Original Research Article

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Prevalence and associate factors of low birth weight in North Indian babies: a rural based study

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ABSTRACT

Background: LBW is universally used as an indicator of health status and is an important subject of national concern and a focus of health policy. LBW is the strongest determinant of infant morbidity and mortality in India. Regional estimates of LBW include 28% in south Asia, 13% in sub-Saharan Africa and 9% in Latin America. Among regions, South Asia has the highest incidence of LBW; with one in four newborns has LBW. In 2011, Indian Statistical Institute reported nearly 20% of new born have LBW in India. DLHS-4 (2012-2013) in Haryana found that the prevalence of LBW was as 12.7%. The aims and objectives of study were to know the prevalence and its associated factors of low birth weight in rural area of Haryana.

Methods: The beri block (Jhajjar) which is rural field practice of department of Community Medicine Pt B D Sharma PGIMS Rohtak (Haryana) India, has one CHC Dighal having 20 sub-centers. 10 sub-centers were selected by simple random sampling from these 20 sub-centres and 800 study subjects were enrolled from June 2015 to May 2016 from selected subcentres.

Results: In present study, prevalence of LBW was 17%. The study found that sex of baby, type of family, socioeconomic status, educational status of mother, occupation of mother, anemia and intake of IFA had significantly impacted on LBW in India.

Conclusions: Prevalence of LBW is decreased by health and nutrition education, iron and folic acid supplementation, effective management of complication.

Keywords: IFA, LBW, Occupation, Socioeconomic status

INTRODUCTION

Low Birth weight (LBW) baby is defined as live baby whose weight is less than 2,500 gm (up to and including 2,499 gm). LBW is universally used as an indicator of health status and is an important subject of national concern and a focus of health policy. LBW is the strongest determinant of infant morbidity and mortality in India. A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or restricted foetal (intrauterine) growth. Low birth weight is closely

associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life.

Many factors affect the duration of gestation and of foetal growth, and thus, the birth weight. They relate to the infant, the mother or the physical environment and play an important role in determining the infant's birth weight and future health. There is considerable variation in the prevalence of LBW across regions and within countries; however, the great majority of low birth weight births

occur in low- and middle-income countries. Regional estimates of LBW include 28% in south Asia, 13% in sub-Saharan Africa and 9% in Latin America. Among regions, South Asia has the highest incidence of LBW, with one in four newborns has LBW.² In 2011, Indian Statistical Institute reported nearly 20% of new born have LBW in India.³ DLHS-4 (2012-2013) in Haryana found that the prevalence of LBW was as 12.7%.4 LBW is the strongest determinant of infant morbidity and mortality in India. LBW is public health problem, caused by factors that are potentially modifiable and identification of maternal risk factors associated with LBW is essential in order to guide program planning, and organizing care for mothers and their newborns. That is why this study was planned to find out the factors associate with LBW in a rural area of Haryana.

METHODS

The present study was carried out in a rural area of Block Beri District Jhajjar (Haryana) which is a rural field practice area of Department of Community Medicine, Pt B D Sharma PGIMS Rohtak. The study was community based, cross-sectional in design and period was one year (June 2015 to May 2016). The block Beri had one Community Health Centre (Dighal), four Primary Health Centers (Dighal, Dujana, Kharhar, Bhembewa) and 20 Sub Health Centres. Considering the prevalence of low birth weight as 13.6% according to DLHS-4 of rural Haryana⁴ and taking 20% allowable error, 800 study subjects were enrolled in this study.

10 sub-centers were selected by simple random sampling method out of 20 sub-centers in CHC Dighal (Jhajjar). From each selected sub-center, the women who delivered during the study period and having live birth subjects were enlisted from ANC, natal, PNC, birth and immunization register of sub centre and 80 mothers from each sub-centre were selected from enlisted subjects by simple random sampling. The interviewer himself visited to these selected mother's house and purpose of study was explained. A written and informed consent was obtained from all mothers and information was collected on predesigned semi structured schedule. The mothers were excluded from study who had twin, not given informed written consent and mothers who could not be contacted after three home visits. Collected data were entered in the MS Excel spreadsheet, coded appropriately and later cleaned for any possible errors. Analysis was carried out using SPSS for Windows version 20.0.

RESULTS

In present study, the prevalence of LBW comes out to be 136/800 (17%) newborn and rest newborn babies had normal birth weight. Range of birth weight was reported as 1000-4500 gms and mean birth weight was 2825.26±517.908 gms.

Table 1 depicts the socio-economic characteristics of study subjects. The minimum and maximum age of subject was 19 years and 36 years respectively. The mean age of study subjects was 23.61±2.63 years. Majority of the participants belonged to general category (59.9%) followed by schedule caste (25.2%) and other backward caste (14.9%). Most of the study participants were Hindu by religion (98.9%) while only nine participants (1.1%) were Muslim. 39.9% of the study subjects belonged to upper middle class, 33.1% (were) from lower middle class and only 0.6% (belonged) to lower class. Majority of the participants 67.6% were living in joint families. Majority of the study participants (84.5%) were housewives followed by labourer (7.9%) and cultivation

Table 1: Socio-economic characteristics of study subjects (N=800).

Variables		No.	Percentage (%)
Age (Years)	<20	98	12.3
	21-25	527	65.9
	26-30	165	20.6
	>30	10	1.2
Religion	Hindu	791	98.9
	Muslim	9	1.1
Caste	General	479	59.9
	Schedule caste	202	25.2
	Other backward caste	119	14.9
Socioeconomic class*	Lower	5	0.6
	Upper lower	211	26.4
	Lower middle	265	33.1
	Upper middle	319	39.9
	Upper	0	0
Occupation	Housewives	676	84.5
	Labourer	63	7.9
	Caste occupation	14	1.7
	Cultivation	32	4.0
	Service	15	1.9
Type of family	Nuclear	260	32.4
	Joint	540	67.6

*(Udai Pareek Socioeconomic Scale)

Table 2 exhibits the association of various factors such as sex of baby, type of family, socioeconomic status, educational status of mother, occupation of mother, anemia and intake of IFA with Low Birth weight.

Prevalence of LBW was observed to be 11.4% in male babies while 20.7% in female babies. The association of birth weight with the gender of the babies was statistically significant (p=0.007). Furthermore study demonstrates that the proportion of LBW was higher

among Muslims (44.5%) as compared to Hindus (16.7%). The study also observed that OBCs had a higher (19.3%) proportion of LBW as compared to SC (18.6%) and general caste (15.6%). However the association of birth weight with both religion and caste was not found statistically significant. Study also displays that as the socio economic status of family increases, the proportion of LBW decreased and the association between birth weight with Socio economic status of family was found to be statistically significant (p=0.001).

Table 2: Association of factors with low birth weight.

Factors		Low birth weight		TD 4 1 (0/)	CI.	
		Yes (%)	No (%)	Total (%)	Chi-square test	
Gender	Male	55 (11.4)	353 (73.6)	408 (100)	$\chi^2 = 7.310 \text{ df} = 1$	
	Female	81 (20.7)	311 (79.3)	392 (100)	p = 0.007	
Religion	Hindu	132 (16.7)	659 (83.3)	791 (100)	$\chi^2 = 4.835 \text{ df} = 1$ p= 0.051	
	Muslim	4 (44.5)	5 (55.5)	9 (100)		
Caste	General	75 (15.6)	404 (84.4)	479 (100)	$\chi^2 = 1.539 \text{ df} = 2$ p= 0.463	
	SC	38 (18.8)	164 (81.2)	202 (100)		
	OBC	23 (19.3)	96 (80.6)	119 (100)		
Socio-economic status	Upper middle	38 (11.9)	281 (88.1)	319 (100)	$\chi^2 = 15.770 \text{ df} = 3$	
	Lower middle	44 (16.6)	221 (83.4)	265 (100)		
	Upper lower	53 (25.1)	158 (74.9)	211 (100)	p= 0.001	
	Lower	1 (20)	4 (80)	5 (100)		
Mother's occupation	Housewives	106 (15.7)	570 (84.3)	676 (100)		
	Labourer	19 (30.2)	44 (69.8)	63 (100)	$\chi^2 = 13.616 \text{ df} = 4$ p=0.018	
	Caste occupation	6 (42.8)	8 (57.2)	14 (100)		
	Cultivation	4 (12.5)	28 (87.5)	32 (100)		
	Service	2 (13.3)	13 (86.7)	15 (100)		
Hemoglobin level in third trimester	<7 gm%	7 (50)	7 (50)	14 (100)	$\chi^2 = 11.753 \text{ df} = 2$	
	7-10.9 gm%	123 (16.)	618 (83.4)	741 (100)	$\chi = 11.753 \text{ di} = 2$ p=0.003	
	≥11 gm%	6 (13.3)	39 (86.7)	45 (100)		
IFA intake	<100	104 (21.8)	374 (78.2)	478 (100)	$\chi^2 = 19.311 \text{ df} = 1$	
(days)	>100	32 (9.9)	290 (90.1)	322 (100)	p<0.001	
Type of family	Nuclear	24 (9.3)	236 (90.7)	260 (100)	$\chi^2 = 16.478 \text{ df} = 1$	
	Joint	112 (20.7)	428 (79.3)	540 (100)	p<0.001	

The proportion of LBW was maximum (42.8%) among mothers involved in their caste occupation, followed by 30.2% among labourers. Among service class mothers, the proportion of LBW was only (13.3%). The association between birth weight with occupation of mother was statistically significant (p=0.018). Observation regarding the association of anemia in mothers with LBW depicts that the proportion of LBW was maximum (50.0%) among mothers who were severely anemic (Hb <7 gm%), whereas in mild to moderately anemic mothers (Hb=7-10.9 gm%), the proportion of LBW was 16.5%. This association came out to be statistically significant (p value=0.003). Moreover, the prevalence of LBW was 21.8% among the mothers who had taken IFA tablets for less than 100 days while proportion of LBW was 9.9% in case of those mothers who had taken IFA for more than 100 days. The association between birth weight and IFA intake was highly statistically significant (p<0.001). Also, the study found that the proportion of LBW was high (20.7%) among those mother who were living in joint family, as compared to proportion of LBW in nuclear families i.e. 9.3%. The association between birth weight with type of family was highly statistically significant (p<0.001).

DISCUSSION

In present study, out of total 800 live birth, 136 (17%) were babies were born with LBW. Mean birth weight came out to be 2825.2±517.9. Majority of the studies done in rural areas of India had the same magnitude of the problem of LBWs while National Family Health Survey (NFHS-3) reported the prevalence of LBW was as 21.5%. ⁵⁻⁸ In the study, the mean age of study participants was 23.61±2.63 years. Majority (65.9%) of the participants were in the age group of 21-25 years. Negi et al reported the similar findings in their study, however, no significant association between maternal age and low birth weight. In the study, gender wise, 11.4% (55/353) male and 20.7% (81/31) female babies were LBW respectively and the statistically the association between birth weight and sex of the babies was found significant (p=0.007). Ranjabaran et al reported the similar association.¹⁰

The prevalence of LBW was higher (44.5%) among Muslim in the present study as compared to Hindus where the proportion of LBW was 16.7%. Caste wise prevalence of LBW was also measured in the present study and found that proportion of LBW among OBC was higher (19.3%) as compared to SC (18.6%) and General caste (15.6%). But both the association i.e. religion wise and caste wise association with birth weight was not found statistically significant. Similar results were reported by Kaushal et al and Agarwal et al but Bhattacharjya et al in Agartala found the proportion of LBW was higher (28.6%) among Muslim as compared to other religions. 11-13 Reason they explained that the Muslim mothers had lower level education that might have associated with lower health awareness and health seeking behavior of the mothers.

Table 2 shows that as socio-economic status of family increased, the proportion of LBW decreased and only 11.9% babies were LBW who belonged to upper middle socioeconomic status. The statistically the association between birth weight and socio-economic status of family was found to be significant (p=0.001). Joshi et al and Thomre et al reported the higher prevalence of LBW among upper lower (62.71%) and lower class (67.86%) as compared to lower middle class (23.81%) and no LBW was reported from upper class. 14,15 They also reported the higher prevalence (21.8%) of LBW among lower socioeconomic. This might be due to that mothers with low socio-economic status are more likely to have inadequate food intake, unhygienic housing and lack of sanitation, inability to seek medical care and purchase medicine/supplements, which then affects the birth weight of their babies.

Our study reported that proportion of LBW was higher (42.8%) among the mothers involved in their caste occupation, followed by labourers (30.2%). However among the mothers engaged in service the proportion of LBW was only 13.3%. The statistically, this association was calculated as significant (p value= 0.018). Sunilbala et al in Imphal and Anand et al in their studies revealed similar observations. 16,17 On comparing, the housewives with labourers, the difference was found statistically significant, but the association between service class and housewives was not significant. This might be owing to an increased physical activity, less rest and low intake of calories that leads to the more chances of LBW Laborer mothers have lower socioeconomic classes and may be worse off financially; they may have an inferior diet and a more stressful environment which do not facilitate food preparation and nutritional absorption that leads to lower in birth weight of baby.

In the current study, the proportion of LBW was 50.0% in severely anemic mothers while proportion of LBW was 16.6% in mild to moderately anemic mothers but proportion of LBW was reported 11.6% in mothers having normal hemoglobin level. The statistically also proven this association i.e. found significant (p=0.003).

This is because the maternal anaemia limits maternal oxygen uptake, decrease oxygen delivery to fetus and consequently leads to fetal growth restriction. Nirmalya et al, Kotbal et al and Bhattacharjya et al reported the similar results that proportion of LBW among anemic mother was higher as compared mother had normal hemoglobin level. A fall in hemoglobin levels during pregnancy is caused by a greater expansion of plasma volume compared with the increase in red cell volume. This disproportion between the rates of increase for, plasma and erythrocytes has the most distinction during the second and third trimester. A lack of iron in the mother's diet is because of not eating enough ironrich foods or the body's inability to absorb the iron being consumed. Without an iron supplement, there is not enough iron to feed the blood supply of the growing fetus because the dietary iron which is absorbed in pregnant women is used by women's body to maintain her own hemoglobin. Anemia during pregnancy can easily be treated by taking daily IFA tablets or taking diet having iron in your daily routine diet.

The association between birth weight and IFA intake was statistically significant (p<0.001) in the current study. Kandhaswamy et al and Dasgupta et al observed that Odds of having LBW was twice among the mothers who inadequately consume IFA tablets. 20,21 The results of study shows that lack of proper consumption of IFA tablets increases the chance of low birth weight and highlighted the need of program directed at girls and women much before pregnancy. In present study, the proportion of LBW was higher (20.7%) among those living joint family, as compared to mothers living in nuclear families i.e. 9.3%. The association between birth weight with type of family was statistically significant (p<0.001). Dasgupta et al and Bhattacharjya et al found that prevalence of LBW was higher in mothers who lived in joint families. 13,21 In India, still in the throes of a culture and tradition of a male-oriented society, women depend upon elder person of the family and could not avail proper ANC care. Also the women in the joint family do extra work and could not take proper rest and their nutritional requirements may be neglected or compromised especially during pregnancy that may leads to LBW baby.

In India, majority of mothers from rural area are not utilizing or inadequately utilizing antenatal care services from health facilities. Antenatal care of pregnant women is an established factor to improve pregnancy outcome and access to quality antenatal care should be viewed as potentially important since it also offers opportunities for counselling and risk detection apart from its necessity for maternal health. Antenatal care is an essential element of the health services provided during pregnancy. During antenatal care visits services such as screening, prevention, and treatment of pregnancy-related complications may decrease the chance of having LBW. The World Health Organization (WHO) recommends at least four standard quality antenatal care visits

comprising interventions such as tetanus toxoid vaccination. The improvement in maternal nutrition during pregnancy, avoiding close birth spacing, delayed child bearing in young females (<20 years), universal coverage of adequate antenatal care may help in reducing the LBW in newborns. This can be achieved only by imparting health and nutrition education to adolescents (both males and females) and to pregnant mothers through grass route level health functionaries.

CONCLUSION

The study conclude that sex of baby, type of family, socioeconomic status, educational status of mother, occupation of mother, anemia and intake of IFA had significantly impacted on LBW in India. The study recommends prevalence of LBW is decreased by health and nutrition education, iron and folic acid supplementation, effective management of complication. Efforts should be made to strengthen the health facilities and to impart health and nutrition education by health functionaries to antenatal mothers and early detection high risk pregnancy and timely referred to higher institutions and also to prevent preterm deliveries and anemia because these are factors which can prevent low birth weight babies.

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