Section: Pediatrics

Original Research Article

MATERNAL FACTORS INFLUENCING LOW BIRTH WEIGHT BABIES

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Received : 22/07/2024
Received in revised form : 12/09/2024
Accepted : 28/09/2024

Keywords:
Low birth weight, Maternal height, weight, Occupation, Malnutrition Anaemia.

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DOI: 10.47009/jamp.2024.6.5.137

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (5); 722-727

Abstract

Background: Low birth weight (LBW) is defined by WHO as the weight of live born infants less than 2,500 g irrespective of their gestation. LBW is closely associated with fetal and perinatal mortality and morbidity. At the population level, the proportion of babies with a LBW is an indicator of a multifaceted public-health problem that includes long-term maternal malnutrition, ill health, hard work and poor health care in pregnancy. At an individual level, LBW is an important predictor of newborn health and survival and is associated with higher risk of infant and childhood mortality. **Materials and Methods:** This was a prospective study conducted in the Department of Pediatrics, Department of Pediatrics, Karpagam Faculty of Medical science and Research Medical College, Coimbatore over a period of 1 year. There was a total of 450 babies in this study, of which 150 were low birth weight babies and the rest 300 babies were weighing 2.5 kg or more. To ascertain the maternal factors responsible for low-birth-weight babies, study of which will enable us to understand the measures involved in reducing the neonatal mortality and morbidity. In this study, an analysis 150 mothers of LBW babies were done and compared with 300 normal weight babies. The variables were subjected to computer analysis using focus format. **Result:** In mothers who had no education& Mothers belonging to lower socioeconomic class had higher chance of delivering low birth weight babies. Parity has a significant relationship with birth weight. There is significant association of PIH and Oligohydramnios with birth weight. Maternal malnutrition and anaemia have a significant association with LBW. **Conclusion:** This study was conducted to know the maternal and bio-social factors that influence low birth weight babies. There was no significant association with maternal age and religion (community) with birth weight in our study. Parity has a significant relationship with birth weight with higher birth weight among women with higher parity. There is significant association of PIH and Oligohydramnios with birth weight. Maternal malnutrition and anaemia have a significant association with LBW with higher incidence of Low birth weight among malnourished and anaemic mothers.

INTRODUCTION

Low birth weight (LBW) is defined by WHO as the weight of live born infants less than 2,500 g irrespective of their gestation. LBW is closely associated with fetal and perinatal mortality and morbidity. At the population level, the proportion of babies with a LBW is an indicator of a multifaceted public-health problem that includes long-term maternal malnutrition, ill health, hard work and poor health care in pregnancy. At an individual level, LBW is an important predictor of newborn health and survival and is associated with higher risk of infant and childhood mortality.[1]

Many socio-biological factors have been postulated to determine the birth weight of the newborn. The principal among these are maternal age, weight, height, education, parity, antenatal care, maternal smoking, and sex of the baby.[2]

In addition, LBW has a higher association with the incidence of infection, malnutrition and handicapping conditions during childhood.[3,4]

In developing countries, many women are short and underweight and the number of low birth weight (LBW) babies is particularly high (more than 30% in South Asia, 10-20% in other regions.[5] LBW infants have less chance of survival; when they do survive, they are more prone to disease, growth retardation and impaired mental development. A good start in

ISSN (O): 2687-5365; ISSN (P): 2753-6556

life is important and maternal nutritional status during pregnancy has repeatedly been demonstrated to be associated with pregnancy outcomes for the infant.[6] Keeping all these in views, an attempt has been made to carry out a study on LBW babies at our institution.

Aim: This study aims at evaluating the risk factors for LBW in infants.

MATERIALS AND METHODS

This was a prospective study conducted in the Department of Pediatrics, Karpagam Faculty of Medical science and Research Medical College, Coimbatore over a period of 1 year. There was a total of 450 babies in this study, of which 150 were low birth weight babies and the rest 300 babies were weighing 2.5 kg or more.

Babies were included in this study according to the following criteria:

Inclusion Criteria

- Live birth babies
- Singleton babies

Exclusion Criteria

- Still births
- Twin gestation
- Babies with major congenital anomalies

Method of Study

In this study, an analysis 150 mothers of LBW babies were done and compared with 300 normal weight babies. The variables were subjected to computer analysis using focus format. The data was analyzed using a Chi-Square for quantitative data. Chi square test was used to calculate p value. P value was considered significant if <0.05. SPSS version 16 software is used to do the necessary statistical calculations.

The first weight of the new born was obtained after birth. The weight was measured preferably within the first hour of life before significant postnatal loss of weight has occurred.

Birth weight measurements were compared to measurements within 24 hours of birth. Heavy objects like metal forceps, for occluding umbilical cord were omitted. Weight scales were checked at intervals for accuracy.

The details of mothers who had delivered infants within the last 24 hours below 2500 grams were taken from the labour room and postnatal ward. The neonates were weighed naked within 24 hours after birth in a spring-dial baby weighing machine with sensitivity of 20 gms and graded upto 4 1/2 kgs in 20 gram units. Sex of the baby was noted. Any congenital malformation was ruled out.

Sampling Mothers

The same procedure used above for locating the infants was also used to trace the mother

Age of the mother was taken as recorded in the case sheet and also by questioning the mothers when data entered in the case sheet was not available.

Parity of the mother was noted down after questioning the mother as also the time interval between the previous delivery and birth of the child under study.

Weight of the mother was assessed within 24 hours after delivery. A Electronic weighing scale which has a sensitivity of 50 gms was used for the purpose, after standardization and after allowing an inter and intrapersonal error of 50 gms

The mothers were weighed barefoot after checking the weighing scale for accuracy. If the mothers had any difficulty in walking, the weighing machine was taken next to their beds.

The advantage of Electronic weighing scale was its easy transportability.

The height of the mother was usually measured within 24 hours after delivery along with other measurements where this was feasible. It was deferred till the mothers were able to stand erect.

Her standard of literacy was grouped into five categories: Illiterate, primary school, middle school, high school, college education.

The total family income and per capita income was assessed by questioning her in detail about the nature of the employment of the earning member in her family, number of earning members, family size and style of living.

Religion of the mother was determined by questioning her, whether she was born into that religion [or got subsequently converted was also enquired into] 8. Maternal diseases during antenatal period was enquired into.

The patients were clinically examined and the basic laboratory investigations were done to determine the following diseases:

Tuberculosis

- Pulmonary
- Extra pulmonary
- Heart diseases-

Hypertension

Blood pressure of 140/90 mm of hg or more on three consequent days (excluding PIH)

Chronic rheumatic valvular disease,

Congenital heart disease,

Coronary disease

Anemia

All the mothers who were anemic on clinical examination were evaluated for their hemoglobin status. A hemoglobin percentage of less than 9gms was considered significant.

Toxemias

- Pre-eclampsia manifesting with at 2 of the following:
- blood pressure of more than 140/90 mm of Hg
- albuminuria
- edema

Eclampsia: Convulsions or coma associated with signs of preeclampsia

Antepartum hemorrhage: Bleeding from the placental site after the 28th week of pregnancy or during the first and second stage of labour.

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-Accidental hemorrhage- Bleeding due to premature separation of a normally situated placenta. -Inevitable hemorrhage- Due to separation of the placenta, wholly or partially situated in the lower uterine segment [placenta previa]

Diabetes Mellitus

Evidence of glycosuria

Fasting blood sugar of more than 140 mg% in cases of glycosuria

G] Renal diseases- Nephritis and Nephrosis Urinary tract infections

Irrespective whether the cases are booked or unbooked, the following factors are taken into consideration.

RESULTS

Maternal age is divided into 3 groups: <20 years, 20-29 years and >30 years. Maternal age does not have any statistical significance in our study as p = 0.11. [Table 1]

Community is divided into 3 groups: Hindus, Muslims and Christians. In our study, community does not have a significant association in our study as p = 0.148

Maternal education ranged from to graduation and was divided into 3groups- illiteracy, primary education and secondary education. Association of maternal education and birth weight is statistically significant. Among the mothers who were having low birth weight babies, 50.7 % had no education; when compared to mothers who gave birth to normal babies (only 24.3% had no education in control group). Thus, p value is highly significant.

Socioeconomic class is divided into 5 classes according to Kuppuswamy classification: I,II,III,IV,V. 54.7% of mothers who had LBW baby belonged to class III. There is a higher statistical significance between birth weight and socioeconomic class.

Deliveries were divided into 2 groups: esarean section (elective and emergency)and normal vaginal delivery(episiotomy and forceps delivery). Among the mothers who delivered LBW baby, 59.3 % were delivered by normal vaginal delivery. p value is found to be significant.

There is a higher statistical signifance when the maternal weight is compared to birth weight (p<0.001). In the mothers having weight < 50 kg, low birth weight incidence is 59.3%, while the incidence in those weighing > 50 kg is 40.6%.

Maternal height is divided into 3 groups: <145 cm, 145-154 cm and 155-164cm. Among the mothers who delivered low birth weight babies, 91.4 % had short stature (height < 145cm). p value <0.001, thus the association of maternal height and birth weight is of statistical significance.

Parity ranged from 1 to 5 and is divided into 3 groups: Primi, Multi and Grand multi (G4 or more). In our study, parity has statistically significant association with regards to birth weight of baby. In our study, 42% of the mothers who delivered babies with birth weight < 2500 gms are multiparous when compared with control group. P value<0.010 and thus of statistical significance.

There is a significant association between maternal risk factors like Oligohydramnios, PIH (pregnancy induced hypertension), and birth weight. Among the mothers who have delivered LBW babies, about 25% had Oligohydramnios, 14% had PIH (Pregnancy induced hypertension). p value is significant especially with the group having Oligohydramnios. The incidence of GDM (Gestational Diabetes Mellitus) and UTI (Urinary tract infections) are comparatively on the higher side in the study group.

About 50% of the low birth weight babies born were male. p = 0.141, thus there is no significant association between sex of baby and birth weight.

In our study, mothers who had inadequate diet had higher incidence of LBW babies (72%) when compared with to controls. Thus there is a strong statistical significance in the association of maternal malnutrition with low birth weight.

Table 1: incidence of low-birth-weight babies among mothers of different age groups.

		Group		Total
		Cases	Controls	
Mother age	<20	4 (2.7%)	13 (4.3%)	17 (3.8%)
	20-29	130 (86.7%)	270 (90.0%)	400 (88.9%)
	>30	16 (10.7%)	17 (5.7%)	33 (7.3%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

X2 = 4.26, P=0.118, NS

Table 2: incidence of low-birth-weight babies among mothers of different communities

		Group		Total
		Cases	Controls	
Community	Hindu	130 (86.7%)	276 (92.0%)	406 (90.2%)
Muslim		13 (8.7%)	13 (4.3%)	26 (5.8%)
Christian		7 (4.7%)	11 (3.7%)	18 (4.0%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 3.815, p=0.148, NS

Table 3: incidence of low-birth-weight babies among mothers of different levels of education.

		Group		Total
		Cases	Controls	
Mother Edu	Illiterate	76 (50.7%)	73 (24.3%)	149 (33.1%)

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	Primary education	12 (8.0%)	35 (11.7%)	47 (10.4%)
	Secondary education	62 (41.3%)	192 (64.0%)	254 (56.4%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 31.33, p<0.001, HS

Table 4: incidence of low-birth-weight babies among mothers of varried socio-economic classes

		Group		Total
		Cases	Controls	
Socioeconomic class	I	2 (1.3%)	13 (4.3%)	15(3.3%)
	II	13 (8.7%)	104 (34.7%)	117 (26.0%)
	III	82 (54.7%)	169 (56.3%)	251 (55.8%)
	IV	41 (27.3%)	13 (4.3%)	54 (12.0%)
	V	12 (8.0%)	1 (.3%)	13 (2.9%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 93.17, p<0.001, HS

Table 5: incidence of low-birth-weight babies among mothers undergoing normal vaginal delivery vs c section

	Group		Total
	Cases	Controls	
Delivery Mode: normal vaginal delivery	89 (59.3%)	226 (75.3%)	315 (70.0%)
Cesarean section	61 (40.7%)	74 (24.7%)	135 (30.0%)
Total	150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 12.19, p<0.001, HS

Table 6: incidence of low-birth-weight babies among mothers with different weights

		Group		Total
		Cases	Controls	
Mother WT	<50 kg	89 (59.3%)	40 (13.3%)	129 (28.7%)
	51-60 kg	56 (37.3%)	241 (80.3%)	297 (66.0%)
	> 60 kg	5 (3.3%)	19 (6.3%)	24 (5.3%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 103.51, p<0.001, HS

Table 7: incidence of low-birth-weight babies among mothers with different heights

		Group		Total
		Cases	Controls	
Mother Ht	<145 cm	67 (44.7%)	18 (6.0%)	85 (18.9%)
	145-154 cm	70 (46.7%)	121 (40.3%)	191 (42.4%)
	155-164 cm	13 (8.7%)	161 (53.7%)	174 (38.7%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 132.46, p<0.001, HS

Table 8: incidence of low-birth-weight babies among mothers primi vs multi & grand multi

		Group		Total
		Cases	Controls	
Parity	Primi	76 (50.7%)	163 (54.3%)	239 (53.1%)
	Multi	63 (42.0%)	91 (30.3%)	154 (34.2%)
	Grand multi	11 (7.3%)	46 (15.3%)	57 (12.7%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 9.28, p=0.010, sig

Table 9: incidence of low-birth-weight babies among mothers with varied maternal risk factors

		Group		Total
		Cases	Controls	
Maternal risk factors (diseases/habits)	None	54 (36.0%)	243 (81.0%)	297 (66.0%)
	PIH	21 (14.0%)	10 (3.3%)	31 (6.9%)
	OLIGOHYDRAMNIOS	38 (25.3%)	7 (2.3%)	45 (10.0%)
	APH	9 (6.0%)	19 (6.3%)	28 (6.2%)
	PROM	1 (.7%)	16 (5.3%)	17 (3.8%)
	GDM	11 (7.3%)	5 (1.7%)	16 (3.6%)
	UTI	13 (8.7%)	0 (.0%)	13 (2.9%)
	HEART DISEASE	3 (2.0%)	0 (.0%)	3 (.7%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

Fishers exact test p<0.001, HS

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Table 10: incidence of low-birth-weight babies in relation to sex of baby

		Group		Total
		Cases	Controls	
Baby sex	Male	75 (50.0%)	172 (57.3%)	247 (54.9%)
	Female	75 (50.0%)	128 (42.7%)	203 (45.1%)
Total		150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 2.17, p=0.141, NS

Table 11: incidence of low-birth-weight babies in relation to maternal nutritional status

	Group		Total
	Cases	Controls	
Maternal Nutrition: adequate	42 (28.0%)	233 (77.7%)	275 (61.1%)
Inadequate	108 (72.0%)	67 (22.3%)	175 (38.9%)
Total	150 (100.0%)	300 (100.0%)	450 (100.0%)

x2 = 103.79, p<0.001, HS

DISCUSSION

Mothers are divided into 3 groups: <20 years, 20-29 years and >30 years. Maternal age does not have any statistical significance in our study as p = 0.118. This is similar to the study done by K.S. Negi,[7] but contrary to the earlier studies done by Parlington,[8] and Tabcharoen,[9] where maternal age <20 years has higher incidence of low birth weight. Among the mothers who delivered babies with birth weight > 2500 gms, majority (90%) belonged to the age group of 20 to 29 years, which is similar to the findings observed by N.S. Nair et al.[10]

Community is divided into 3 groups: Hindus, Muslims and Christians. In our study, community does not have a significant association in our study as p = 0.148. This is similar to the study done by N.S. Nair et al.[10]

Maternal education ranged from illiteracy to graduation and was divided into 3 groups- illiteracy, primary education and secondary education. Association of maternal education and birth weight is statistically significant. Among the mothers who were having low birth weight babies, 50.7 %had no education. p value is highly significant. This is similar to the study done by Selina Khatun and Saroj Parchiary.[11,12]

Maternal occupation is divided into 3 groups: housewife, labour and others. About 12.7% of mothers who had LBW babies were labourers when compared to the mothers of babies with normal birth weight (control group) where it is 0.7%. Thus, there is association of occupation and birth weight with p value highly significant in the labour group.

This is similar to the results of Selina Khatun and Saroj Parchiary.[11,12]

Socioeconomic class is divided into 5 classes according to Kuppuswamy classification: I (upper), II(upper middle), III(lower middle), IV(lower middle), V(lower). 54.7% of mothers who had LBW baby belonged to class III. There is a higher statistical significance between birth weight and socioeconomic class. This is similar to the studies done by N.S Nair4, James Donnelly, Saroj Parchiary and Shanti Ghosh.[12-14]

Deliveries were divided into 2 groups: cesarean section (elective and emergency)and normal vaginal delivery(episiotomy and forceps delivery). Among the mothers who delivered LBW baby, 59.3 % were delivered by normal vaginal delivery.p value is found to be significant.

There is a higher statistical signifance when the maternal weight is compared to birth weight (p<0.001). In the mothers having weight < 50 kg, low birth weight incidence is 59.3%, while the incidence in those weighing > 50 kg is 40.6%. This is similar to the studies done by E J Love, James Donnelly, Niyogi and Shanti Ghosh.[13-16]

Maternal height is divided into 3 groups: <145 cm, 145-154 cm and 155-164 cms. Among the mothers who delivered low birth weight babies, 91.4 % had short stature (height < 145cm). p value <0.001, thus the association of maternal height and birth weight is of higher statistical significance. This is similar to the studies done by S. Ganesh kumar.[17]

Parity ranged from 1 to 5 and is divided into 3 groups: Primi, Multi and Grand multi (G4 or more). In our study, parity has statistically significant association with regards to birth weight of baby. In our study, parity has statistically significant association with regards to birth weight of baby. In our study, 42% of the mothers who delivered babies with birth weight < 2500 gms are multiparous when compared with control group. P value<0.010 and thus of statistical significance. This is similar to the studies done by S. Mukherji,[18] Mohsin,[19] Datta Banik,[20] and Khin Nyunt,[21] according to whom birth weight increases with parity. Studies done by Khetua and Bachani also showed similar results.[22,23]

There is a significant association between maternal risk factors like Oligohydramnios, PIH (pregnancy induced hypertension), and birth weight. Among the mothers who have delivered LBW babies, about 25% had Oligohydramnios, 14% had PIH. p value is significant especially with the group having Oligohydramnios. The incidence of APH (antepartum hemorrhage) and PROM (premature rupture of membranes) is comparatively on the higher side among the controls. Studies done by AMMark Anez Conteras and LR Rahman also showed that PIH is a risk factor for LBW.[24,25]

About 50% of the low birth weight babies born were male. p = 0.141, thus there is no significant association between sex of baby and birth weight.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Similar results were obtained from the studies done by B Mondal.[26]

In our study, mothers who had inadequate diet had higher incidence of LBW babies (72%) when compared with to controls. Thus there is a strong statistical significance in the association of maternal malnutrition with low birth weight. Similar results were obtained by A Dharmalingam.[27]

Maternal Hb% ranged from 6.5% to 13.5% and is classified into 3 groups: 10gm%, 1011gm%, >11gm%. In our study, 32.7% of the mothers who delivered babies with birth weight < 2500 gms had Hb% < 10 gm%, thus p value is significant in the group having Hb% < 10 gm%. SPachauri, S MMarevah,[28] Khetua,[22] and Shanti Ghosh,[14] also mentioned that anaemia is a risk factor for LBW.

CONCLUSION

This study was conducted to know the maternal and bio-social factors that influence low birth weight babies. There was no significant association with maternal age and religion (community) with birth weight in our study. There was higher incidence of low birth weight babies among illiterate mothers. Mothers belonging to lower socioeconomic status had higher chance of delivering low birth weight babies. Parity has a significant relationship with birth weight with higher birth weight among women with higher parity. There is significant association of PIH and Oligohydramnios with birth weight. There is no significant association of LBW with sex of the baby. Maternal malnutrition and anaemia have a significant association with LBW with higher incidence of Low birth weight among malnourished and anaemic mothers.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556