

Original Research Article

A study on predictors of low birth weight

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ABSTRACT

Background: purpose of this study was to determine prevalence of maternal and social risk factors of low birth weight. The purpose of this study is to prevalence of maternal and social risk factors of low birth weight.

Methods: The cross-sectional and comparative study was carried out by reviewing medical records of newborn delivered for one year in 250 newborn. Birth weight was categorized into two as low birth weight (birth weight <2500 grams), considered as cases, and normal birth weight (birth weight ≥2500 grams), considered as controls or the reference birth weight.

Results: In our study mother's age, socioeconomic, educational status, occupation as significant variables to be associated with low birth weight. caesarean section increased significantly with decrease in gestational age and maternal weight, history of abortion, iron supplementation Hypertension, anemia, and DM are Predictors of maternal and obstetric with low birth weight.

Conclusions: Prompt identification of causes and prevention of premature delivery, proper knowledge of signs and symptoms of pregnancy complications, and preventing any physical trauma or its potential causes are recommended during pregnancy to prevent low birth weight.

Keywords: Low birthweight, Newborn, Caesarean section

INTRODUCTION

Low birthweight (LBW) is defined as a birthweight below 2500 g regardless of gestational age and is usually applied to livebirths only. Low birth weight is considered as the single most important predictor of infant mortality, especially of deaths within the first months of life. LBW is one of the main causes of infant mortality including around 40% of all death among children under 5 years old which occurs in neonatal or newborn.¹ The mortality rate of LBW is approximately twenty times more than heavier infants.² Totally, about 15.5% of all birth is LBW while 95.6% of it occurs in developing countries. In addition, the incidence of LBW in low-income societies is more than twice in compare to middle incomes.³

A baby's birth weight is a strong indicator of both maternal and child health and nutrition. A baby born with low birth weight is bound to face several health consequences from low levels of immunity, increased risk of infections, reduced muscle strength, impaired cognition and increased risk of several non-communicable diseases.

There are several established determinants of low birth weight, ranging from maternal smoking, poor diet, low body mass index, nutritional deficiencies like anemia, etc.⁴ There are several studies which have linked socioeconomic status with low birth weight. In developing countries, poverty, lack of literacy and poor socioeconomic status are the key determinants of low birth weight. The purpose of this study is to prevalence of maternal and social risk factors of low birth weight.

METHODS

The cross-sectional and comparative study was carried out by reviewing medical records of newborns delivered between January and December, 2019 in 250 newborns. Study is done at Chalmeda Anand Rao Institute of Medical Sciences in department of Paediatrics in referred from Gynecology department. Birth weight was categorized into two as low birth weight (birth weight <2500 grams), considered as cases, and normal birth weight (birth weight \geq 2500 grams), considered as controls or the reference birth weight. Having the average age and the relative proportion of mothers in each age category under consideration as well as other literatures for comparison purpose, age of the mothers was categorized into three as <20 years, 21–30 years, and 31 years or above.

Data were collected from the delivery certificates which are supposed to be completed for each newborn. This record reports comprehensive information on socio-demographic characteristics of both parents, obstetric history and pregnancy and prenatal care, delivery and on newborn. Supplemental information of mother and on familiar and/or social support during pregnancy was gathered through telephone interviews. Two physicians collected information from the records and a trained obstetrician performed telephone interviews. Newborns were classified as preterm if delivery occurred before the 37th week of gestation.

Sociodemographic as well as maternal and obstetric variables were extracted from birth records, while gestational age of the fetus and data about history of pregnancy complications were obtained from the mothers' ANC files. Data processing and analysis were performed by using Statistical package for social sciences (SPSS) version 20.

RESULTS

A total of 250 mothers (125 cases and 125 controls) participated in the study. The mean age of mothers was found to be 25.63 years with \pm 5.12 standard deviation. Among study participants, 161 (64.4%) mothers were of the age group of 20–30 years, 154(61.6%) are of class III of the socioeconomic status, 189 (75.6%) were literate and 209 (83.6%) were housewives.

Most of the women were primi with 172 (68.8%), only 40 cases (16%) are with history of abortion, Preterm delivery was prevalent in 57 (22.8%) mothers. Proportion of mothers with ANC visit of are 116 (46.4%). Proportion of mothers with weight more than or equal to 50 kg was 196 (78.4%). Iron supplements were not received in most of the patients 90 (36%). There is no hypertension 222(88.8%), history of anaemia is 96 (38.4%), Diabetes mellitus is seen in 18 (7.2%). Trauma during pregnancy were 3 (1.2%) respectively. Results from analysis revealed mother's age, socioeconomic, educational status,

occupation as significant variables to be associated with low birth weight.

Table 1: Sociodemographic details about mother.

Variable	Category	Number of patients	%
Age group of mother	<19	15	6
	20-30	161	64.4
	>31	74	29.6
Socioeconomic status (as per modified B G Prasad classification)	I	-	-
	II	13	5.2
	III	154	61.6
	IV	59	23.6
	V	24	9.6
Educational status of mother	Literate	189	75.6
	Illiterate	61	24.4
Occupation of mother	Labor/wage worker	14	5.6
	unemployed/ house wife	209	83.6
	Employed	27	10.8

Table 2: Maternal and obstetric details of mother.

Variable	Category	Number of patients	%
Parity	1	172	68.8
	2	59	23.6
	3	17	6.8
	above 3	2	0.8
History of abortion	No	210	84
	Yes	40	16
Gestational age at birth	Term	178	71.2
	Preterm	57	22.8
	Postterm	15	6
Mode of delivery	Vaginal	132	52.8
	CS	118	47.2
ANC visit	No	134	53.6
	Yes	116	46.4
	<50 kilograms	54	21.6
	\geq 50 kilograms	196	78.4
	No	160	64
	Yes	90	36
	No	222	88.8
	Yes	28	11.2
	No	154	61.6
	Yes	96	38.4
	No	232	92.8
	Yes	18	7.2
No	247	98.8	
Yes	3	1.2	

Predictors of maternal and obstetric with low birth weight has significant association with caesarean section,

increased significantly with decrease in gestational age and maternal weight. Low birth weight is also associated

significantly with history of abortion, iron supplementation hypertension, anemia, and DM.

Table 3: Sociodemographic predictors of low birth weight.

Variable	Category	Cases (n=125)	Control (n=125)	P value
		N (%)	N (%)	
Age group of mother	<19	12 (9.6)	3 (2.4)	Significant
	20-30	73 (58.4)	88 (70.4)	
	>31	40 (32)	34 (27.2)	
Socioeconomic status (as per modified B.G Prasad classification)	I	0	0	Significant
	II	6 (4.8)	7 (5.6)	
	III	69 (55.2)	85 (68)	
	IV	32 (25.6)	27 (21.6)	
	V	18 (14.2)	6 (4.8)	
Educational status of mother	Literate	78 (62.4)	111 (88.8)	Significant
	Illiterate	47 (37.6)	14 (11.2)	
Occupation of mother	Labor/wage worker	11 (8.8)	3 (2.4)	Significant
	unemployed/ house wife	103 (82.4)	106 (84.8)	
	Employed	11 (8.8)	16 (12.8)	

Table 4: Maternal and obstetric predictors of low birth weight.

Variable	Category	Cases (n=125)	Control (n=125)	P value
		N (%)	N (%)	
Parity	1	88 (70.4%)	84 (67.2%)	Not Significant
	2	28 (22.4%)	31 (24.8%)	
	3	8 (6.4%)	9 (7.2%)	
	Above 3	1 (0.8%)	1 (0.8%)	
Gestational age at birth	Term	77 (61.6%)	101 (80.8%)	Significant
	Preterm	40 (32%)	17 (13.6%)	
	Postterm	8 (6.4%)	7 (5.6%)	
Mode of delivery	Vaginal	78 (62.4%)	54 (43.2%)	Significant
	CS	47 (37.6%)	71 (56.8%)	
ANC visit	No	74 (59.2%)	55 (44%)	Significant
	Yes	51 (40.8%)	70 (56%)	
Maternal weight	<50 kilograms	31 (24.8%)	23 (18.4%)	Significant
	≥50 kilograms	94 (75.2%)	102 (81.6%)	
History of abortion	No	108 (86.4%)	102 (81.6%)	Significant
	Yes	18 (14.2%)	22 (17.6%)	
Iron supplementation	No	60 (48%)	100 (80%)	Significant
	Yes	65 (52%)	25 (20%)	
Hypertension	No	114 (91.2%)	108 (86.4%)	Significant
	Yes	11 (8.8%)	17 (13.6%)	
History of anemia	No	63 (50.4%)	91 (72.8%)	Significant
	Yes	62 (49.6%)	34 (27.2%)	
Chronic DM	No	114 (91.2%)	118 (94.4%)	Significant
	Yes	11 (8.8%)	7 (5.6%)	
Trauma during pregnancy	No	124 (99.2%)	123 (98.4%)	Not significant
	Yes	1 (0.8%)	2 (1.6%)	

DISCUSSION

We conducted a study investigating the occurrence of LBW in a regional hospital with the specific aim of exploring the risk factors in newborn children. However, it should be noted that the hospital we researched provides a neonatal intensive care unit and we may hypothesize that women with at risk pregnancies would more likely choose this specific hospital for the delivery, thus overestimating preterm and LBW rates.

Many investigators have studied the impact of social and economic factors on the outcome of pregnancy, particularly on birth weight, revealing a significant risk of prematurity and intrauterine growth retardation in low socio-economic and in specific ethnic groups.⁵⁻⁷ The findings, in this area, however, have not always been consistent, and comparisons across studies, therefore, are difficult to assert because of the discrepancies both in the studied groups and in the methods used to measure social factors. Our study was able to circumvent this difficulty, since there were relatively few significant differences between low and normal birth weight newborns taking into account almost all of the indicators of social and economic conditions found to be reliable predictors of very LBW compared to LBW.

Maternal age, parity, marital status and social class of the parents are known predictors of birth weight, but it has been argued that there have been changes in the distributions of these factors over recent years, since mean maternal age have increased, as well as the proportion of first births and births outside marriage.⁶ Moreover, the impact of the decision to delay childbearing on maternal and perinatal outcomes becomes increasingly relevant, although in a study conducted in the US, patients aged 35 and older delivered at term with birth weights comparable to infants born to women aged less than 35 at delivery.⁸

In our study mother's age, socioeconomic, educational status, occupation as significant variables to be associated with low birth weight. This finding is similar to the study conducted in Sandeep Shrestha et al.⁹ This finding parallels with the previous randomized control trial study conducted in Kenya, cohort study conducted in Ethiopia, and case control study conducted in Ghana, Ethiopia, and Nepal.¹⁰⁻¹⁴

Predictors of maternal and obstetric with low birth weight has significant association with caesarean section, increased significantly with decrease in gestational age and maternal weight. Low birth weight is also associated significantly with history of abortion and iron supplementation and anemia. The study findings align with the previous studies conducted by Sandeep Shrestha et al. and also in agreement with Kenya, Spain, Brazil, and Iran.^{10,15-17} The observed association with a gestational age of less than 37 weeks, are more prone to cesarean delivery and are found to be contributing factors for LBW.

However, no significant association was observed between mode of delivery and LBW in a study conducted in Nepal.¹⁸ In this study, low maternal weight was found to be an independent risk factor for LBW which is supported by findings of previous study conducted in India¹⁰ and Ethiopia²⁰ using case control and cross-sectional study design, respectively.

Maternal medical risk factors including gestational hypertension, gestational diabetes mellitus (GDM), and anemia were found significantly associated with LBW. A large number of epidemiological and biological evidence support this fact. Gestational hypertension leads to reduce uteroplacental flow, which increases the risk of LBW. GDM can lead preterm labor and other complications as well. Furthermore, conventional treatment for GDM increases the risk of LBW.²¹ However, it is in contrary to the finding from a hospital-based study in Tigray, northern Ethiopia, which reported that presence of any chronic medical illness increased the risk of low birth weight. The discrepancy could be related to the specific type of disease observed as evidenced from studies in northern Tanzania, in which mother's chronic hypertension was observed to be associated with low birth weight or it could be related to variations in clinical stages of the diseases.²²

Regular ANC during pregnancy is beneficial for both the pregnant mother and developing baby as obstetric complications can be identified during ANC and managed timely.

Limitations

Study include imprecisions associated with assessing gestational age from date of LMP and a relatively small sample of infants born LBW. Notably, this relatively small sample may even be an overestimate of LBW as birthweights were collected over a period of 72 hours, a time when newborns typically lose weight

CONCLUSION

Prompt identification of causes and prevention of premature delivery, proper knowledge of signs and symptoms of pregnancy complications, and preventing any physical trauma or its potential causes are recommended during pregnancy to prevent low birth weight. Identification of high-risk mothers and early detection and management of the risk factors would reduce incidence of low birth weight and related short-term and long-term consequences. Controlling these risk factors and increasing access to high-quality health-care services in rural and deprived areas are effective strategies for prevention of LBW.

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