

Original Research Article

Maternal determinants of low birth weight- a record-based study from a tertiary care centre in central India

Parvati Nair, Sarita Wadhva*, Ujwala Ukey, Uday Narlawar, Aditi Dabir

Department of Community Medicine, Government Medical College, Nagpur, Maharashtra, India

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*Correspondence:

Dr. Sarita Wadhva,

E-mail: saritawadhva@yahoo.com

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ABSTRACT

Background: Birth weight is a major determinant of child's health and nutrition. There are various factors which determine birth weight like maternal age, parity, socio economic status etc. A new born weighing less than 2.5 kg is classified as a low birth weight (LBW) baby. Low birth weight can be prevented by improving health status and socio-economic status of the community, improving antenatal care and also by providing proper health education.

Methods: A record-based study was carried out in a tertiary care facility of central India. Labour room records from January 2021 to December 2021 were reviewed. The details on birth weight, gender, gestational age, parity, and mode of delivery were obtained and recorded. The data obtained was entered in Microsoft office excel software. Statistical analysis was carried out with the help of open Epi.

Results: Out of 4266 records which were studied 46.65% mothers were in the age group 21-25 years and 53.52% were multiparas. The proportion of LBW was found to be 41.30%. LBW was found to have a significant association between age of mother, parity, residence and gender of the baby.

Conclusions: In this study, sociodemographic factors, maternal age and multiparity has contributed substantially to LBW. Hospitals should inform pregnant women about the importance of appropriate age at conception. It is high time to discuss the aftereffects of older maternal age in detail and to focus more on biological components underlying these associations.

Keywords: Low birth weight, Maternal age, Maternal determinants, Parity

INTRODUCTION

'A good start in life begins in the womb'.¹ Birth weight is the first weight of the newborn obtained after birth preferably measured within the first hour of life before significant postnatal weight loss has occurred.² WHO defines low birth weight (LBW) as weight at birth of <2500 gm.³ LBW is a public health indicator of maternal and fetal health, nutrition and poverty and contributes significantly to long term disabilities like stunted growth and lower IQ. The effects of LBW can continue in adulthood in the form of chronic conditions like obesity, diabetes and cardiovascular disorders. The main causal factors are Intrauterine Growth Restriction (IUGR) and preterm birth.^{4,5}

According to UNICEF-WHO LBW estimates 2019, nearly 15% of babies worldwide are born with LBW. Earlier studies show that out of 20.5 million LBW babies born globally in 2015, nearly half were born in Southeast Asia. This is despite of the fact that birth weight details are not available for nearly one in three children globally.¹ Since health and nutritional status of mothers play a major role in LBW of babies, the societies they belong to also have a crucial function.

Research carried out in developed and developing nations has revealed that various determinants of LBW are maternal malnutrition, preceding history of preterm delivery, maternal diseases like antepartum hemorrhage, anaemia, cervical incompetence, adolescent pregnancy,

elderly pregnancy (>35 years), inadequate prenatal care, short birth interval, underweight mothers, hypertension, diabetes etc. Different sociodemographic factors affecting mothers such as living in rural residence, poor economic status and illiteracy also play a significant role.⁶ Improving health status and socioeconomic position of community, antenatal care, health promotion and education can help to accomplish changes to present circumstances to a certain extent.

With this background the present study was undertaken in an attempt to know the proportion of LBW babies delivered at a tertiary care centre taking into account various factors like maternal age, social and obstetric elements etc.

METHODS

Study design and study duration

A record-based study was carried out in a tertiary care facility of Central India wherein labor room records for one year from January 2021 to December 2021 were reviewed. The study duration was two months- from January 2022 to February 2022.

Study setting

The study setting was a government owned tertiary care centre, where an average of 15 to 20 deliveries are conducted per day.

Sampling technique

Universal sampling technique was resorted to wherein records of all women who delivered between January 2021 to December 2021 were obtained. Records of women who had adverse obstetric outcomes like abortion or multiple pregnancies were excluded from the study, thus a total of 4266 records were reviewed.

Data collection and management

The data abstraction tool included details on various variables like birth weight, gender, gestational age, parity, and mode of delivery. The data obtained was entered in Microsoft office excel software. Statistical analysis was carried out with the help of Epi info 7.2.5.0. Percentages and mean were calculated, chi square test was applied and $p < 0.05$ was considered to be significant.

All data obtained was treated with utmost confidentiality.

RESULTS

Analysis was restricted to 4266 singleton births after excluding abortions and multiple pregnancies. The study included records of small for age (SGA), IUGR, preterm and stillbirths with 1955 (45.8%) females and 2311 (52.2%) males. Of the 4266 babies born during the study

period in the tertiary care centre, 1762 (41.30%) had LBW of which 902 (51.19%) were male and 860 (48.81%) were female. About 74% of the study subjects were urban residents.

Table 1: Distribution of study subjects according to sociodemographic factors.

Variables	Frequency	Percentage
Age (in years)	15-20	366
	21-25	1990
	26-30	1347
	31-35	443
	>35	120
Religion	Hindu	3516
	Buddhist	548
	Muslim	141
	Christian	58
	Jain	3
Residence	Urban	3159
	Rural	1107

Table 1 shows sociodemographic characteristics of study subjects- most of the study subjects (3337, 78.23%) were in the age group 21-30 years, majority were Hindus (3516, 82.42%) and 3159 (74%) of the study subjects lived in urban areas.

Table 2: Distribution of study subjects according to mode of delivery and parity.

	Number	Percentage
Mode of delivery	Full term normal delivery	2662
	Full term LSCS	849
	Preterm normal delivery	547
	Preterm LSCS	203
	Post term LSCS	5
Parity	>3	183
	2-3	2100
	Primi	1983

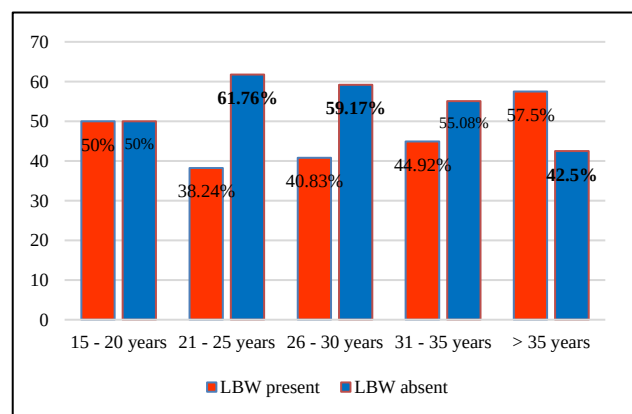


Figure 1: Distribution of age against birth weight.

Mode of delivery and parity is seen in Table 2. Most common mode of delivery was full term normal delivery. A total of 2662 (62.40%) full term normal deliveries were conducted whereas there were 547 (12.82%) and 203 (4.76%) preterm normal deliveries and preterm LSCS respectively and 2283 (53.52%) study subjects were multiparas.

Figure 1 shows LBW was highest in the age group of >35 years, 57.5% mothers aged >35 years delivered LBW babies. LBW was least in the age group of 21-30 years.

Table 3: Factors influencing LBW.

		LBW present (n)	LBW absent	P value
Age (years)	<30	1494	2093	0.0005
	≥30	268	295	
Residence	Urban	1259	1900	0.0006
	Rural	503	604	
Parity	≥2	896	1387	0.001
	Primi	866	1117	
Religion	Hindu	1437	2079	0.198
	Buddhist	235	313	
	Muslim	68	73	
	Christian	22	36	
	Jain	0	3	
Gender	Male	902	1409	0.001
	Female	860	1095	

Table 3 shows that a total of 1762 (41.30%) study subjects had LBW babies. There was statistically significant association between LBW and various factors like maternal age (0.0005), residence (0.0006), parity (0.001) and gender of the baby (0.001) (Table 3).

DISCUSSION

In this study, the proportion of LBW was found to be 41.30%. Bhattacharjya et al had carried out a study in a similar set up wherein LBW proportion was found to be 23.9%.⁷ Another research carried out by Pal et al in various districts of West Bengal revealed that nearly one-fifth (21.49%) infants had LBW.⁴ LBW prevalence in tribal infants in India were found to be 39.89% in a literature published by Das et al.⁸ A similar hospital-based study was carried out in Tanzania which reported that prevalence of LBW was 26.4%.⁶ The prevalence of LBW has significantly declined from 20.4% (95%CI 19.4-21.4) to 16.4% (95% CI 16.1-16.8) in the last decade according to a study published by Khan et al interpreting NFHS4 data.⁹

Deka et al reported in their study that there is a significant association between maternal age and birth weight.¹⁰ The present study shows that both maternal age and parity plays a significant role in LBW of babies. A similar observation was spotted in a hospital-based study done by Goel showing significant variation in birth weight with

maternal age.¹¹ A study carried out by Wang et al revealed that the risk of LBW increased by 13.3% per year increase in maternal age when maternal age was greater than 36 years.¹² Also, a study done in Ethiopia indicated that mothers above 40 years had greater risk of delivering a baby with LBW. The study findings were also supported by Widiyanto et al with their research proving that there is a significant relationship between maternal age and LBW.¹³ A study in Guwahati by Gogoi concluded that LBW was significantly associated with maternal age <18 years.¹⁴

The present study shows that there is statistical significance between gender of the baby and LBW. Similar findings were observed in a study conducted by Sarika et al.¹⁵ Not many studies are available in this context. Our study showed significant association between residence and LBW contrary to a case control study conducted in Nanded by Domple et al.¹⁶ The quality of women's eggs declines as her age progresses leading to pregnancy related complications. Also, they are more prone to suffer from chronic illnesses like hypertension and diabetes. Various other factors like ethnicity, education, smoking, economic and nutritional status also play a vital role as mentioned in different international studies in Washington, Chicago, Finland, Bangladesh and also in some Indian studies.^{5,17,18}

In this study the prevalence of LBW is high in mothers of age between 21 and 25 years. The rationale behind this can be firstly the number of mothers of less than 20 years old and those of more than 30 years of age who gave birth were very small in number as compared to that of mothers of 21 to 25 years of age.

Since this study was record based it has certain limitations as many details could not be obtained like maternal height, weight, nutritional and educational status and family income. Some other factors like psychological stress, domestic violence, and quality of antenatal care received by the pregnant women, which may have some effect on LBW were not studied. Besides these limitations a large sample size remains a great advantage to this study.

CONCLUSION

Multiparity and maternal age contribute substantially to LBW. For reducing the prevalence of low birth weight, public health strategy needs to focus attention on better maternal nutrition and education. There is a need of ensuring proper antenatal care and also highlighting the need for basic supportive care facilities and improved disease prevention strategies. Even though there is extensive research regarding the fatal consequences of adolescent pregnancy, the possible outcomes of delaying first birth are very less discussed. It is high time to discuss the aftereffects of older maternal age in detail and to focus more on biological components underlying these associations.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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