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Unraveling the threads of preterm very low birth weight babies: Identifying maternal risk factors

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Abstract
Background: Neonatal mortality is among the most important indicators of health and development in global communities. One of the causes of neonatal mortality is very low birth weight.
Aim of the study: The study aims to identify the maternal risk factors associated with preterm very low birth weight (VLBW) babies.
Methods: The study conducted at the Department of Pediatrics, Kumudini Hospital in Dhaka, Bangladesh, observed 60 preterm VLBW babies over a year from [1st August, 2008] to [30th July, 2009]. Inclusion criteria comprised of birth weight under 1500 gm and gestational age less than 37 weeks. Exclusion criteria included life-threatening anomalies and the need for surgery. Detailed prenatal, natal and postnatal data were collected by history, examinations, and structured questionnaires.
Result: This study enrolled and analyzed 60 cases of very low birth weight (VLBW) babies. Among the 60 babies, 5 (8.3%) were born up to 28 weeks, 44 (73.3%) were born between 29-32 weeks of gestation and 11 (18.3%) were born between 33 to less than 37 weeks. Several maternal risk factors were observed in this study, such as prolonged rupture of membrane, previous preterm birth baby, eclampsia, hypertension, and UTI during pregnancy. The majority of the mothers (80%) had regular antenatal checkups. The incidence of VLBW decreased with parity and maternal age.
Conclusion: This study identified crucial risk factors for the incidence of VLBW babies. These risk factors might exert a great influence on the incidence of VLBW babies. Promoting health education, maternal nutrition, and increasing health services during pregnancy are important for reducing VLBW. Health professionals should identify pregnant mothers who are at risk of having babies with VLBW and ensure that women have access to essential health services on the causes of very low birth weight.

Keywords: Threads of preterm, very low birth weight babies, identifying maternal risk factors

Introduction

Birth weight is of paramount importance for the prediction and maintenance of the health status of an individual. Babies with a birth weight below the normal range experience extreme health hazards. One of the most crucial aspects of a baby's growth, survival, and the future is their birth weight [1]. The World Health Organization (WHO) has established a criterion for low birthweight, defining it as a birthweight below 2500 grams irrespective of gestational age [2]. This benchmark is derived from findings indicating that babies weighing under 2500 grams are at a significantly higher risk of mortality compared to those born heavier, with a mortality rate approximately 20 times greater [3]. LBW can be subdivided into very low birth weight (VLBW), defined as less than 1500 grams, and extremely low birth weight (ELBW), defined as less than 1000 grams [4]. The WHO reported in 2015 that 15% of people worldwide were LBW. It was 9% in the US, 6% in East Asia and the Pacific, and 13% in emerging nations [5]. Over the past 40 years, although under-five and infant mortality declined in developing countries, neonatal mortality rates remain static. Approximately 3.9 of the 10.8 million annual deaths in under-fives are neonatal, mostly in rural areas, 50-70 % during the first week of life [6, 7]. Bangladesh has seen a substantial reduction in under-five and infant mortality like any other part of the developing world. VLBW can result from either premature birth, being small for gestational age (indicating slow prenatal growth), or a combination of both factors [8]. In developed nations, preterm birth stands as the primary cause of LBW [9]. Preterm birth (PTB) is characterized by the delivery of babies before completing 37 weeks of pregnancy or fewer than 259 days since the first day of a woman's

last menstrual period [10]. Worldwide, there were 14.84 million preterm births, with the majority happening in Asia and sub-Saharan Africa [11]. The precise causes of prematurity are often unidentified, though they may be linked to factors such as maternal hypertension, acute infections, strenuous physical activity, multiple pregnancies, as well as stress, anxiety, and other psychological elements [12]. Mothers in lower socio-economic conditions often give birth to infants with low birth weight. Furthermore, engaging in physically demanding work during pregnancy is also a contributing factor to poor fetal growth [13]. Adequate and balanced nutrition is essential for a woman during pregnancy to ensure a healthy birth outcome [14]. Women who start pregnancy with poor nutrition are more susceptible to illness, relying on access to and consumption of a balanced diet to meet their increased nutrient requirements during pregnancy [15]. While some studies have attempted to assess the determinants of LBW in Bangladesh, no published research has specifically investigated maternal risk factors associated with very low birth weight in this particular study setting. Therefore, this study aims to identify the maternal risk factors associated with preterm very low birth weight (VLBW) babies.

Methodology & Materials

This prospective observational study was conducted at the Department of Paediatrics in Kumudini Women's Medical College and Hospital, Mirzapur, Dhaka, Bangladesh. The study duration was one year from [1st August, 2008] to [30th July, 2009], the study focused on 60 preterm VLBW babies. Before enrolment, a consent form was taken from every parent of the babies.

Inclusion criteria

- Birth weight less than 1500 gm.
- Gestational age less than 37 weeks.

Exclusion criteria

- Congenital cardiac or other life-threatening anomalies of the babies.
- Patients requiring surgical intervention.

Upon enrollment, thorough documentation of the subjects' prenatal, natal and immediate postnatal experiences was conducted through parental history and clinical examinations utilizing a structured questionnaire. The weight of the babies was measured in grams using a baby weighing scale, while gestational age was initially estimated based on maternal dates and further verified through the Ballard scoring system [15]. Standard laboratory investigations were carried out as per hospital protocols. Daily follow-ups were conducted to document the observations. The collected data were organized into tables or graphs based on relevance, with each presentation accompanied by a clear, descriptive explanation. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software on the Windows platform.

Result

This study enrolled and analyzed 60 cases of very low birth weight (VLBW) babies. The distribution of these babies by gestational age is depicted in Table 1. Among the 60 babies, 5 (8.3%) were born up to 28 weeks, 44 (73.3%) were born between 29-32 weeks of gestation and 11 (18.3%) were born between 33 to less than 37 weeks. Regarding gender distribution, Figure 1 shows that 53.33% of the infants were female, and 46.67% were male. Table 2 illustrates the weight distribution of the infants, revealing that 8 (13.33%) babies weighed below 1000 grams, while 52 (86.67%) weighed between 1000-1499 grams. According to Table 3, out of 60 babies, 34 (56.67%) of the babies were born to mothers up to 25 years of age, 19 (31.67%) of the babies were born to mothers of age group in between 26-30 years, 7(11.7%) of the babies were born to mothers in between 31 to 35 years of age. Table 4 shows that out of 60 VLBW babies, 25(41.7%) were born to primipara mothers, 20 (33.33%) babies were born to mothers with second gravida, 9(15.00%) were born to mothers of third gravida, 4 (6.67%) babies were born to mothers with fourth gravida, and 2 (3.33%) were born to mothers with fifth gravida or more. Among 60 patients, 80% of babies were born to mothers having regular antenatal checkups, and 20% were born to mothers without antenatal checkups (Figure 2). Table 5 shows the Maternal risk factor of VLBW babies: 21(35.00%) babies had a history of prolonged rupture of membrane, 10 (16.67%) babies had a maternal history of previous preterm babies, 8 (13.33%) babies had a history of maternal eclampsia, and 4(6.67%) babies had a maternal history of hypertension, 2(3.33%) babies with maternal UTI (Figure 3).

Table 1: Distribution of VLBW babies by gestational age (N=60)

Gestational age	Frequency (n)	Percentage (%)
Up to 28 weeks	5	8.33
29-32 weeks	44	73.33
33 to less than 37 weeks	11	18.33

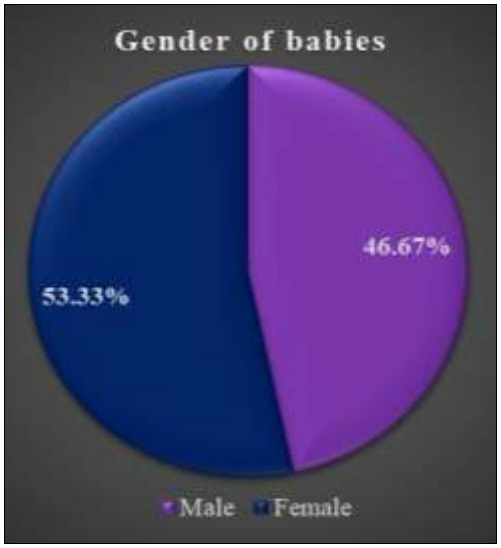

Fig 1: Distribution of VLBW babies by sex (N=60)

Table 2: Birthweight distribution of the VLBW babies (N=60)

Birthweight	Frequency (n)	Percentage (%)
Below 1000 gm	8	13.33
1000-1499 gm	52	86.67

Table 3: Maternal age distribution of the study mothers (N=60)

Age groups	Frequency (n)	Percentage (%)
Up to 25 years	34	56.67
26-30 years	19	31.67
31-35 years	7	11.67
Total	60	100.00

Table 4: Gravida distribution of the study mothers (N=60)

Gravida	Frequency (n)	Percentage (%)
1st	25	41.67
2nd	20	33.33
3rd	9	15.00
4th	4	6.67
≥ 5th	2	3.33
Total	60	100.00

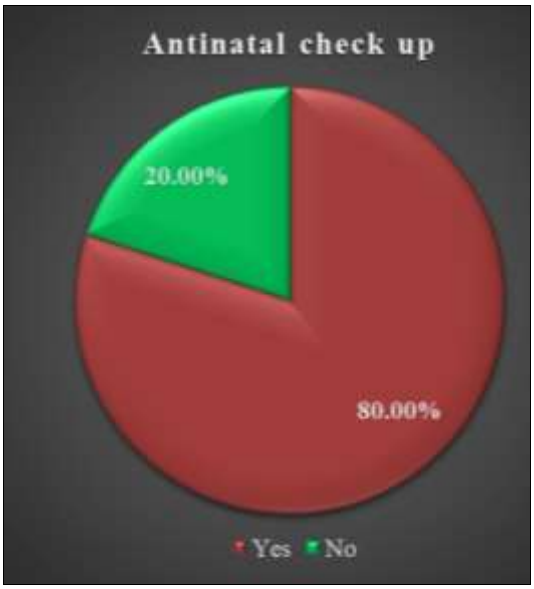

Fig 2: Distribution of antenatal cheek up

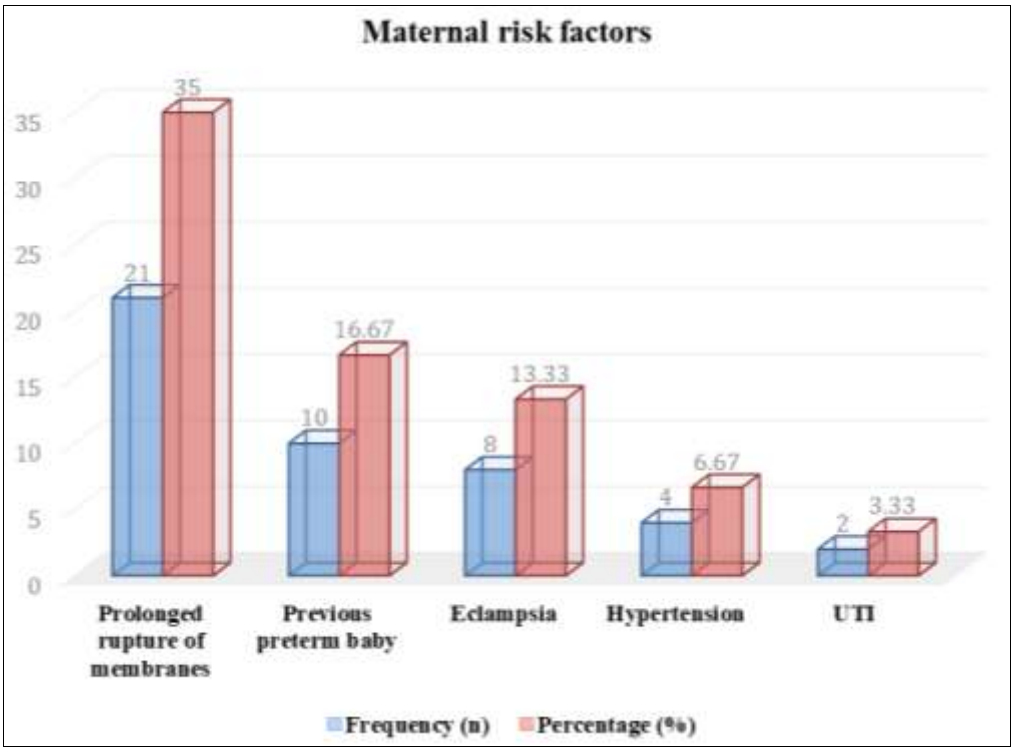

Fig 3: Maternal risk factor of VLBW babies (in percentage)

Table 5: Maternal risk factor of VLBW babies (N=60)

Risk factor	Frequency (n)	Percentage (%)
Prolonged rupture of membranes	21	35.00
Previous preterm baby	10	16.67
Eclampsia	8	13.33
Hypertension	4	6.67
UTI	2	3.33

Discussion

Factors associated with low birth weight, often termed as "risk factors" and their presence in an individual woman indicates an increased chance, or risk, of bearing a preterm low birth weight infant. Globally, VLBW is the indicator of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work and poor

pregnancy health care. The results of this study found that maternal age was a predictor of low birth weight. Some studies found significant association between maternal age and birth weight of baby [16, 17], while other research did not find significant relationship [18, 19]. This difference might be due the difference in socio-demographic characteristics of study participants and the difference in the techniques and methods of the study. In our study, gestational age of the fetus decreases from the standard gestational age (37 weeks). A similar study conducted in Iran found the gestational age less than or equal to 37 weeks in 41.76% patients [1]. There is slight preponderance of female babies over male babies in this study comprising 53.33% male and 46.67% female. Moradi *et al*. also found 51.6% girl and 48.35% boy babies in their study [1]. The body weight of the fetus falls dramatically due to prematurity. The majority (86.67%) of birthweights fall within the 1000-1499 gram range, with a smaller proportion (13.33%) falling below 1000 grams. This is in conformity with other study that increasing birth weight has a marked influence towards better survival of these babies [20]. According to our study, maternal age during antenatal period was associated with low birth weight. Other studies also observed similar findings [21]. Mothers who deliver after the age of 35 years had lower odds to have a low birth weight baby which is similar to other studies [22-24]. This might be because higher age groups might be less likely to deliver low birth weight infants usually as the pregnancy might be planned and wanted, which leads to giving more attention to the dietary value and healthcare services utilization and increased awareness of pregnancy's danger signs and main risk factors [24]. Our study showed that the majority of the women (41.67%) were experiencing their first pregnancy which is comparable with the study of Moradi *et al*. [1]. In our observation, 20% of mothers had no antenatal care before the delivery of VLBW babies. This study conforms with another study [18]. Proper antenatal care is an important factor for reducing the risk of VLBW babies either by diagnosis and timely treatment of pregnancy complications or by eliminating or reducing modifiable risk factors. According to our study, the occurrence of premature rupture of the membrane was 35% and the history of previous preterm baby was 16.67%. Eclampsia is an important risk factor for VLBW babies, 13.33% of VLBW babies in the study were born to mothers who had eclampsia. Hypertension also contributes an important risk factor of VLBW babies, in this study which was found to be in 6.67% of VLBW babies. 3.33% of the mothers also had a history of UTI during pregnancy. Regarding maternal risk factors of VLBW babies, almost consistent results found in the observation of Feresu et al. [25].

Limitations of the study: Every hospital-based study has some limitations and the present study undertaken is no exception to this fact. The limitations of the present study are mentioned. Therefore, the results of the present study may not be representative of the whole of the country or the world at large. The number of patients included in the present study was less in comparison to other studies. Because the trial was short, it was difficult to remark on complications and mortality.

Conclusion and Recommendations

This study was an enthusiastic approach to finding out risk factors in VLBW babies. This is a hospital-based study of 60 babies and is not representative of the whole population. However, it can be suggested from this study that VLBW is a major problem in Bangladesh. The maternal risk factors like premature rupture of membrane, previous pre-term babies, diseases during pregnancy, antenatal check-ups, and nutritional status of the mother give birth to VLBW babies. It was also observed that younger mothers were more prone to give birth to VLBW babies. Ensuring the widespread facilities for the management of high-risk pregnancy and also the management of labor is of pivotal importance. The development and implementation of intensive maternal health care and fetal monitoring are essential to reduce the incidence of VLBW babies. These services should be developed widely all over the country.

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Conflict of interest: None declared.

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