A Retrospective study to evaluate the risk factors associated with low birth weight infants in a tertiary care hospital

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ABSTRACT- Birth weight is a predictor of neonatal morbidity,mortality and determines long term health of the infant. Low birth weight suggests that intrauterine period was adversely affected and recognizing these factors can help us to prevent LBW infants. According to WHO it is estimated that 15-20% of all births globally are LBW and 28% are born in South Asia. **Aim:** To identify high risk factors associated with low birth weight. **Material & methods:** 520 LBW infants born during the period of 1st july 2016 to 30th june 2017 were selected and antenatal records studied retrospectively. **Results:** 29% of LBW infants were preterm (<37wks),58% were born to primi mothers,55.3% belonged to low socioeconomic status and 58.7% were unbooked. Majority of the LBW infants were born to mothers having poor nutrition 50.1% to mothers with weight gain <7kg, belonging to remote areas and associated co-morbidities. **Conclusion:** LBW is a significant health problem. Identifying the risk factors early and their prevention would lead to better outcomes.
KEYWORDS- Low birth weight, preterm neonate, risk factors, nutrition.

I. INTRODUCTION

Low birth weight (LBW) is defined as a birth weight of an infant less than 2500 g (up to and including 2499 g), as per the World Health Organization (WHO) regardless of gestational age[1]. Very low birth weight (VLBW) is less than 1500g and extremely low birth weight (ELBW) is less than 1000g[1].

It is estimated that one out of seven babies born globally are LBW. According to WHO it is estimated that 15-20% of all births globally are LBW and 28% are born in South Asia[2]. The incidence of LBW is disproportionately high in developing countries. The incidence of LBW in India has declined from 20.4% to 16.4% in the last decade[3].

Multiple factors determine the birth weight of an infant like genetic, socio-economic, cultural, environmental etc. One of the important factors is gestational age at delivery. Most of the LBW infants are preterm (<37weeks). So factors causing preterm delivery are directly associated with LBW. Inadequate utero-placental perfusion leading to chronic hypoxia causes intra uterine growth restriction (IUGR) and thus resulting in LBW[4,5]. Maternal infections, including intrauterine infections, HIV, and malaria, result in LBW due to growth restriction[6,7]. Socio-demographic factors such as pregnancy at early age, inadequate antenatal visits and care, short inter pregnancy interval, poor nutrition, low socio-economic status, illiteracy and cultural practices also play a major role in determining the birth weight[8]. Fetal factors associated are ethinicity, congenital anomalies and in-utero infections[9].

Low birth weight is a significant indicator of maternal health, nutrition, healthcare status, and socio-economic fabric of society. Neonates with low birth weight have a >20 times greater risk of dying than neonates with birth weight of >2500 g[8,10]. Additionally, low birth weight is associated with long-term neurologic sequelae, impaired motor development, learning disabilities[11], and increased risk of chronic diseases including cardiovascular disease, diabetes and chronic lung diseases.

Hence identifying risk factors in antenatal and pre-conceptional period helps in preventing low birth weight and gives opportunity for timely intervention. This can help in improving overall health of infants and in reducing the burden on healthcare services of that area.

II. MATERIALS & METHOD

This is a retrospective observational study done over a period of one year from 1st July 2016 to 30th June 2017. This study was conducted at Dept of obstetrics & gynaecology, Gandhi Memorial

Hospital, associated with Shyam Shah Medical College and Hospital, Rewa (M.P.). 520 Infants delivered in the hospital in this period whose birth weight was less than 2500g were selected and antenatal records of the mothers were studied. Relevant history regarding socio-demographic factors, antenatal history, dietary history were recorded. Birth weight of the baby was recorded within first hour of delivery on an electronic weighing scale.

Frequency and present values were computed for qualitative variables. Mean values were compared using analysis of variance. Frequency distributions were compared using Chi-square/Fisher's exact test as appropriate.

Inclusion criteria:
1. Birth at gestational age >34 weeks
2. Singleton pregnancy

Exclusion criteria:
1. Gestation with mistaken dates
2. severe co-morbidities to the mother eg. cardiac disease, essential hypertension.

III.   RESULT

Out of 772 LBW infants born in the study period,520 fulfilled our inclusion/exclusion criteria and their mothers' antenatal records were studied and detailed history taken. Following are the determinants observed.

Table no.1- Distribution of LBW cases according to demographic factors

S No.	Demographic factor	No. of LBW infants	%
1.	Un-booked pregnancy	302	58%
2.	Rural areas	346	66%
3.	Lower socio-economic status	288	55.3%
4.	Illiterate	198	38%
5.	Occupation(labourer)	194	37.3%

Thus one of the important factors was booking status of the mother. Out of LBW cases 58% were unbooked and had lesser antenatal visits (<4). 66% belonged to rural and remote areas where access to healthcare facility was difficult.55.3% belonged to lower socio-economic status.

Table No. 2- Distribution of cases according to maternal factors

S No.	Maternal factors	No. of LBW infants	%
1.	Age <20 yrs 21-29 yrs 31-34 yrs >35 yrs	54 359 80 27	10% 69% 15% 05%

2.	Parity
	    Primi
	
	    Multi
		301
		
		219
			58%
			
			42%

3.	BMI (kg/m^2)
	    <18.5
	    18.5-24.9
	    24.9-29.9
	    >30
		
		86
		256
		156
		22
			
			16.5%
			49.2%
			30%
			4.2%

4.	Weight gain during pregnancy(kg)
	    <7
	    7-11
	    >12
		
		261
		205
		54
			
			50.1%
			39.4%
			10.3%

5.	Calorie intake(kcal)
	    <2000
	    2000-2400
	    >2400
		
		214
		194
		112
			
			41%
			37%
			21%

6.	IFA tablets intake
	    Regular
	    Irregular
		
		240
		280
			
			46%
			53.8%

Most of the LBW infants i.e. 69% belonged to the mothers with age group 21-29 yrs and 10% to below 20 yrs.

58% of LBW infants were born to primigravida mothers.

49.2% belonged to the mothers with normal BMI. 41% were born to mothers with low calorie intake and 53.8% to mothers who did not take complete course of iron and folic acid tablets.

Table No.3- Distribution of cases according to maternal complications

S No.	Maternal complications	No. of LBW infants	%
1.	Anaemia (<9gm)	298	57.3%
2.	Preeclampsia	126	24.2%
3.	GDM	32	06%
4.	No complications	64	12.3%

57.3% of LBW infants were born to mothers with anaemia reflecting their poor nutritional status. 24.2% belonged to mothers with pre-eclampsia suggesting correlation with IUGR and gestational hypertension.

Table No.4- Distribution of cases according to fetal factors

S No.	Fetal factors	No. of LBW infants	%
1.	Gestational age at delivery		
	Preterm 34-37 weeks	150	29%
	Term 37-40 weeks	273	52.5%
	Post term>40 weeks	97	18.6%
2.	Birth weight(gm)		
	2000-2500	429	82.5%
	1500-2000	80	15.38%
	<1500	11	02%
3.	Mode of delivery		
	Vaginal	381	73%
	Cesarean	139	26.7%
4.	NICU admissions	162	31%

29% of LBW infants were born preterm.
82.5% had birth weight between 2000-2500g.
26.7% were born with caesarean section and 31% had NICU admissions.

IV.   DISCUSSION

LBW is one of the major causes of infant morbidity and mortality in India. Though its genesis is multi-factorial and complex there are many factors that can be prevented with vigilance and rectifying certain aspects such as diet, education of mother and providing basic health care amenities.

In our study out of 520 LBW infants we found that 58% were born to mothers whose gestation were unbooked and had lesser no. of antenatal visits (<4). 66% belonged to rural and remote areas where access to healthcare facility was difficult.55.3% belonged to lower socio-economic status. 38% belonged to mothers with poor literacy background and 37.3% where mothers were working as daily wagers and doing heavy physical work.

In a study done by Kader M et al. it was that the percentage of LBW babies among illiterate mothers was high[12]. Kramer in his meta-analysis has concluded that socio-demographic factors like educational status, age of mother,pre-pregnancy weight have been found to be associated with LBW[8]. Nutritional status of mothers has been demonstrated to be an important determinant of birth especially in developing countries. Biswas et al reported that no. of antenatal visits and place of delivery also determines birth weight[13]. Banerjee et al concluded no of ANC visits>4, maternal age >20yrs and with normal BMI had less chances of having LBW babies[14]. Raman TR et al in their study have listed a no. of maternal factors such as maternal age, parity and spacing between pregnancies are associated with LBW[15].

In our study we reported that 69% of LBW infants were born to mothers within age group 21-29years and 10% with age <20 years.58% to primipara mothers. 49.2% to mothers who had normal BMI pre-pregnancy and 16.5% to BMI <18.5 suggesting under weight.51% mothers had <7kg weight gain during pregnancy and 41% had calorie intake less than 2000kcal.53.8% did not take regular IFA tablets.

These inferences are in conclusion with studies done by Kramer, Banerjee et al[8,14].

Nisar YB et al reported that antenatal IFA supplementation results in improved linear growth of infants and children[16]. Parmar P et al reported that maternal BMI is positively associated with birth weight[17]. Jain A et al stated that lesser calorie intake, poor nutritional status of mother was positively associated with LBW infants[18].

57.3% of LBW infants were born to anaemic mothers concluding that maternal anaemia plays an important role in birth weight. Prakash S et al, Mumbare SS et al reported that maternal anaemia resulted in LBW infants[19,20].

52.5% of LBW infants were born at term gestation but as much as 29% were pre-term (<37 weeks) in our study. 73% were born through vaginal delivery and 26.7% were born through caesarean.15.3% had birth weight <2000g and 2% were below 1500g. About 31% had some form of NICU admission at birth. Jain A et al reported in their study that 29% of LBW infants were preterm and mean birth weight of preterm babies was generally less[18]. Desta M et al reported that incidence of LBW increases with preterm births[21].

Rate of NICU admission was also high in LBW infants. Murta et al and Silva A et al reported that caesarean section was a high risk factor for low birth weight infants[22,23].

V.   CONCLUSION

Low birth weight is determined by multiple factors such as socio-demographic, cultural, maternal etc and their association is complex. Certain determinants can be identified and corrected early such as maternal nutrition, anaemia and awareness among mothers regarding antenatal visits. Mothers who are at higher risks for LBW can be monitored. Prevention of preterm births and timing and need of caesarean should be considered. This can greatly improve the health and development of infants.

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