Research Article

Assessment of Socio-Demographic, Maternal and Obstetric Factors Related to Birth Weight of Newborn: A Study at Shri Guru Govind Singh Memorial Hospital, Nanded

Jain S[1], Doibale MK[2], Inamdar IF[3], Nair A[4*], Sonkar VK[5], Salve DS[6]

[1, 4, 6]Junior Resident, Department of Community Medicine, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra– 431601, India

[2]Professor and Head of the Department, Department of Community Medicine, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra– 431601, India

[3, 5]Assistant Professor, Department of Community Medicine, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra– 431601, India

*Corresponding author

Dr. Abhilasha Nair

Email: drabhilashanair@gmail.com

Abstract: Low birth weight is a prospective marker of future growth and development and a retrospective marker of mothers nutritional and health status. This study is undertaken to find out proportion of low birth weights in institutional deliveries and factors influencing birth weight of baby. To assess the socio-demographic, maternal and obstetric factors related with birth weight of newborn. Hospital based cross sectional study conducted at Shri Guru Govind Singh Memorial Hospital, Nanded. It was decided to enroll 50% of the mothers who delivered live baby during the study period in the study. A predesigned questionnaire was used to collect the relevant information regarding various socio-demographic, maternal and obstetric factors. Data was entered in Microsoft Excel and analyzed by using statistical software SPSS version 16 for chi-square tests. Out of the total 249 newborns, 128 (51.4%) were having birth weight ≥2.5 Kg and 121 (48.6%) were having birth weight <2.5 Kg. None of the socio-demographic variables like residence, socioeconomic status, education, occupation etc were found to be significantly associated with birth weight of newborn. 62.5% of the preterm babies were LBW while only 46.5% of the term babies were LBW. Inter-pregnancy interval of 25-36 months (55.6%) and 49-60 months (71.4%) both were associated with more LBW newborns. 64.7% of those mothers who did not take any ANC care during pregnancy gave birth to LBW newborns. The prevalence of low birth weight in the study population was high. Inter-pregnancy interval, gestational age and number of antenatal visits were significantly associated with birth weight of newborn. It calls for overall improvement in the antenatal services to reduce the burden of LBW as a major public health problem.

Keywords: Newborn, Low birth weight, Determinants, Maternal factors, Obstetric factors, ANC care.

INTRODUCTION

Birth weight is a reliable and sensitive predictor of a newborn's chances for survival, growth and long term social and psychosocial development. Low birth weight (LBW) has been defined as a birth weight of less than 2.5 kg regardless of gestational age [1]. The LBW is a consequence of either preterm (<37 weeks of gestation) delivery or intrauterine growth retardation (IUGR) or both [2].

World Health Organization (WHO) has estimated that globally, out of 139 million live births, more than 20 million LBW babies are born each year, consisting 15.5% of all live births, nearly 95.6% of them in the developing countries [3]. Infants weighing less than 2.5 Kg at birth represent about 26% of all live births in India and more than half of these are born at term. LBW infants are 40 times more likely to die within the first four weeks of life than infants born with normal weight. Half of all perinatal and 1/3rd of all infant deaths occur in babies with LBW [1].

LBW prevalence of a country is a good summary measure of reflecting its public health problems and has been used as a very sensitive public health indicator for all the developing countries, including India. In developing countries, LBW problem is more than double (16.5%) the level in developed regions (4%) [4].

According to NFHS-3 report among children for whom birth weight was reported, 22 percent had a low birth weight, that is, they weighed less than 2.5 Kg. The proportion of LBW has been found to be slightly

higher in rural areas (23%) than in urban areas (19%) with regional disparities like as low as 8 percent in Mizoram to 33 percent in Haryana. In Maharashtra percentage is reported to be 22% [5].

At the national level, both in the Child Survival and Safe Motherhood Programme and Reproductive and Child Health Programme in India, the need of reduction of LBW problem, early identification of LBW babies delivered at home and their appropriate management either by supervised domiciliary care or referral to health institutions has been reiterated.[6,7] It was in this context present study was conducted to find out status of current incidence of LBW and associated factors in institutionally delivered newborns. The NFHS Report 3 reports association of low birth weight to place of residence (rural or urban), age of mother, religion, caste, birth order, education, wealth, use of tobacco etc.[5] Majority of these factors are preventable. Recognition of these factors is the essential and initial step in control of the problem of low birth weight.

Some of the interventions suggested to reduce LBW include delayed child bearing in adolescents, efforts to improve the nutritional status of women, particularly anaemia in pregnancy, access to antenatal care, advice on adequate rest during pregnancy, especially in undernourished women, efforts to stop smoking, and reduce tobacco chewing in areas wherever it is a common practice, improving female education, especially that of mothers [3].

MATERIALS AND METHODS

The present study was carried out amongst pregnant women and their newborn delivered at Shri Guru Govind Singh Memorial Hospital, Nanded. In our study various risk factors responsible for low birth weight were studied. As this is a tertiary care hospital, the delivery rate is high. So we have decided to enroll 50% of the mothers who delivered live baby during the study period. The sampling methodology used was systematic random sampling. Every second delivery that occurred during the study period was included in the study. The ethical clearance was obtained from institutional ethical committee. Investigator ensured that weighing machines and weighing procedure were standardized before start of study. Software SPSS version 16 was used for data analysis. Chi square test was applied for test of significance.

Process of birth recording

Birth weight of babies was recorded within 48 hrs of delivery (as per C.S.S.M programme) using portable spring balance weighing scale.

Sample population

Target population was new born delivered in hospital during study period and mothers delivering live born baby.

Questionnaire

A predesigned questionnaire was used to collect the relevant information after obtaining informed consent and by considering inclusion and exclusion criteria.

Informed consent

All women were explained about objectives of the study and informed consent was obtained prior to study.

Exclusion criteria

Mothers with multiple pregnancy, mother whose last menstrual period was not exactly known, neonates with congenital malformations, chromosomal anomalies and hemolytic disease of newborn.

Statistical analysis

Data was entered in Microsoft Excel and analyzed by using statistical software SPSS version 16 for chi-square tests.

Operational definition of low birth weight

All babies were weighed within 24 hrs after the birth. LBW was defined as birth weight of <2500 grams.

All mothers were examined and interviewed within 24hrs after delivery. Standardization of equipment was done to minimize error. Observers were trained to avoid inter-observer variations. After completing interview, response were coded and entered in computer. Antenatal check up was graded regular if minimum 3 checkups were done and one check up in each trimester.

RESULTS

It was decided to enroll 50% of the mothers who delivered live baby during the study period using systematic random sampling. Finally the study population comprised of 249 recently delivered mothers and their new born babies. Most of the mothers were in age group of 19-24 years (49%) and belonged to rural area (54.2%). 57.8% of the mothers were from joint family and were predominantly Hindu (80.8%). As per Modified BG Prasad's classification, 43.8% (n=109) and 30.2% (n=75) of mothers belonged to socio-economic class IV and V. Majority of mothers had education only till primary level (32.0%) and were housewives (88.4%). Their husbands were also having education till primary level (33.8%) or were illiterate (25.3%). Most of the husbands worked as unskilled worker (52.3%) and only few were professional workers (4.4%) (Table 1).

Out of the total 249 newborns, 128 (51.4%) were having birth weight ≥2.5 Kg and 121 (48.6%) were having birth weight <2.5 Kg (LBW babies). (Fig.1) Most of these LBW babies were born at term (35.0%) and to primiparous mothers (25.7%).
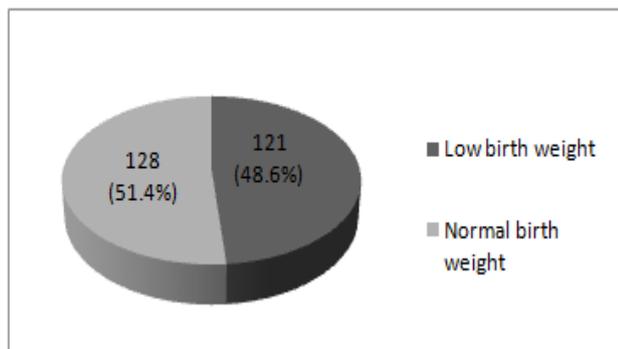
Fig. 1: Distribution of newborn according to birth weight

residence, joint family and Hindu religion predominated in both low birth weight and normal birth weight babies. Most of the mothers of both low birth weight (20.5%) and normal birth weight babies (23.3%) belonged to socio-economic class IV. 53.3% mothers from socio economic class V give birth to low birth weight babies. Majority of mothers in both groups were housewives and were educated till primary level. 50.8 % of illiterate mothers gave birth to LBW babies. Most of the fathers in both groups were unskilled workers and were also educated till primary level. 57.9 % of the mothers who had any of the types of tobacco addiction gave birth to LBW babies. None of these socio-demographic variables were found to be significantly associated with birth weight of newborn (p>0.05).

Table 1 shows some socio-demographic factors related to birth weight of newborn. Rural area of

Table-1: Some socio-demographic factors related to birth weight of newborn

Variables	Wt<2.5Kg	Wt≥2.5Kg	Total	Chi square (p value)
Residence				
Rural	63 (46.7%)	72 (53.3%)	135 (54.2%)	0.439 (0.508) df=1
Urban	58 (50.9%)	56 (49.1%)	114 (45.8%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Family				
Nuclear	46 (43.8%)	59 (56.2%)	105 (42.2%)	1.664 (0.197) df=1
Joint	75 (52.1%)	69 (47.9%)	144 (57.8%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Religion				
Hindu	100 (49.8%)	101 (50.2%)	201 (80.8%)	0.559 (0.455) df=1
Muslim	21 (43.8%)	27 (56.2%)	48 (19.2%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Socio-economic class				
I	0 (0%)	0 (0%)	0 (0%)	
II	3 (33.3%)	6 (66.7%)	9 (3.6%)	
III	27 (48.2%)	29 (51.8%)	56 (22.4%)	1.659 (0.646) df=3
IV	51 (46.8%)	58 (53.2%)	109 (43.8%)	
V	40 (53.3%)	35 (46.7%)	75 (30.2%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Education				
Illiterate	26 (47.3%)	29 (52.3%)	55 (22.2%)	
Primary	38 (47.5%)	42 (52.5%)	80 (32.0%)	
Middle	17 (51.5%)	16 (48.5%)	33 (13.3%)	2.854 (0.722) df=5
Secondary	19 (45.2%)	23 (54.8%)	42 (16.8%)	
Higher Secondary	13 (65.0%)	7 (35.0%)	20 (8.1%)	
Graduate	8 (42.1%)	11 (57.9%)	19 (7.6%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Occupation				
Housewife	110 (48.9%)	115 (51.1%)	225 (88.4%)	0.081 (0.776) df=1
Working (Non housewife)	11 (45.8%)	13 (54.2%)	24 (9.6%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Tobacco addiction				
No	110 (47.8%)	120 (52.2%)	230 (92.4%)	0.712 (0.399) df=1
Yes	11 (57.9%)	8 (42.1%)	19 (7.6%)	
Total	121(48.6%)	128(51.4%)	249(100%)	

Table 2 shows some maternal and obstetric factors related to birth weight of newborn. Most of the mothers of both LBW (22.9%) and normal birth weight babies (26.1%) were in age group of 19-24 years. Prevalence of LBW babies increased with increase in maternal age, with maximum prevalence in ≥31 years age group (66.7%). The relationship between maternal age and birth weight of newborn was not statistically significant (p>0.05).

43.0% of mothers had height<145 cm, out of which 42.1% gave birth to low birth weight babies and 57.9% gave birth to normal birth weight babies. This association was also not statistically significant (p>0.05%). 62.5% of the preterm babies were LBW while only 46.5% of the term babies were LBW. This association between gestational age and birth weight of newborns was found to be statistically significant (p<0.05).

52% of primiparous women gave birth to LBW babies while 100% of the 5th para mother gave birth to LBW babies. Majority of mothers in both groups were primiparous with no statistically significant association with birth weight of newborn (p>0.05). Among the multiparous mothers, inter-pregnancy interval of 12-24 months predominated in both low birth weight (6.8%) and normal birth weight babies (14.9%). Inter-pregnancy interval of 25-36 months (55.6%) and 49-60 months (71.4%) both were associated with more LBW newborns. The association between inter-pregnancy interval and newborn's birth weight was found to be statistically significant (p<0.05).

Majority of mothers had <=3 ANC visits during pregnancy. 64.7% of those mothers who did not take any ANC care during pregnancy gave birth to LBW newborns. Number of ANC visits was found to be highly significantly associated with birth weight of newborn (p<0.05).

Table 2: Some maternal and obstetric factors related to birth weight of newborn

Variables	Wt<2.5 Kg	Wt≥2.5Kg	Total	Chi square (p value)
Age of mother(in years)				
19-24	57(46.7%)	65(53.3%)	122(49%)	2.559 (0.278)
25-30	52(47.7%)	57(52.3%)	109(43.8%)	df=2
≥31	12(66.7%)	6(33.3%)	18(7.2%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Maternal height (in cms)				
<145	45 (42.1%)	62 (57.9%)	107 (43.0%)	3.211 (0.073)
>=145	76 (53.5%)	66 (46.5%)	142 (57.0%)	df=1
Total	121(48.6%)	128(51.4%)	249(100%)	
Gestational age				
Preterm	30 (62.5%)	18 (37.5%)	48 (19.2%)	
Term	87 (46.5%)	100 (53.5%)	187 (75.2%)	6.283 (0.043)
Postdated	4 (28.6%)	10 (71.4%)	14 (5.6%)	df=2
Total	121(48.6%)	128(51.4%)	249(100%)	
Parity of mother				
1	64(52.0%)	59(48.0%)	123(49.4%)	
2	35(43.8%)	45(56.2%)	80(32.1%)	4.933 (0.294)
3	15(45.4%)	18(54.6%)	33(13.3%)	df=4
4	4(40.0%)	6(60.0%)	10(4.0%)	
5	3(100%)	0(0.0%)	3(1.2%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
Inter-pregnancy interval				
Primi	64 (52.0%)	59 (48.0%)	123 (49.4%)	
12-24 months	17 (31.5%)	37 (68.5%)	54 (21.7%)	
25-36 months	15 (55.6%)	12 (44.4%)	27 (10.8%)	12.788 (0.012)
37-48 months	10 (41.7%)	14 (58.3%)	24 (9.6%)	df=4
49-60 months	15 (71.4%)	6 (28.6%)	21 (8.4%)	
Total	121(48.6%)	128(51.4%)	249(100%)	
ANC visits				
None	11 (64.7%)	6 (35.3%)	17 (6.8%)	
<=3	65 (40.1%)	97 (59.9%)	162 (65.1%)	13.32 (0.001)
>3	45 (64.3%)	25 (35.7%)	70 (28.1%)	df= 2
Total	121(48.6%)	128(51.4%)	249(100%)	

DISCUSSION

Low birth weight (LBW) is a major public health problem due to its association with high morbidity and mortality of infants. Birth weight is considered as the single most crucial determinant of child survival, growth and development. Present cross sectional study was undertaken to study various parameters affecting low birth weight. The 48.6% prevalence of LBW in present study is very high compared to that reported from other studies in the Indian subcontinent. Agarwal *et al*. [8] in their study found the LBW prevalence to be 40%, Jawarkar *et al*. [9] got 30.7% prevalence of LBW in their study and in another study by Joshi *et al*. [10] it was found to be 34.37%.

None of the socio-demographic factors studied in this study were found to be significantly associated with the birth weight of newborn. Prevalence of delivering LBW among women with high socioeconomic status was low. The women with high socioeconomic status have better nutrition, good environmental condition and have better care than women with poor socioeconomic status. Studies by Jawarkar *et al*. [9] and Anand *et al*. [11] further supports this finding. Urban residence and joint family mothers had more LBW babies than normal birth weight babies, but the association was not statistically significant. We could not find statistically significant association between maternal education, occupation and birth weight of newborn. Joshi *et al*. [10], Anand *et al*. [11], Dasgupta *et al*. [12] and Phalke *et al*. [13] in their studies found significant association between maternal education and occupation with newborn's birth weight. Mother's with higher level of education and higher monthly income were less likely to give birth to LBW newborns. Our study was unable to demonstrate any significant association between tobacco addiction and low birth weight. This could be due to small sample size. The present study showed that the proportion of LBW babies among mothers who chew tobacco was 57.9% when compared with 47.8% among the mothers who did not give such history. Agarwal *et al*. [8] (56.1% & 31.2%) and Mehta *et al*. [14] (64.62% & 36.28%) found similar results in their respective studies. But these studies showed that tobacco chewing is significant determinant of birth weight which was insignificant in our study.

Study by Agarwal *et al*. [8] showed that there is significant association of LBW and maternal age of less than 20 years (58.5%) and more than 30 years of age (48.8%). In this study the prevalence of LBW is high in mothers of age ≥31 years (66.7%) and that to a statistically non significant association.

Proportion of LBW among women with height <145 cm was 42.1% when compared with 53.5% among the mothers whose height was 145 cm and above. The difference was not statistically significant. Phalke et al [13] (22%) and Biswas *et al*. [15] (37.7%)

found similar results with maternal height <145 cm. But all these studies revealed a statistically non significant association between maternal height and birth weight of newborn.

In our study 62.5% of the preterm babies were LBW and this association was statistically significant. Agarwal *et al*. [8] found a higher proportion (76.5%) of LBW among newborn with gestational age <37 weeks of age, but that was a statistically significant association.

52% of primiparous women gave birth to LBW babies while 100% of the 5th para mother gave birth to LBW babies. Majority of mothers in both groups were primiparous with no statistically significant association with birth weight of newborn (p>0.05). Agarwal *et al*. [8] found that the proportion of LBW newborn was maximum among birth order 1 (39.1%) followed by birth order 2 (34.9%) and birth order 3 (26.0%), but this reduction in risk of LBW newborns with increasing birth order was not statistically significant. Jawarkar *et al*. [9] found a statistically significant association of increment in LBW prevalence with increasing birth order.

Inter-pregnancy interval of 25-36 months (55.6%) and 49-60 months (71.4%) both were associated with more number of LBW births. This association between inter-pregnancy interval and newborn's birth weight was found to be statistically significant (p<0.05) in our study. The proportion of LBW was 38.5% among the mothers who had inter-pregnancy interval less than 2 years when compared with 31.0% among the mothers who had pregnancy interval more than 2 years in the study by Agarwal *et al*. [8] (p>0.05). Jawarkar *et al*. [9] and Phalke *et al*. [13] found similar results in their studies (p<0.05).

In our study, majority of mothers had <=3 ANC visits during pregnancy. 64.7% of those mothers who did not take any ANC care during pregnancy gave birth to LBW newborns and this association was statistically significant (p<0.05). Biswas *et al*. [15] (35.7%) (p>0.05) and Jawarkar *et al*. [9] (46.7%) (p<0.05) found similar results in their studies.

CONCLUSION

The prevalence of low birth weight in the study population was high. Inter-pregnancy interval, gestational age and number of antenatal visits were significantly associated with birth weight of newborn. There was no significant association with age of mother, education, occupation, socio-economic class, type of family, residence, religion, tobacco addiction, maternal height, gestational age, parity etc to birth weight of newborn. It calls for overall improvement in the antenatal services and effective heath education to the pregnant mothers to reduce the overall burden of LBW as a major public health problem. Thus the

challenge of addressing this problem undoubtedly deserves an urgent attention by the concerned authorities. Small sample was the major limitation of our study. This may preclude statistical significance.

REFERENCES
1. Park K; Park's Text Book of Preventive and Social Medicine. M/s. Banarsidas Bhanot Publishers, Jabalpur, 2007; 17: 426–428.
2. Nisawander K, Jacson EC; Physical charactersitics of the gravid and their association with birth weight and perinatal deaths. Am J Obstet Gynaecology, 1974; 119: 306-313.
3. Sachdeva HPS; Low birth weight in South Asia. Int J Diab Dev Countries, 2001; 21: 13–29.
4. United Nations Children's Fund and World Health Organization; Low Birth Weight: Country, regional and global estimates. UNICEF, New York, 2004: 1-9.
5. International Institute of Population Sciences; National Family Health Survey (NFHS-3) 2005-2006, Ministry of Family Welfare, Government of India: Volume 1, Mumbai, 2007.
6. Govt. of India, National Institute of Health & Family Welfare, MCH division; National Child Survival and Safe Motherhood Programme – Programme Interventions, Safe Motherhood Newborn Care, New Delhi, 1994.
7. Govt. of India, National Institute of Health & Family Welfare, Reproductive and child health module for medical officers (Primary Health Centre) MO (PHC), Integrated Skill Development Training, New Delhi, 2002.
8. Agarwal K, Agarwal A, Agrawal VK, Agrawal P, Chaudhary V; Prevalence and determinants of "Low birth weight" among institutional deliveries. Annals of Nigerian Medicine, 2011; 5(2): 48-52.
9. Jawarkar AK, Lokare PO, Dore S; Study of socio-demographic and maternal determinants influencing birth-weight. J MGIMS, 2012; 17(2): 28–33.
10. Joshi HS, Subba SH, Dabral SB, Dwivedi S, Kumar D, Singh S; Risk factors associated with low birth weight in newborns. Indian Journal of Community Medicine, 2005; 30(4): 142-143.
11. Anand K, Garg BS; A study of factors affecting LBW. Indian Journal of Community Medicine, 2000; 15(2): 57-62.
12. Dasgupta S, Roy B, Mandal A; Low birth weight and maternal socio-biological determinants situation in a medical college hospital. Indian Journal of Public Health, 2004; 48(4): 218-220.
13. Phalke VD, Phalke DB, Bangal VB, Avachat SS, Deshpande JD, Palve SB; A cross sectional study of maternal factors influencing low birth weight. Indian Medical Gazette, 2012: 226-228.
14. Mehta A, Shukla S; Tobacco & pregnancy. J Obstet Gynaecol India, 1990; 40(2): 156-160.
15. Biswas R, Dasgupta A, Sinha RN, Chaudhuri RN; An epidemiological study of low birth weight newborns in the district of Puruliya, West Bengal. Indian Journal of Public Health, 2008; 25(2): 65-71.