LOW BIRTH WEIGHT BABIES : INCIDENCE AND RISK FACTORS

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ABSTRACT

In a prospective hospital based study, during the period from Jan 95 to Dec 96, 3100 consecutively delivered live newborns were studied for the incidence of low birth weight neonates and to evaluate the associated risk factors. One thousand fourteen newborns were classified as low birth weight babies. The incidence expressed per 1000 live births was 327 (32.7%). Of these, 815 (80.4%) were small for gestational age neonates and 199 (19.6%) were preterm neonates. Five hundred seventy small for gestational age neonates (70%) were weighing between 2001 to 2500 gms. Mothers belonging to the age group of 19-25 years delivered the maximum number of low birth weight babies (618/1014) and of these 82.8% were small for gestational age neonates. There were 48 neonates with low birth weight born to mothers below the age of 18 years. Primiparous mothers were found to contribute higher number of low birth weight neonates (414/1014). Spacing as a factor did not show any major difference. Two hundred sixty two low birth weight neonates were born to mothers with significant obstetrical problems such as pregnancy induced hypertension, bad obstetrical history and premature rupture of membranes. The incidence of 32.7 % of low birth weight babies is high enough to ring alarm bells.

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KEYWORDS :

Introduction

Health is to be "a state of complete physical, mental and social well being and not merely the absence of diseases or infirmity". This is the main objective of health services including maternal and child health of our nation. Birth weight is a good reflector of the status of maternal health. It is also true that birth weight is the single most important factor that affects neonatal mortality and morbidity, infant and childhood morbidity. Low birth weight i.e. weight below 2500 gms may indicate that the baby did not remain in the uterus long enough or it did not develop well enough. Neonates with weight less than 10th percentile or more than 2 SD below the mean for the gestation age are classified as small for gestational age. This group of neonates with poor intra uterine growth remains the cause of concern in developing countries including India. The incidence of low birth weight (LBW) in India varies between 25-30% and of which 60-65% are because of intra uterine growth retardation (IUGR) [1]. Evidence from developing countries over time also demonstrates that the incidence of IUGR decreases as a country becomes more developed. Some of the adverse factors responsible are maternal malnutrition, anemia, inadequate prenatal care,

drug abuse, birth order, maternal medical problem, e.g., pregnancy induced hypertension, diabetes mellitus, cardiac diseases and chronic infections [2]. The present study was undertaken to know the incidence of low birth babies in a mixed population having a varied socio-economic background and to study the associated maternal risk factors like social, obstetric and anthropometric factors in low birth weight babies.

Material and Methods

This was a two year hospital based prospective study. The population of the study included mothers attending regular antenatal clinics. The hospital being a tertiary referral government hospital included women from the very low income strata of the society of class 1-4 employees of the central government who were authorized free medical care. Newborn babies were weighed on a beam type weighing scale within one hour of birth to the closest of 20 gms. Gestational age was determined by the Dubovitch criteria [1]. All consecutively born low birth weight babies were included and evaluated. Low birth weight babies were defined as those babies with a birth weight of less than 2500 gms irrespective of their period of gestation. Small for gestational age (SGA) newborns were defined as those with weight less than the 10th percentile [1]. Incidence of low birth weight babies was calculated by the following formula :

- Live LBW babies born during the study period X 1000
Total live births during the study period
and expressed as per 1000 live births
- Live LBW babies born during the study period X 100

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Total live births during the study period
and expressed as percentage

Detailed maternal data were recorded for all low birth weight neonates studied based upon direct questioning and review of the antenatal card. Maternal malnutrition for the study was defined as weight < 45 kgs and height < 145 cms. Maternal anemia was defined as Hb < 11 g/dl [3]. Bad obstetrical history (BOH) was considered when there was previous history of one or more abortions, one or more stillbirths or one or more neonatal deaths. Low birth weight babies were further segregated into small for gestational age and preterm babies in relation to their maternal data.

Results

During the period of study (Jan 95 to Dec 96), 3100 consecutively delivered live newborn babies were studied. Out of these 1014 were classified as low birth weight babies. The incidence expressed, as per 1000 live births was 327. Of the total 1014 LBW babies, 815 (80.4%) were small for gestational age neonates and 199 (19.6%) were preterm neonates. There were 560 female low birth weight neonates out of the total 1014. The classification and pattern of birth weight is reflected in Fig 1. Eight hundred and fifteen neonates were small for gestational age out of the total 3100 live births (26.3%). Of these majority (570/815 i.e. 70%) were weighing between 2001 to 2500 gms. The correlation between maternal age, height, weight and parity and low birth weight neonates is highlighted in Table 1. The maximum number of LBW babies (60.9%) were born to mothers in the age group of 19-25 years. Of these 82.8 per cent were SGA neonates. Significantly 48 LBW neonates were born to mothers below the age of 18 years. Table 2 highlights the correlation between maternal parity, spacing between pregnancy and family income. Primiparous mothers were found to contribute significantly higher number of LBW neonates (40.8%) and of these 85 per cent were SGA neonates. Spacing as a factor did not show major difference in the incidence of LBW neonates. Mothers belonging to the income group of Rs 1000 - Rs 3000 per month gave birth to higher number of LBW neonates (750/1014). Of these 85.6 per cent were SGA neonates. Fig 2 reflects the correlation between maternal medical morbidity including anemia, medical illness and obstetrical problems and low birth weight babies. Nine hundred and eighty four low birth weight babies were born to mothers whose hemoglobin levels

Fig. 1 : Pattern of distribution of neonates (n=1014)

TABLE 1

Correlation between maternal anthropometry and low birth weight neonates (n=1014)

Factor	Small for gestation	Preterm	Total
Maternal age (years)			
> 35	14	4	18
30 - 35	56	16	72
25 - 30	210	48	258
19 - 25	512	106	618
< 18	23	25	48
Maternal height (cms)			
> 155	130	25	155
145 - 155	650	115	765
< 145	80	14	94
Maternal weight (kg)			
< 45	191	39	230
45 - 55	639	101	740
> 55	23	21	44

TABLE 2

Correlation between LBW and maternal parity, spacing and family income (n=1014)

Factor	Small for gestation	Preterm	Total
Parity			
Primipara	332	82	414
2nd para	307	58	365
3rd para	143	42	185
> 3	33	17	50
Spacing			
< 2 years	509	116	625
> 2 years	306	83	389
Family income (Rs/month)			
> 5000	21	8	29
3000 - 5000	23	7	30
2000 - 3000	235	65	300
1000 - 2000	366	84	450
< 1000	170	35	205

were below 10 g/dl. Further of these 26 per cent (97) of low birth weight neonates were delivered by mothers with Hb per cent below 8 gm per cent. Medical illness including rheumatic heart disease [12], urinary tract infection [18] and other episodic illness (76) were observed in mothers with LBW babies in the present study. Obstetrical problems included premature rupture of membranes (PROM), pregnancy induced hypertension (PIH), bad obstetrical history (BOH) and ante-partum hemorrhage (APH). The detail of correlation between obstetrical problems and low birth weight neonates is highlighted in Fig 3. Out of a total 1014 LBW neonate, 262 cases had significant antenatal obstetric problems in their mother. Bad obstetric history and PIH were two important factors.

Discussion

Pierre Budin introduced the most basic concepts in the care of low birth weight babies in 1895. He stated,

Fig. 2: Correlation between maternal medical morbidity and LBW.

'with weaklings we shall have to consider three points, one, their temperature and their chilling, two, their feeding and three, the diseases to which they are prone'.

Of the low birth weight babies, small for gestational age neonates are the cause for concern, given their long-term consequences. It shall not be wrong to say that the vicious cycle of malnourished mother giving birth to a small for gestational age girl neonate who will in turn deliver a low birth weight child continues in our country. The incidence of low birth weight neonates in India varies between 25-30 per cent [1]. In the present study the incidence was 32.7 per cent. In a study by ICMR, wherein the criterion for low birth weight was taken to be < 2000 gms, the incidence was reported to be 5.5 per cent [4]. The argument was based on the assumption that the mean birth weight of the mature Indian baby is about 500 gms less than that of the American infant and hence the WHO definition of LBW babies wherein 2500 gms is the dividing line cannot be applied for Indian infants. A debate needs to be initiated whether for the sake of economics shall we lower our standards! Small for gestational age neonates contribute the maximum to the incidence of LBW babies in India vis a vis the developed countries. In the present study 80.4 per cent of the LBW neonates were SGA infants. In a national collaborative study, the authors have given similar observation [5].

Maternal age, parity and spacing interval are important epidemiological causative factors for the high incidence of LBW babies. Sixty one per cent of SGA neonates were born to mothers in the age group of 19-25 years. Mother below 18 years of age delivered 4.6 per cent of SGA neonates. Achieving a higher female literacy would probably correct this adverse fac-

Fig. 3: Correlation between maternal obstetrical problems and low birth weight neonates (n=262).

tor. The observations are similar to other studies [6,7]. There is general agreement that pregnancy outcomes are more favorable for multiparae than primiparae, with the exception of grand multiparity. Hirve SS et al [2] in their prospective study have reported primiparas contributing significantly to the incidence of LBW neonates. In the present study, 40.7 per cent of SGA neonates were born to primipara mothers as compared to 37.6 per cent to 2nd para and 17.5 per cent to 3rd para. Another Indian study [8], has observed that newborn of primiparae were 150 gms lighter than those of second para. Short spacing interval between pregnancies is a confounding factor to nutritional deficiency and inadequate physiological recovery [9]. In the present study 509/815 neonates with SGA were born to mothers with spacing interval less than 2 years. It has also been observed that outcome of previous pregnancy is an important confounding factor. If the previous gestation resulted in a preterm or SGA neonate or still birth, the mother will be at an increased risk for both shorter pregnancy interval and a repeat preterm or SGA neonate [9].

Maternal undernutrition does play an important role in outcome of pregnancy in terms of fetal growth. Adopting the definition criteria for maternal malnutrition to be weight < 45 kg and or height < 145 cms, 324/1014 of total LBW were born to malnourished mothers in the present study. In a recent study to evaluate the scoring system for predicting the risk of a preterm baby, previous history of preterm delivery and low prepregnancy weight were the most predictive risk factors in multiparous and nulliparous mothers [10]. An ICMR sponsored study has observed high incidence of LBW in maternal malnutrition [5]. During normal pregnancy, women not given supplemen-

tary iron, the hemoglobin concentration falls from a non pregnant average of about 133 g/l to an average of about 110 g/l at 36 weeks [11]. Whether this represents anemia or not remains a controversial issue. WHO in its nutritional report of 1972 suggested that anemia was likely to be present in pregnant women when the hemoglobin fell below 110 g/l [12]. Anemia in mothers is a major determinant for increased morbidity both for the mother and the growing fetus. Anemia if severe could impair oxygen delivery to the fetus and thus interfere with normal intrauterine growth or pregnancy duration. Iron deficiency without anemia might affect key enzymes and thereby also lead to adverse outcome [9]. Two studies [2,5] have noticed the relation between low birth weight and low maternal hemoglobin levels. In the present study, 835 (82.4%) neonates with SGA were born to mothers with anemia. However in a contrasting study, the authors [13] conclude that hemoglobin concentrations as low as 95 g/l in pregnancy were associated with optimal fetal growth. Failure of the hemoglobin concentration to fall during pregnancy was associated with a five to seven fold increase in the incidence of low birth weight and preterm birth.

Closely related factor is income and the economic status of the family. Two studies analyzing the social factors related to low birth weight babies, has observed the direct relation between family income and birth weight [5,14]. In the present study, 64.5 per cent of low birth weight neonates were born to mothers in the family income bracket of less than Rs 2000 per month.

Maternal illness like rheumatic heart disease, chronic infections and other episodic illnesses such as respiratory tract infection, diarrheal disorder and short febrile episodes were the contributing factors in the present study for low birth weight babies. Among cardiac problems, rheumatic heart diseases is the commonest cause complicating pregnancy and resulting in smaller babies in our country [15]. Incidence of 11 per cent low birth weight babies has been reported in mothers with minor/episodic illness during pregnancy [16]. A similar figure (12%) was seen during the present study. Obstetric problems complicating third trimester of pregnancy like PIH, BOH and PROM are important in contributing to the chances of premature delivery and poor growth of the fetus. Several authors have observed the increased incidence of low birth weight babies in these morbidity states [5,9].

The present study has strengthened the fact that a significant percentage of neonates are born with the disadvantage of low birth weight. The maternal factors

were found to be working in unison and to reach any logical conclusion regarding the causative or etiological effect of these maternal factors on low birth weight, they should be properly controlled to prevent confounding. However certain recommendations need to be made in order to reduce the incidence of low birth weight babies [1]. Adoption of 'At risk approach' to include all those mothers with social, natural and medical adverse factors. The 'risk approach' is a managerial tool for improved MCH care. Apart from professional health workers, involvement of community health workers and social women's organization is required to be incorporated in the health delivery system [2]. Correction of three interrelated conditions, viz. maternal malnutrition, infections and unregulated fertility through direct intervention programmes, including dietary improvements through the existing ICDS scheme, identifying and controlling infections and early detection and treatment of medical disorders complicating pregnancies [3]. Adoption of 'risk concept' and provide efficient immediate and follow up pediatric services for low birth weight neonates to the whole community and not confined to a clinic or hospital. These measures are urgent if the goal of the national health policy i.e. to reduce the incidence of low birth weight infants to 10 per cent by the year 2000 is to be achieved.

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