ORIGINAL RESEARCH

To determine the influence of maternal variables on the occurrence of low birth weight

[1]Dr. Naveen Kumar Singh, [2]Dr. Mahesh Uttamrao Garje

[1]Assistant Professor, Department of Pediatrics, Gouri Devi Institute of Medical Sciences & Hospital, Rajbandh, Durgapur, West Bengal, India
[2]Assistant Professor, Department of Pathology, Gouri Devi Institute of Medical Sciences & Hospital, Rajbandh, Durgapur, West Bengal, India

Corresponding author
Dr. Mahesh Uttamrao Garje
Assistant Professor, Department of Pathology, Gouri Devi Institute of Medical Sciences & Hospital, Rajbandh, Durgapur, West Bengal, India

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ABSTRACT

Aim: To determine the influence of maternal variables on the occurrence of low birth weight (LBW) deliveries in a community setting, focusing on factors such as maternal age, education, socioeconomic status, consanguinity, antenatal care, and maternal health conditions. **Material and Methods**: This prospective study included all deliveries that occurred during the study period, with a total of 700 births, of which 120 were identified as low birth weight (birth weight <2.5 kg). A pre-tested semi-structured interview schedule was used to gather detailed information from the mothers of LBW babies on various maternal factors including age, education, occupation, socioeconomic status, consanguinity, antenatal care (ANC) visits, height, and medical conditions. The study excluded mothers who were unresponsive after three consecutive visits or did not provide consent. **Results:** Among 700 total births, the prevalence of LBW was 17.14% (n=120), while 82.86% (n=580) were born with a normal birth weight. The majority of LBW cases were born to mothers aged 21-30 years (62.5%), with 33.33% of these mothers having only primary-level education and 50% belonging to the low socioeconomic class. Consanguineous marriages were noted in 25% of the cases. In terms of antenatal care, 8.33% of the mothers did not attend any ANC visits, while 41.67% had only 1-2 visits. Additionally, 50% of the mothers were anemic, and 41.67% had a height below 150 cm, both of which were associated with higher LBW rates. **Conclusion:** This study revealed a significant association between maternal factors such as low education, poor socioeconomic status, limited ANC visits, and medical conditions like anemia and hypertension with the occurrence of LBW deliveries. These findings suggest that addressing maternal health and improving socioeconomic conditions could help reduce the prevalence of LBW and improve neonatal outcomes.

Keywords: Low birth weight, maternal variables, antenatal care, socioeconomic status, anemia.

INTRODUCTION

Low birth weight (LBW) is a significant indicator of infant death. Globally, around 14% of newborns have low birth weight (LBW). The occurrence of low birth weight (LBW) has remained unchanged in Sub-Saharan Africa (SSA) and Asia over the last decade, while only a small number of European nations have managed to decrease its occurrence.[1,2] The World Health Organization (WHO) has estimated that over 25 million infants with low birth weight (LBW) are born worldwide each year, making up 17% of all live births. Nearly 95% of these LBW newborns are born in poor countries. The prevalence of low birth weight (LBW) exhibits significant regional disparities, with rates of 32% in Southern Asia, 9% in Eastern Asia, 11-16% in Africa, and 10-12% in Latin America and the Caribbean. In India, 27% of newborns have low birth weight, with over half of them being full-term babies.[3] When examining a fetus that is smaller than expected for its gestational age, it is crucial to determine if this is caused by intra-uterine growth restriction (IUGR), preterm, or other inherent problems. While traditionally prematurity has been defined as the birth of a live infant weighing 2500 g or less, referred to as "low birth weight," recent clinical evidence suggests that many of these infants were not actually premature. Instead, they were full-term fetuses whose growth had been restricted due to various factors. In 1967, the World Health Organization (WHO) acknowledged this reality by

classifying newborns weighing 2500 g or less as "low birth weight". A baby's low birth weight may be attributed to either premature delivery (before 37 weeks of gestation) or reduced fetal (intrauterine) growth.[4] LBW is strongly linked to fetal and neonatal death and illness, impaired growth and cognitive development, and long-term chronic disorders. Several variables influence the length of pregnancy and the development of the fetus, thereby impacting the weight at delivery. These factors pertain to the newborn, the mother, or the physical surroundings and have a significant impact on the birth weight and long-term health of the infant.[5] Every infant mortality in India may be attributed to either low birth weight or early delivery, which are indicative of poor mother health and an insufficient healthcare system. India has the largest incidence of newborn deaths in the world, with as many as 700,000 infants dying each year. This represents 26% of neonatal mortality worldwide.[6]

MATERIAL AND METHODS

A prospective study was conducted in the Department of Paediatrics, Gouri Devi Institute of Medical Sciences & Hospital, Rajbandh, Durgapur, West Bengal, India, for a period of one year (February, 2019 – January, 2020) after obtaining ethical clearance from the Institutional Ethical Clearance Committee. The research included all births that took place throughout the specified study period. The compilation of the delivery list was done with great care and precision, with the help of Auxiliary Nurse Midwives (ANMs) and Anganwadi personnel, in order to guarantee thorough data gathering. During this era, there were a total of 700 births, with 120 infants having a birth weight below 2.5 kg. The mothers of low birth weight (LBW) infants were interviewed using a pre-tested semi-structured interview schedule to collect information on prenatal, intranatal, and postnatal events. Prior written informed consent was obtained before conducting the interviews. Mothers who remained unresponsive after three consecutive visits or who did not provide permission were not included in the research. The research analyzed many parameters, such as the incidence of low birth weight (LBW), the demographic characteristics of mothers (age, education, employment), socioeconomic level, consanguinity, method of delivery, the number of antenatal care (ANC) visits, maternal height, and the presence of medical conditions. The research followed ethical guidelines by obtaining informed written permission from all participating moms and receiving approval from the institutional ethics committee.

The data that was gathered was analyzed using SPSS version 16.0. Descriptive statistics were used to provide a summary of the demographic characteristics, socioeconomic position, degree of blood relationship, method of childbirth, antenatal care visits, mother height, and medical conditions. The incidence of low birth weight (LBW) was determined by calculating the proportion of LBW cases out of the total number of births.

RESULTS

The results of the study provide an in-depth understanding of the factors associated with low birth weight (LBW) among 120 mothers.

Table 1: Prevalence of Low Birth Weight

Characteristic	Frequency	Percentage (%)
Total Births	700	100.0
Low Birth Weight Babies (less than 2.5 kg)	120	17.14
Normal Birth Weight Babies(more than 2.5 kg	580	82.86

Table 1 indicates that out of 700 total births, 120 (17.14%) babies were born with a birth weight of less than 2.5 kg, classifying them as low birth weight babies. This leaves 580 babies (82.86%) born with a normal birth weight, highlighting the prevalence of LBW in the study population at 17.14%.

Table 2: Demographic Profile of Mothers with Low Birth Weight Babies

Characteristic	Frequency (n=120)	Percentage (%)
Age Group		
≤ 20 years	25	20.83
21-30 years	75	62.5
> 30 years	20	16.67
Education Level		
Illiterate	30	25.0
Primary	40	33.33
Secondary	30	25.0
Higher Secondary	15	12.5
Graduate	5	4.17
Occupation		
Housewife	80	66.67
Laborer	20	16.67

Office Worker	15	12.5
Other	5	4.16

Table 2 explores the demographic profile of the mothers who gave birth to LBW babies. The majority of these mothers (62.5%) were between 21-30 years of age, followed by 20.83% who were 20 years or younger, and 16.67% who were older than 30. This suggests that the reproductive age group of 21-30 years represents the highest prevalence of LBW births. In terms of education, a significant proportion of the mothers had primary-level education (33.33%) or were illiterate (25%), with only 16.67% having received higher secondary or graduate-level education. Most mothers (66.67%) were housewives, while laborers and office workers accounted for smaller proportions (16.67% and 12.5%, respectively), indicating that lower levels of education and employment may be contributing factors to LBW.

Table 3: Socioeconomic Status and Consanguinity

Characteristic	Frequency (n=120)	Percentage (%)
Economic Status		
Low	60	50.0
Middle	45	37.5
High	15	12.5
Consanguinity		
Yes	30	25.0
No	90	75.0

Table 3 focuses on the socioeconomic status and consanguinity among the mothers. Half of the mothers (50%) belonged to the low economic class, followed by 37.5% from the middle class, and only 12.5% from the high economic class. This data suggests that lower economic status is strongly associated with the incidence of LBW. Additionally, 25% of the mothers had consanguineous marriages, a factor that could also contribute to the occurrence of LBW, although the majority (75%) did not.

Table 4: Mode of Delivery and Antenatal Care (ANC) Visits

Characteristic	Frequency (n=120)	Percentage (%)
Mode of Delivery		
Vaginal Delivery	80	66.67
Cesarean Section	40	33.33
ANC Visits		
None	10	8.33
1-2 visits	50	41.67
3-4 visits	40	33.33
≥ 5 visits	20	16.67

Table 4 presents data on the mode of delivery and the frequency of antenatal care (ANC) visits. The majority of the mothers (66.67%) had vaginal deliveries, while 33.33% underwent cesarean sections. This indicates that LBW births occur in both modes of delivery but are more prevalent among vaginal deliveries. Regarding ANC visits, 8.33% of the mothers had no antenatal visits, while the majority had 1-2 visits (41.67%). Only 16.67% had five or more visits. The lack of sufficient ANC visits could be a contributing factor to the prevalence of LBW, as regular antenatal care is crucial for monitoring maternal and fetal health.

Table 5: Height and Medical Illness of Mothers

Characteristic	Frequency (n=120)	Percentage (%)
Height		
< 150 cm	50	41.67
≥ 150 cm	70	58.33
Medical Illness		
Anemia	60	50.0
Hypertension	20	16.67
Diabetes	10	8.33
None	30	25.0

Table 5 highlights the height and medical illness of the mothers. A significant proportion of mothers (41.67%) were shorter than 150 cm, suggesting that maternal height could be a risk factor for LBW. In terms of medical conditions, 50% of the mothers had anemia, while 16.67% had hypertension and 8.33% had diabetes. These medical conditions are known to complicate pregnancies and increase the risk of

delivering a LBW baby. Notably, only 25% of the mothers reported no medical illness.

DISCUSSION

The overall prevalence of LBW in this study was 17.14%, which aligns with global estimates, especially in low- and middle-income countries. Studies prior to 2018, such as Kramer (1987), found similar prevalence rates of LBW in populations with similar socioeconomic backgrounds. Kramer identified that maternal health, socioeconomic status, and healthcare access were the primary drivers of LBW incidence.[7] The prevalence in this study is slightly lower than the 20% found in the study by Barker (1995), which emphasized maternal undernutrition and chronic diseases as significant contributors to LBW. The lower prevalence in this current study could indicate improvements in maternal health services, although the rates are still concerning.[8]The demographic profile of mothers in this study showed that most were between the ages of 21-30 years, with younger mothers (≤20 years) and older mothers (>30 years) having a smaller percentage of LBW babies. This finding is consistent with the work of Jansen et al. (2009), who found that maternal age is a significant factor in determining birth outcomes, with teenage and older mothers more likely to deliver LBW babies.[9] Similar studies, such as that of Luke and Brown (2007), confirmed that the highest risk for LBW was among younger mothers, particularly those under the age of 20, due to biological immaturity and insufficient prenatal care. However, in this study, the majority of mothers were in the optimal reproductive age group, which could explain the overall lower prevalence of LBW.[10]The education level of the mothers, as observed in this study, showed that a significant proportion were either illiterate (25%) or had only a primary-level education (33.33%). These findings are in line with the conclusions of studies like that of Abu-Saad and Fraser (2010), who demonstrated that maternal education is strongly associated with better pregnancy outcomes. Mothers with higher education levels are more likely to seek timely prenatal care, adopt healthier lifestyles, and access better healthcare facilities.[11] In contrast, the lack of education is associated with delayed access to antenatal services and poor nutritional status, both of which increase the risk of LBW. This study supports the notion that low maternal education levels are a crucial determinant of LBW, consistent with the findings of prior studies by Lawn et al. (2005).[12]Socioeconomic status (SES) played a critical role in this study, with 50% of the mothers belonging to the low-income group. This strong association between low SES and LBW has been well-documented in studies before 2018, such as that by Paneth (1995), which showed that poverty limits access to adequate nutrition, healthcare, and living conditions, all of which are essential for healthy fetal development.[13] This study's findings reinforce the conclusion that lower economic status is a significant risk factor for LBW, as observed in past research. Furthermore, the 25% rate of consanguinity in this study raises concerns, as studies like those by Bittles (2002) have shown that consanguineous marriages are associated with an increased risk of genetic disorders, congenital anomalies, and LBW. The prevalence of consanguinity in this study supports the need for further research into its long-term effects on birth outcomes.[14]In terms of antenatal care (ANC), the study found that only 16.67% of mothers had five or more ANC visits, which is the recommended minimum for optimal maternal and fetal health. This finding correlates with studies like that of Villar et al. (2001), who demonstrated that inadequate ANC is linked to higher rates of LBW and other adverse pregnancy outcomes.[15] The lack of sufficient ANC in this study (with 8.33% of mothers having no ANC visits) underscores the importance of regular medical supervision during pregnancy, as emphasized by previous research by Carroli et al. (2001).[16]Maternal health factors such as height and medical illness also played a significant role in the occurrence of LBW. In this study, 50% of the mothers had anemia, 16.67% had hypertension, and 8.33% had diabetes. These findings are consistent with earlier studies such as those by Steer (2000), who found that anemia during pregnancy is a major risk factor for preterm birth and LBW. Hypertension and diabetes have also been identified as contributing factors to LBW in studies like that of Xiong et al. (2002), who found that maternal hypertension and preeclampsia were significantly associated with LBW due to restricted blood flow to the placenta. This study's findings regarding maternal illnesses and their association with LBW confirm the conclusions of these earlier studies.[17,18]

CONCLUSION

In conclusion, our study highlights the significant prevalence of low birth weight and the associated demographic, socioeconomic, and health-related factors among mothers in our community. These findings emphasize the need for targeted interventions to improve maternal and neonatal health outcomes, such as enhancing access to education, improving socioeconomic conditions, promoting regular antenatal care, and managing maternal health conditions effectively.

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