TAJ December 2003; Volume 16 Number 2

ISSN 1019-8555
The Journal of
Teachers Association
RMC, Rajshahi

Original Article

Biological Risk Factors of Low Birth Weight in Rural Rajshahi

M A Ullah[1], M J Haque[1], M A Hafez[2], Merina Khanam[3]

Abstract

This prospective type of study was conducted in nine rural upazilas of Rajshahi district with a view to find out the biological risk factors of low birth weight (LBW). The calculated minimum required sample size was 748. A total 900 pregnant mothers in 3rd trimester were selected by two stage cluster sampling technique for follow up. Data were collected for 822 singleton live birth successfully and analyzed. Maternal weight < 50 kgs at 3rd trimester, birth interval < 2 years and female sex of the new born were identified as the important risk factors of LBW in rural community of Rajshahi district. Sex of the newborns is genetically determined, but maternal weight < 50kgs *in third trimester and birth space < 2 years can prevented by measures like proper antenatal care*, health & nutritional education, effective family planning services etc.

TAJ 2003; 16(2): 50-53

Introduction

Traditionally, birth weight is regarded as one simple measure of pregnancy outcome. It is a reliable indicator of foetal well being and maturity[1]. The birth weight of a newborn baby is probably the single most important factor that affects its survival and quality of life[2, 3].

WHO estimates that globally about 25 million low birth weight babies are born each year, consisting 17% of all live births, nearly 95 % of them in developing countries[1]. LBW is one of the major problems of children in Bangladesh also. Maximum morbidity and mortality of neonates are related to LBW[4]. It is very high (30% - 50%) in Bangladesh and is far behind the target (10%) fixed up by United Nation at 34th World Health Assembly[1, 5, 6]. LBW has declined very little over the past several decades here. In rural Rajshahi, still it is too high (not less than 31%)[7].

The incidence of LBW varies between regions, countries and within areas of the same country. It depends upon numerous factors like biological, sociodemographic, environmental etc[1]. The causes of LBW, although multifactorial, are incompletely understood and in place of adequate specific information about causes, much has been developed about risk factors associated with LBW. The presence of those factors in an individual woman indicates her increased chance of bearing a LBW baby[8]. In this study researchers attempted to identify the biological risk factors of the pregnant women of the rural Rajshahi as well as the prevalence, relative and attributable risk of the prevailing risk factors.

This study was conducted in the rural areas (i.e. 9 rural upazilas) of the district of Rajshahi in Bangladesh. The cohort of pregnant mothers in third trimester at the time of interview constituted the basis of the study population and the live births out of this cohort formed the actual study

[1] Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshahi.
[2] Associate Professor, Department of Biostatistics, NIPSOM, Dhaka.
[3] Professor, Department of Obstetrics and Gynaecology, Rajshahi Medical College, Rajshahi.

population. Initially 900 pregnant mothers in third trimester was selected and enlisted for follow up to get at list 748 live births as sample population so as to account for stillbirths, neonatal deaths within 96 hours of birth and migration of pregnant women for delivery and other reasons. The minimum sample size (748) of this study was calculated on the basis of the study population and probable Proportion of attribute (low birth weight) of the 9 rural Thanas of this district after applying design effect of 2. The sample units was selected by applying 2 - stage cluster sampling. In the first stage 9 unions, one from each thana, were selected by simple random sampling. Then every subsequent house, starting from the house whose door was closest to the Union Parishod office, with a pregnant mother in third trimester was chosen to complete the total number of 100 from each union. At the end of the data collection, final sample was reduced to 822. Of the these 78 mothers, who were drooped out / excluded from the study during follow up period, 36 for still births, 28 for not taking birth weight of their newborn babies within 96 hours after their deliveries, 13 for migration to other places and 1 for twin. So a complete data set was collected for 822 singleton live births whose birth weights were measured within 96 hours after their birth. This was the final sample size of this study.

Data were collected by a pair of trained one male and one female interviewer in each union with the help of a pretested structured interview schedule into two phases. In the first phase, the pregnant mothers of third trimester were enlisted and data on biological factors were collected. Then the interviewers followed up the respective mothers up to their delivery by 15 days of interval and repeatedly reminded them to inform of their delivery at the earliest opportunity to them at least within 96 hours of delivery. In the second phases, the interviewers measured the new born's birth weight within 96 hours of delivery and also noted the sex of the new born. No birth weight was taken after 96 hours of birth. Weight of the mothers and newborns were measured by bath room and detecto type baby scale weight machine respectively.

Data were analyzed by computer using SPSS for windows and statistical interpretations were done with appropriate tests and means. The factors which had a p-value <0.05(significant at 95% confidence interval) in bivariate (Chi-square test) analysis were included in the multiple logistic regression.

Results

Table 1 show that the distribution of birth weight by biological factors. Maternal height, maternal weight at 3rd trimester, birth interval and sex of the new born were significantly associated with low birth weight (LBW), but maternal age and parity were not associated. with LBW.

Table-1: Low birth weight and biological factors.

	Status of birth weight		Chi-square
Factors	LBW (%)	NBW (%)	Significance
1. Age in years (N = 822)			
< 20 (n = 216)	34.3	65.7	
20 - 34 (n = 566)	29.0	71.0	3.67
≥ 35 (n = 40)	40.0	60.0	
2. Maternal height (cm) (N = 822)			
< 145 (n = 122)	39.3	60.7	4.78*
≥ 145 (n = 700)	29.4	70.6	
3. Maternal weight (kgs)(N = 822)			
< 50 (n = 376)	39.4	60.6	23.23***
≥ 50 (n = 446)	23.8	76.2	
4. Parity (N = 822)			
Primipara (n = 316)	32.3	67.7	1.36
Multipara (n = 374)	28.9	71.1	
Grand Multipara (n = 132)	33.3	66.7	
5. Birth interval (years) (N = 822)			
< 2 (n = 95)	46.3	53.7	
≥ 2 (n = 411)	26.3	73.7	14.74**
6. Sex of the new born (N = 822)			
Male (n = 396)	19.7	80.3	44.91**
Female (n= 426)	41.3	58.7	

*P<.05 **P<.001 ***P < .0001

Multiple logistic regression was applied to assess the independent effects and relative and attributable risk of 4 selected biological factors which were significant (at 95% level) in chi-square such as maternal height, maternal weight at 3rd trimester, birth interval and sex of the new born. All the factors except maternal height had independent effects on LBW. Among these factors, sex of the new born with the highest relative (2.65 with a range of 1.85 - 4.36) and attributable risk (52 %) was identified as most important risk factors of LBW in the rural community of Rajshahi district. This female sex had also highest prevalence rate in this rural community (Table 2).

Table-2: Multiple logistic regression analysis: biological risk factors of low birth weight in the rural Rajshahi.

Risk factors	Relative risk risk (%)	Attributable of risk factors	Prevalence	p
Maternal height < 145 cm	1.33 (1.04 - 1.71)[a]	25	14.4	0.1108
Maternal weight < 50 kgs	2.29 (1.49 - 3.50)[a]	40	45.7	0.0001
Birth interval < 2 years	1.88 (1.12 - 3.14)[a]	43	18.8	0.0155
Female baby	2.84 (1.85 - 4.36)[a]	52	51.8	0.0000

[a] Figures in parentheses are the 95% confidence intervals (CI).

Discussion

In this study, the mothers of 35 years or above were found to have higher chance of LBW delivery than the others age groups. This results also indicate that not only the age 35 or above but also the mothers aged below 20 years had substantially greater chance to deliver LBW baby than the age group of 20 - 34 years but age of the mothers was not significantly associated with the incidence of LBW. It corresponds with the findings of Ahmed et al(1994)[9] and Eisner et al (1979)[10]. This fact reflects both consequences of aging in elderly women may be due to decline hormonal activities, which may occur after the age of 34 and biological immaturity in case of mothers below 20 years of age. Height of the mothers created a great debate as a risk factor of LBW. Some authors[11,12] opined that it was an important risk factor of LBW but on the other hand some [13,14] opined that it was not. Bivariate analysis in this study, indicates that short height (<145 cm) of the mother was associated with an increase in LBW. Since determinants of LBW are clearly interrelated, so logistic regression analysis gives more meaningful results than the above. But in logistic regression in this study, height of he mother was not identified as significant determinant of LBW. It suggests that there was any confounding variable which was remained in between them. The findings of the study suggest that maternal weight in third trimester of pregnancy was an important determinant of birth weight of the newborns. It corresponds with the findings of others studies[2, 9]. It indicates that maternal nutrition in third trimester which reflects the final nutritional condition of the mothers during pregnancy is an important determinant of birth weight. Like others studies[11, 12] this study also suggest that maternal weight <50 kgs in third trimester was an important risk factor of LBW. It may occur for intrauterine growth retardation (IUGR) due to failure of the mothers to achieve 50 kgs weight during pregnancy. This hypothesis is also supported by the findings of Ferrez et al (1990) [12], in this study it was found that maternal weight less than 50kgs was an important cause of IUGR. The study suggests that there was no significant relationship between birth order and LBW. Though incidence of LBW was high among the grand multiparas. It is consistent with the findings of Eisner et al. (1979) [10]. Ahmed et al (1994) [9] in their study, it was observed that birth space less than 2 years was an important risk factor of LBW. Similar finding was also observed in this study. It may be explained that the most of the mothers who had birth interval less than 2 years, were malnourished for the effect of pregnancy and breast feeding of the preceding child. This malnutrition leads to LBW. This finding could be a basis for education and motivation of the mothers for adopting contraceptive methods. Thus may be

assumed that successful implementation of family planning program leading to widening of birth interval will reduce the risk of LBW. The relationship between sex of newborns and their birth weight is universally accepted[15]. In other words, females have lower birth weight than males. The findings of this study also go in favour of this. Since it is an established fact that females have lower birth weight than males question may be posed: is it justifiable to use same criterion (<2.5kgs) of LBW for both the sexes?

Two points can be made out from the study. One, we have nothing to do about some biological risk factors which are genetically determined like height of mothers and sex of newborns. And second, some biological factors like maternal age below 20 years and above 34 years, maternal weight below 50kgs in third trimester and birth space below 2 years could be prevented by measures like proper antenatal care, health education, family planning activities etc.

Acknowledgement

We would like to express our gratitude to Bangladesh Medical Research Council (BMRC) authority for sponsoring the study.

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All correspondence to:
M A Ullah
Lecturer
Department of Community Medicine
Rajshahi Medical College,
Rajshahi.