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Original Research Article

To Determine the Impact of Maternal Variables on the Occurrence of LBW Deliveries: An Observational Study

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Abstract

Aim: To determine the influence of maternal variables on the occurrence of low birth weight deliveries in the state of Bihar.

Material and Methods: This study was done in the Department of Pediatrics, SKMCH, Muzaffarpur, Bihar, India. During this era, there were a total of 650 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.

Results: The research included a total of 650 births, with 120 infants being categorized as having low birth weight (weighing less than 2.5 kg). This yielded a prevalence rate of 18.46% for low birth weight. Out of the total number of newborns, 530 of them had a birth weight that was within the normal range, which makes up 81.54% of the total. Out of all the births, 66.67% were delivered vaginally and 33.33% were delivered by cesarean section. The percentage distribution of prenatal care (ANC) visits among the mothers is as follows: 8.33% had no ANC visits, 41.67% had 1-2 visits, 33.33% had 3-4 visits, and 16.67% had five or more visits. Regarding the height and medical conditions of the moms, 41.67% of them had a height below 150 cm, while 58.33% had a height of 150 cm or above. With respect to medical conditions, half of the moms had anemia, 16.67% had hypertension, 8.33% had diabetes, and 25% had no medical conditions.

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.

Keywords: Risk factors, Low birth weight, Socioeconomic status,

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

This study was done in the Department of Pediatrics, SKMCH, Muzaffarpur, Bihar, India for 18 months . 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 650 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 25.0. 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 study included a total of 650 births, out of which 120 babies were classified as low birth weight (birth weight less than 2.5 kg), resulting in a prevalence rate of 18.46% for low birth weight. The remaining 530 babies had a normal birth weight, accounting for 81.54%. (Table 1).

Table 2 show that the demographic profile of mothers with low birth weight babies, 20.83% were aged 20 years or younger, 62.5% were between 21-30 years old, and 16.67% were over 30 years old. Regarding education, 25% of the mothers were illiterate, 33.33% had primary education, 25% had secondary education, 12.5% had higher secondary education, and 4.17% were graduates. The majority of these mothers were housewives (66.67%), followed by laborers (16.67%), office workers (12.5%), and a small portion had other occupations (4.16%).

Table 3 show that socioeconomic status and consanguinity, 50% of the mothers belonged to the low economic status group, 37.5% were from the middle economic status group, and 12.5% were from the high economic status group. Furthermore, 25% of the mothers had a history of consanguinity, while 75% did not.

Table 4 show that the mode of delivery and antenatal care visits, 66.67% of the births were vaginal deliveries, and 33.33% were cesarean sections. For antenatal care (ANC) visits, 8.33% of the mothers had no ANC visits, 41.67% had 1-2 visits, 33.33% had 3-4 visits, and 16.67% had five or more visits.

Table 5 considering the height and medical illnesses of the mothers, 41.67% of the mothers were shorter than 150 cm, while 58.33% were 150 cm or taller. Regarding medical illnesses, 50% of the mothers had anemia, 16.67% had hypertension, 8.33% had diabetes, and 25% had no medical illnesses.

Table 1: Prevalence of Low Birth Weight

Characteristic	Frequency	Percentage (%)
Total Births	650	100.0
Low Birth Weight Babies (less than 2.5 kg)	120	18.46
Normal Birth Weight Babies(more than 2.5 kg	530	81.54

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 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 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 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

Discussion

The birth weight of a child is a significant measure for assessing reproductive health and the overall condition of the population. Low birth weight (LBW) is the most significant indicator of infant mortality, particularly for fatalities occurring during the first month of life. Infants born with low birth weight (LBW) have a higher likelihood of mortality during infancy. Additionally, many LBW newborns have permanent cognitive abnormalities and face an elevated risk of acquiring non-communicable illnesses in adulthood. Based on the prenatal genesis of illness concept, commonly referred to as Barker's hypothesis, inadequate nutrition during crucial periods of fetal development might lead to a higher susceptibility to adult degenerative diseases such as hypertension, diabetes mellitus, hyperlipidemia, and syndrome X. Early detection and management of risk factors may effectively minimize mortality caused by LBW. Therefore, this research was conducted to ascertain the prevalence and determinants linked to low birth weight (LBW) in order to develop effective ways to address this issue [7].

The prevalence rate of low birth weight in our research, which stands at 18.46%, aligns with the results of previous studies done in comparable situations. An illustrative instance is the research conducted by Xiong et al. (2018), which revealed that the occurrence of low birth weight in a rural community in China was 17.5%. This finding emphasizes the presence of comparable demographic and socioeconomic characteristics [8]. In addition, a research conducted by Kumar et al. (2017) discovered that there was a prevalence rate of 19.3% in a similar community context in India. This highlights the importance of maternal nutrition and availability to healthcare. The demographic profile of mothers with low birth weight babies in our study revealed that a majority (62.5%) were between 21-30 years old. This age group is often associated with better health outcomes due to improved access to health care and education. [9] However, 20.83% of mothers were aged 20 years or younger, which is a critical factor as younger mothers are often at higher risk for complications leading to low birth weight. This is corroborated by a study by Scholl et al. (2016), which found that teenage mothers are more likely to have low birth weight babies due to factors such as inadequate prenatal care and nutritional deficiencies [10] .

Regarding education, our study found that 25% of mothers were illiterate, while 33.33% had primary education. Education level is a significant determinant of maternal and child health. Mothers with higher education levels tend to have better health outcomes due to increased awareness and utilization of health services. This finding is supported by a study by Ghosh et al. (2015), which demonstrated that maternal education is strongly associated with improved birth outcomes, including higher birth weights [11] .

The majority of mothers (66.67%) in our study were housewives, while 16.67% were laborers. Occupational status often correlates with socioeconomic status and access to health care. A study by Rana et al. (2019) highlighted that occupational stress and physical labor during pregnancy are significant risk factors for low birth weight [12] .

Our study found that 50% of the mothers belonged to the low economic status group. Low socioeconomic status is a well-known risk factor for low birth weight due to limited access to nutrition and health care services. This is supported by a study conducted by Bhargava et al. (2018), which found a strong association between low socioeconomic status and increased risk of low birth weight [13] .

Additionally, 25% of the mothers in our study had a history of consanguinity. Consanguinity can increase the risk of genetic disorders and congenital anomalies, which can contribute to low birth weight. This finding aligns with a study by Bittles et al. (2015), which highlighted the increased risk of adverse birth outcomes in consanguineous marriages [14] .

Our study found that 66.67% of births were vaginal deliveries, while 33.33% were cesarean sections. The mode of delivery can influence birth weight, with some studies suggesting that cesarean deliveries are associated with higher birth weights due to elective timing and avoidance of labor stress. However, our study did not find a significant difference in birth weights based on the mode of delivery, similar to findings by Smith et al. (2017) [15] .

Regarding antenatal care visits, 8.33% of mothers had no ANC visits, while 41.67% had 1-2 visits. Regular ANC visits are crucial for monitoring and managing maternal and fetal health. A study by Villar et al. (2014) found that adequate ANC visits significantly reduce the risk of low birth weight by allowing early detection and management of complications [16].

In our study, 41.67% of mothers were shorter than 150 cm. Maternal height is a known predictor of birth weight, with shorter stature associated with higher risk of low birth weight due to potential nutritional deficiencies and health issues. This finding is consistent with a study by Zhang et al. (2016), which found a significant association between maternal height and birth weight [17] .

Regarding medical illnesses, 50% of mothers in our study had anemia, 16.67% had hypertension, and 8.33% had diabetes. These conditions are well-

established risk factors for low birth weight. Anemia, in particular, can reduce oxygen delivery to the fetus, while hypertension and diabetes can lead to placental insufficiency. A study by Rahman et al. (2018) highlighted the critical impact of maternal health conditions on birth weight [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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