STUDY OF AETIOLOGICAL FACTORS OF LOW BIRTH WEIGHT NEWBORNS ADMITTED IN DR. SUSHEELA TIWARI GOVERNMENT HOSPITAL, HALDWANI

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ABSTRACT

BACKGROUND

The purpose of this observational study was to study aetiological factors associated with low birth weight newborns.

MATERIALS AND METHODS

This study was conducted as a cross-sectional study using data from women who had delivered their children at Dr. Susheela Tiwari Government Hospital. This study was conducted on 202 female patients. The newborns were divided into 2 categories based on birth weight as those with a birth weight of 2.5 kg and above and those with a birth weight of less than 2.5 kg based on gestational age. The data were collected by interviews with the mothers, abstraction of medical records and anthropometry.

RESULTS

The incidence of Low Birth Weight (LBW) was higher in anaemic mothers with p value 0.026. 43% of women were primigravida in LBW while in Normal Birth Weight (NBW) there was 26%. In the study, 18% mothers were passive smoker in NBW babies and 34% mothers were passive smoker in LBW babies. Birth interval in NBW babies was 24.2 weeks (mean) and it was 20.1 weeks in LBW babies with p value 0.028.

CONCLUSION

Anaemia, short birth interval, passive smoking, low maternal age and primiparity are significant risk factors for LBW.

KEYWORDS

Low Birth Weight Infant, Passive Smoking, Anaemia, Birth Interval, Multiple Pregnancy.

HOW TO CITE THIS ARTICLE: Rathi A, Arya A, Singh N, et al. Study of aetiological factors of low birth weight newborns admitted in Dr. Susheela Tiwari Government Hospital, Haldwani. J. Evid. Based Med. Healthc. 2017; 4(38), 2321-2324. DOI: 10.18410/jebmh/2017/457

BACKGROUND

Low Birth Weight (LBW) is universally used as an indicator of health status and has been shown to be associated with a higher risk for childhood mortality and morbidity. Low birth weight has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams (5.5 pounds).[1]

LBW is considered the single most important predictor of infant mortality, especially of deaths within the first month of life.[2] About 25-35% of babies in India are low birth weight as opposed to about 5-7% of the newborns in the west.

Birth weight is a reliable and sensitive predictor of newborns chances for survival, growth and long-term physical and psychosocial development.[3] Infants weighing lesser than 2500 grams are approximately 20 times more likely to die than other babies and are closely associated with foetal and neonatal mortality and morbidity.

Aims and Objectives

LBW is a result of preterm birth, intrauterine growth retardation or a combination of both pathophysiological conditions. Since birth weight has a strong correlation with infant survival, attention needs to be given to strategies that will reduce the proportion of infants born with LBW.

Weight at birth is directly influenced by general level of health status of the mother.

In developing countries, including India, the majority of LBW infants because of Intrauterine Growth Retardation (IUGR) are born small at term (>37 weeks of gestation) with only 6.7 percent born prematurely. LBW is caused by either a short gestation period or retarded intrauterine growth (or a combination of both). Low birth weight leads to an impaired growth of the infant with its attendant risks of a higher mortality rate, increased morbidity, impaired mental development and the risk of chronic adult disease (foetal origin of adult disease) like hypertension, diabetes mellitus, metabolic X syndrome and coronary artery disease.[4]

Financial or Other, Competing Interest: None.
Submission 18-04-2017, Peer Review 25-04-2017,
Acceptance 08-05-2017, Published 11-05-2017.
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DOI: 10.18410/jebmh/2017/457

MATERIALS AND METHODS

Plan of this study was approved by the institutional ethics committee and informed consent was taken from all the patients included in the study. This study was conducted in Department of Paediatrics/Obstetrics and Gynaecology, Government Medical College, Haldwani, during the period October 2014 to September 2015.

This study was conducted as a cross-sectional study using data from women who had delivered their children at Dr. Susheela Tiwari Government Hospital. All babies were weighed within one hour after birth. All the subjects included after obtaining written informed consent from parents.

A thorough clinical examination of the newborn done and weight of the baby calculated by electronic weighing scale. Classification of infants done on gestational age as term and preterm newborn based New Ballard scoring.[5]

Inclusion and Exclusion Criteria

The newborns were divided into 2 categories based on birth weight as those with a birth weight of 2.5 kg and above and those with a birth weight of less than 2.5 kg based on gestational age. Exclusion criteria include newborn with congenital anomaly, birth outside Dr. Susheela Tiwari Government Hospital were excluded from our analysis.

The exposure of passive smoking was calculated by the number of smokers in the house to which mother was exposed, average number of bidis/cigarettes smoked per day by them in the presence of mother and the period of gestation in weeks.

Birth interval was analysed in week's women excluding primipara. Interpregnancy interval was calculated as the number of months between the date of delivery and the date of the preceding birth minus the duration of the pregnancy.

Haemoglobin estimation was done by Sahli's method and haemoglobin level at the time of admission to the hospital was considered for analysis. Anaemia was defined according to WHO guidelines as haemoglobin level less than 11.0 g/dL.[6]

Blood pressure was taken by using appropriate-sized cuff twice, 6 hours apart in lying down position. Mothers with blood pressure reading less than 140/90 mm of Hg were labeled as normotensive.

Statistical Analysis

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 16.0, Statistical Analysis Software. Association of the risk factors under study was assessed by applying Chi-square test taking a level of significance of $P < 0.05$. The values were represented in number (%) and Mean ± SD.

RESULTS

This study was conducted on 202 female patients who had delivered at our hospital. Out of 202 newborns, 52 were Low Birth Weight (LBW) and 150 were Normal Birth Weight (NBW) babies.

Age (in yrs.)	Normal Birth Weight		Low Birth Weight		x^2 Value	P Value
	Frequency	Percentage	Frequency	Percentage		
<20	31	20.7	19	36.6	6.80	0.033
20-30	110	73.3	28	53.8		
>30	9	6	5	9.6		
Total	**150**	**100**	**52**	**100**		

Table 1. Age of Mother

There is a significant difference in NBW and LBW mother's age. The patients were compared according to their age in both NBW and LBW groups. Their age (in years) was 24 ± 4.3 (mean ± SD) in normal birth weight mothers and 22.7 ± 4.9 (mean ± SD) in low birth weight mothers.

Apgar Score	Normal Birth Weight		Low Birth Weight		x^2 value	p-value
	Frequency	Percentage	Frequency	Percentage		
6	5	3.3	8	15.4	9.97	0.040
7	57	38	20	38.5		
8	66	44	17	32.6		
9	12	8	4	7.7		
10	10	6.7	3	5.8		
Total	**150**	**100**	**52**	**100**		

Table 2. Apgar Score at 1 Min.

There was a significant difference in Apgar score at 1 min. in NBW and LBW newborns. Apgar score at 1 min. was 7.7 ± 0.9 (mean ± SD) in NBW while in LBW it was 7.5 ± 1 (mean ± SD).

Apgar Score	Normal Birth Weight		Low Birth Weight		x^2 value	P value
	Frequency	Percentage	Frequency	Percentage		
6	0	0	0	0	3.36	0.339
7	4	2.7	1	1.9		
8	63	42	29	55.8		

9	66	44	16	30.8		
10	17	11.3	6	11.5		
Total	**150**	**100**	**52**	**100**		

Table 3. Apgar Score at 5 Mins.

The difference in Apgar score at 5 mins. was not significant in NBW and LBW newborn. Apgar score at 5 mins. was 8.6 ± 0.7 (mean ± SD) in NBW, while in LBW, it was 8.5 ± 0.7 (mean ± SD).

Haemoglobin (g/dL)	Normal Birth Weight		Low Birth Weight		x^2 Value	P Value
	Frequency	Percentage	Frequency	Percentage		
<7	1	0.7	2	3.8	9.187	0.026
7-9.9	76	50.6	31	59.6		
10-10.9	28	18.7	13	25		
>11	45	30	6	11.6		
Total	**150**	**100**	**52**	**100**		

Table 4. Anaemia in Pregnancy

The difference in haemoglobin in two groups were statically significant. Haemoglobin in mothers of NBW and LBW babies were (in gms) 9.9 ± 1.3 (mean ± SD) and 9.1 ± 1.1 (mean ± SD).

	Normal Birth Weight		Low Birth Weight		x^2 Value	P Value
	Frequency	Percentage	Frequency	Percentage		
Passive smoker	27	18	18	34.6	6.15	0.013
Nonsmoker	123	82	34	65.4		
Total	**150**	**100**	**52**	**100**		

Table 5. Passive Smoking

There was a significant difference in NBW mothers and LBW mothers. Out of the 202 patients, 18% mothers were passive smoker in NBW babies and 34% mothers were passive smoker in LBW babies.

The frequency of low birth weight was more in primigravida mothers as compared to multigravida mothers.

Gravida	Normal Birth Weight		Low Birth Weight		x^2 Value	P Value
	Frequency	Percentage	Frequency	Percentage		
Primigravida	40	26.7	22	42.3	4.44	0.035
Multigravida	110	73.3	30	57.7		
Total	**150**	**100**	**52**	**100**		

Table 6. Gravida

There was a significant difference between primigravida and multigravida mothers.

IPI (Months)	Normal Birth Weight		Low Birth Weight		x^2 Value	P Value
	Frequency	Percentage	Frequency	Percentage		
<24 months	45	40.9	19	63.3	4.77	0.028
≥24 months	65	59.1	11	36.7		
Total	**110**	**100**	**30**	**100**		

Table 7. Birth Interval

IPI=Interpregnancy Interval. There was a significant difference of birth interval in between NBW and LBW babies. Birth interval in NBW babies was 24.2 ± 11.6 (mean ± SD) and was 20.1 ± 11.5 (mean ± SD) in LBW babies.

	Normal Birth Weight		Low Birth Weight		x^2 Value	P Value
	Frequency	Percentage	Frequency	Percentage		
Singleton	148	98.7	51	98.1	0.091	0.761
Multiple	2	1.3	1	1.9		
Total	**150**	**100**	**52**	**100**		

Table 8. Multiple Gestation

Difference in singleton and twin gestation was insignificant. There was singleton and twin gestation births.

DISCUSSION

Low birth weight newborns and particularly those who are preterm are poor at withstanding the stress of labour and may require active resuscitation. The immaturity of various systems result in different clinical problems. They express inactivity and lethargy and poor reflexes.

They are vulnerable to develop intraventricular-periventricular haemorrhage due to deficiency of vitamin K dependent coagulation factors. They are more prone to hypothermia due to large surface area and poor heat production. These babies are prone to develop hypoglycaemia, hypocalcaemia, hypoproteinaemia, acidosis and hypoxia.

Kramer (1987) presents a synthesis comprising 43 potential maternal risk factors for low birth weight grouped into 7 categories, genetic and constitutional factors, demographic and psychosocial factors, obstetric factors, nutritional factors, maternal morbidity during pregnancy, toxic exposures and antenatal care.[7]

The Kallan (1993) framework comprises 11 'intervening variables' (maternal characteristics) grouped into 4 categories- (1) Sociodemographic (age; education; marital status); (2) Health-related (parity; prior history of foetal loss or low birth weight; hypertension; diabetes; pelvic infectious disease); (3) Attitudinal (wantedness of the pregnancy); and (4) Behavioural (smoking; prenatal care).[8]

The present study shows the incidence of LBW to be 25.7%. The mean birth weight of the present study was 2.56 kg (± 0.16 kg).

The higher percentage in low birth weight women belongs to group <20 years and >30 years while in normal birth weight the higher percentage group was 20-30 yrs. There are higher possibility of low birth in women who are at border of their reproductive age.

There was a significant difference in Apgar score at 1 min. in LBW and NBW babies while at 5 mins., it was not significant between them.

There is a significant difference in anaemia between normal birth weight mother and low birth weight mother. The mean haemoglobin in NBW mother was 9.9 (gms) while in LBW mother, the mean haemoglobin was 9.1 (gms). The percentage of anaemia is higher in LBW mother than NBW mother. Deshmukh et al also found that anaemia was significantly associated with LBW.[9]

In the present study, 18% mothers were passive smokers in NBW babies and 34% mothers were passive smoker in LBW babies. The mean birth weight of babies born to mothers exposed to passive smoking in this study was lower than that of babies born to unexposed mothers. Lazzaroni F showed that there was a mean reduction of 16 g in birth weight and a decrease in birth length of 0.05 cm were found for each hour of antenatal passive smoke exposure.[10]

There is a greater risk of foetal growth restriction (as reflected by a lower mean birth weight and higher SGA risk) at short interpregnancy intervals. In NBW women, 40% have short interpregnancy interval while in LBW women, it was 63%.

The difference in singleton and twin gestation was insignificant in our study. There are 1.3% of twin gestation in NBW women, while it was 1.9% in LBW women.

There was a significant relationship between low birth weight and primigravida. 43% of women were primigravida in LBW, while in NBW, there was 26%.

CONCLUSION

Based on the findings of the current study it can be concluded that prevalence of low birth weight in newborns is significantly associated with maternal passive smoking, primigravida compared to multigravida , low maternal age and anaemia during pregnancy.

ACKNOWLEDGMENT

No financial support from any individual/company was required for this study.

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