on a master sheet. The descriptive and comparative test was done where needed. The collected data were analyzed with Microsoft excel 2010 and SPSS statistical software version 20.0. The results were transferred to predesigned classified tables as required. Chi-square test was applied as a test of significance for data analysis.

RESULTS

Table-1: Social and demographical Characteristics of parents (N=120)

Socio-Demographic Characteristics		Frequency(n)	Percent (%)
Types Residence Areas of Participants			
	Urban	98	81.67
	Rural	22	18.33
Mothers's Education			
	Illiterate	25	20.83
	Primary	26	21.67
	Secondary	49	59.17
	Higher Secondary	20	16.67
	Above Higher Secondary	0	0.0
Mothers's Occupation			
	House wife	104	86.67
	Service	7	5.83
	Skilled Workers	5	4.17
	Others	4	3.33
Fathers's Education			
	Illiterate	4	3.33
	Primary	13	10.84
	Secondary	54	45.0
	Higher Secondary	18	15.0

Socio-Demographic Characteristics		Frequency(n)	Percent (%)
	Above Higher Secondary	31	25.83
Father's Occupation			
	Business	54	45.0
	Service	38	31.67
	Daily laborer	7	5.83
	Cultivation	6	5.0
	Unemployed	7	5.83
	Others	8	6.67
Mother's BMI			
BMI	<18.5	17	14.16
	18.5-24.9	98	81.67
	>24.9	5	4.17
Mother's Age			
Years	<20	15	12.5
	20-30	88	73.33
	>30	17	14.17

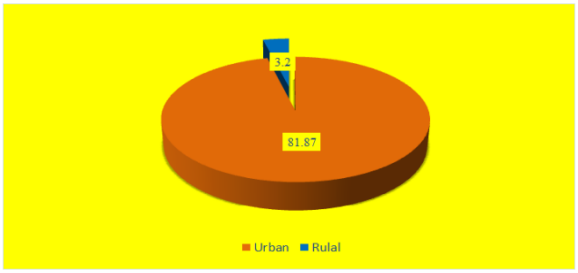

Fig-I: Participants residence area distribution

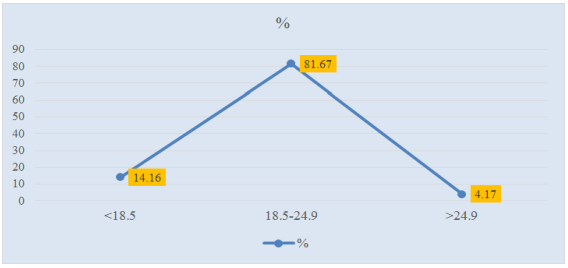

Fig-II: Mothers BMI distribution

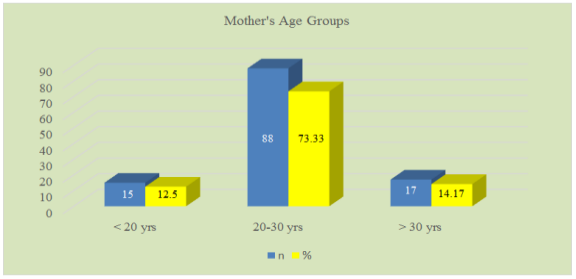

Fig-III: Mothers age distribution

Table 1 shown that, most of the participants were from urban areas, which is 98(81.67). More than half of them were completed secondary level education that is 49(59.17). Among the participant's more than two third of them were house wife 104(86.67). The minimum maternal age was 16 years and maximum was 40 years. Most of the participants were between 20 to 30 years in age. The lowest maternal BMI was 16 and maximum was 31.5. Most of the participants (81.67 %) were of average BMI.

Table-2: Distribution of neonates by birth weight and maternal BMI (N=120)

Maternal BMI	Birth Weight (kg)					
	<2.5		2.5-4.0		>4.0	
	n	%	n	%	n	%
<18.5	9	52.94	8	47.06	0	0.0
18.5- 24.9	27	27.55	68	69.39	3	3.06
>24.9	0	0.0	3	60.0	2	40.0

Table 2 shown that, more than half 9(2.94%) of the neonates were LBW, born to the mothers whose BMI was <18.5. On the other hand, 27(27.55%) neonates were LBW, born to the mothers whose BMI was 18.5- 24.9. Whereas there was no LBW baby, born to the mothers. Whose BMI was >24,9. That is the lower the maternal BMI; the greater is the risk of producing LBW babies. The finding is statistically strongly significant (Chi^2=9.55, p=0.002).

Table-3: Distribution of neonates by birth weight and Anemia, Hemoglobin Level (N=120)

Mother's Anemia (Hemoglobin Level)	Birth Weight(kg)					
	<2.5		2.5- 4.0		>4.0	
	n	%	n	%	n	%
Severe Anemia(<7g/dl)	13	61.9	8	38.1	0	0.0
Moderate Anemia(±7g/dl to 8g/dl)	17	43.24	20	54.05	1	2.70
Mild Anemia(±8g/dl to 10g/dl)	4	16.67	18	75.0	2	8.33
No Anemia(±10g/dl)	2	5.41	33	89.19	2	5.41

Table 3 shown that, 13(61.9%) of the neonate were LBW, whose mother's hemoglobin level was <7g/dl. On the other hand, 17(43.24%) neonate was LBW, whose mother's hemoglobin level was ±7g/dl to 8g/dl. Whereas only 2(5.41%) neonate was LBW, whose mother's hemoglobin level was ±10g/dl that was lower maternal hemoglobin level which is risk of bathing LBW babies? Calculating the significant level of Chi^2 and p value, which was statistically strongly significant (Chi^2=5.23, p=0.001).

Table-4: Distribution of neonates by birth weight and Antenatal Care (N=120)

Antenatal Care	Birth Weight(kg)					
	<2.5		2.5-4.0		>4.0	
	n	%	n	%	n	%
None	22	77.78	7	22.22	0	0.0
Irregular	7	14.0	41	82.0	2	4.0
Regular	6	14.63	32	78.05	3	7.32

Table 4 shown that, a highest number of 22(77.78%) LBW babies were born, whose families hadn't taken any type of antenatal care. On the other hand, 7(14.63%) LBW babies were born, whose families had taken regular neonatal care. And 7(14%) LBW babies were born whose families had taken irregular neonatal care. Almost 78% LBW babies were born whose family had not taken any antenatal Care and 14.63%LBW babies were born whose family had taken regular antenatal Care. This shows that, regular antenatal care reduces LBW babies. The finding was statistically significant (p<0.001).

Table-5: Distribution of neonates by birth weight and Maternal education (N=120)

Maternal Education	Birth Weight(kg)					
	<2.5		2.5-4.0		>4.0	
	n	%	n	%	n	%
Illiterate	17	80.95	4	19.05	0	0.0
Primary	8	30.77	16	61.54	2	7.69
Secondary	7	14.29	39	79.59	3	6.12
Higher Secondary	2	10.0	18	90.0	0	0.0
Above Higher Secondary	2	50.0	2	50.0	0	0.0

Table 5 shown that, a highest number 17(80.95%) LBW neonates were born of illiterate mothers, followed by 6(30.77%) LBW neonates were born, whose mothers were educated up to primary level, 7(14.29%) LBW neonates were born; whose mothers were educated secondary level and only 2(10%) LBW neonates were born, whose mothers education were higher secondary level. It stated that, maternal education had a vital role to reduce the incidences of LBW neonate. This finding is giving the information that the more maternal education, the less is the risk of having LBW neonates, which is statistically significant.

Table-6: Distribution of neonates by birth weight and maternal occupation (N=120)

Maternal Occupation	Birth Weight(kg)					
	<2.5		2.5-4.0		>4.0	
	n	%	n	%	n	%
Housewife	27	25.96	74	71.15	3	2.89
Service	4	57.14	2	28.57	1	14.29
Manual worker	4	80.0	1	20.0	0	0.0
Others	1	25.0	2	50.0	1	25.0

Table 6 shown that, highest number 27(25.96%) LBW neonates, whose mothers were housewife, followed by service mothers 4(57.14%) of LBW neonates 4(80%) manual laborer of LBW neonates. The finding is statistically significant (Chi^2=24.9, p=<.0001).

Table-7: Distribution of neonates by Sex and birth weight (N=120)

Birth Weight(kg)	Male		Female	
	n	%	n	%
<2.5	12	33.33	24	**66.67**
2.5-4.0	42	53.16	37	**46.84**
>4.0	**5**	**100.0**	**0**	**100.0**

Table 7 shown that, more than two third 24(66.67%) LBW neonates were found female babies and 12(33.33%) LBW neonates were male babies. In this regards, male babies were found better birth weight Comparison with female babies.

Table-8: Distribution of neonates by birth weight and gestational age (N=120)

Gestational Age(Wks.)	Birth Weight(kg)					
	<2.5		2.5-4.0		>4.0	
	n	%	n	%	n	%
37-40	31	36.05	54	62.79	1	1.16
>40	5	14.71	25	73.53	4	11.76

Table 8 shown that, the babies who born after 40 weeks had fewer incidences of LBW neonates than 37-40 gestational ages.

Table-9: Distribution of neonates by Sex and birth-length (120)

Birth Length	Male		Female	
	n	%	n	%
<50cm	18	40.0	27	60.0
±50cm	41	54.67	33	45.33

Table 9 shown that, 27(60%) of female baby's birth length was <50 com, on the other hand, 18(40%) male baby's birth length was ±50 cm.

Table-10: Distribution of neonates by Sex and Head Circumference (120)

Head Circumference	Male		Female	
	n	%	n	%
<30cm	11	40.7	15	59.3
±30cm	48	51.0	46	49.0

Table 10 shown that, 15(59.3%) neonates head circumstance was <3 cm, who were male babies on the other hand, 11(40.7%) neonates of female babies' head circumstance were ±30 cm. I this regards, it had been found that in normal head circumstance ±30 cm both male and female babies were almost equal.

Table-11: Distribution of fetal outcome (120)

Adverse effect	Frequency(n)	Percent (%)
LBW	34	28.3
Needs NICU admission	7	5.8
Apgar Score< 6	12	10.0
Intra uterine death(IUD)	0	0.0

Table 11 shown that, LBW was highest, followed by NICU admission 5.8% and Apgar score <6 were 10% respectively. But IUD was 0%.

DISCUSSION

This hospital-based study was carried out to aim to get information regarding the determination of birth weight, birth length, and head circumference of the neonatal outcome in the context of Bangladesh. To get accurate information about the relationship between the nutritional status of the mother and the birth weight of the baby at term a community-based study was needed which could reveal a real picture. However, this study provided information obtained in a hospital setting. BMI is usually used as a parameter for non-pregnant women. Here we received the mothers in a pregnant state, so to minimize the inaccuracy anthropometric measurements were done on the day after delivery. Neonatal well-being largely depends on birth weight and other anthropometric measurements. Therefore, it is suggested that to assess the influence of nutritional status of mother on the birth weight of her baby at term birth weight birth length, head circumference, chest circumference should be considered. In this study, an analysis of several factors influencing neonatal outcome was done. It showed that maternal age, educational and occupational status of the mothers, maternal nutritional status, anemia, ANC, parity, and sex of the baby had an influence on neonatal outcome. In this study, the mean birth weight (2.7 kg) was found slightly higher than in a previous study. Another study found a mean birth weight of 2.5 kg in a hospital in Dhaka city [14]. The difference in birth weight with the other study could be due to the better economic status of the sample population of the current study. However, the mean neonate length and head circumference as revealed in this study were similar to other studies [14]. Mothers who are economically solvent are conscious about their health, antenatal care, and immunization. For these reasons, they are able to give birth to babies of at least average weight [15]. In the present study, the highest percentage of LBW babies were found among the teen-aged mothers and with the increase of maternal age, the birth weight of their babies increased. This result corroborates with another study in Bangladesh [16]. In the present study, there was a significant difference between the basic hemoglobin level of the mothers at registration and the birth weight of the baby (p=0.0002). The mean birth weight increased with increasing hemoglobin values [17]. That low maternal hemoglobin concentration was associated with LBW babies. The hemoglobin level (<8 g/dl to ≥11 g/dl) during pregnancy was significantly associated with LBW as reported in the studies [18-20]. In rural Karnataka at Belgaum, noted that a maximum (80.0%) number of LBW babies were born to mothers with hemoglobin level, 7 g/dl (severe anemia) in the third trimester [20]. The study revealed that neonatal birth weight is significantly influenced by maternal

education highest percentage of LBW was found among illiterate mothers. On the other hand, a small percentage of LBW babies were born among the mothers who were educated up to the primary level. It means LBW is associated with the literacy of the mother. It was also observed that mothers who were educated up to the secondary level have lesser LBW incidence. This means educated mothers have less chance of having LBW babies and better neonatal outcome. In this study majority of the mothers came from middle-class and affluent society. For that reason, the incidence of low birth weight was a bit less than the other studies. The study showed that neonates of the lower socioeconomic groups have an increased tendency of low birth weight. On the other hand, mothers of higher socioeconomic status have a lower incidence of LBW babies. K. Nazneen also mentioned in her study that economic status has a lot of influence on pregnancy outcome [16]. The study also showed a close association between SGA babies with parity and sex of the baby. It was observed that with increasing parity neonatal birth weight also increased. Kramer analyzed various studies and found that parity had a significant effect on birth weight. Nullipara and extremely high parity were associated with low birth weight in this study [21]. The current study showed the effect of neonatal sex on birth weight and birth length. Male babies were found weighty and larger than female babies. Birth weight has a tendency to increase with the advancing maternal gestational period. Akther N showed A linear relationship between birth weight and gestational period. The present study included only the term pregnancies. Even though it showed a difference with gestational age. With increasing, gestational age birth weight was also found to increase. Various studies were conducted in many countries about the incidence and factors related to low birth weight. The major and lowest birth weights are reported for Asia [22]. According to the demographic and health survey, UNICEF (1998-2002) 30% low birth weight babies were born in Bangladesh, 21% in Nepal, and 22% in Srilanka [23]. This indicates the poorest condition of birth weight in Bangladesh among these countries. The percentage of LBW in the present study is not close to that of UNICEF (1998-2002) because the study is hospital based and the study population who sought medical care was restricted within the middle class and affluent society. The present study showed a strong association between socio-economic conditions and birth weight. Maternal nutritional status is influenced by the socio-economic condition of the family.

CONCLUSION

The study revealed that maternal nutritional status and socio-economic condition influence neonatal outcome. Mothers who came from families with low income were found to the highest proportion of LBW babies were found among them. It also revealed an association between the literacy of the mothers and birth weight and size of the neonates. It was noticed that mothers with no education had a higher proportion of LBW babies. The maternal occupation was found to affect the growth of neonates. Housewives and mothers whose occupation was of sedentary habits had fewer incidences of LBW babies. Whereas mothers who were manual workers had the highest percentage of LBW babies. Influences of maternal age, parity, sex of the baby, and gestational age were also seen on the birth weight in this study.

RECOMMENDATIONS

The study revealed that maternal nutritional status and socio-economic condition influence neonatal outcome. Mothers who came from families with low income were found to the highest proportion of LBW babies were found among them. It also revealed an association between the literacy of the mothers and birth weight and size of the neonates. It was noticed that mothers with no education had a higher proportion of LBW babies. The maternal occupation was found to affect the growth of neonates. Housewives and mothers whose occupation was of sedentary habits had fewer incidences of LBW babies. Whereas mothers who were manual workers had the highest percentage of LBW babies. Influences of maternal age, parity, sex of the baby, and gestational age were also seen on the birth weight in this study.

Based on the study findings the following recommendations can be produced

- To reduce the incidence of maternal malnutrition and low birth weight antenatal check-up should be more strengthened in a hospital-like DMCH.
- Every mother with poor nutritional status should be screened during antenatal check-ups and should be considered a high-risk pregnancy. For these mother's special emphasis should be given to provide health and nutrition education.
- Planners and policymakers of the hospital can develop policies to provide low-cost calorie-dense foods for pregnant women who are poor and have low nutritional status.
- Mass media could be utilized to disseminate health and nutrition information for pregnant mothers in a simple manner with cooperation and coordination from different health, educational and different social welfare organizations.

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