

Sociodemographic determinants of low birth weight: a case control study in rural south India

Gururaj MS¹, Anitha N², Kulkarni AK³, Rekha⁴

¹Assistant Professor, Department of Community Medicine, Sathagiri Institute Of Medical Sciences and Research Centre, Bangalore, INDIA.

²Resident, Department of OBG, BGS Apollo Hospital, Mysore, INDIA.

³Professor, Department of Community Medicine, K.V.G Medical College and Hospital, Sullia, INDIA.

⁴Assistant Professor cum Statistician, Department of Community Medicine, K.V.G Medical College and Hospital, Sullia, INDIA.

Email: ¹drgurums@gmail.com, ²s_anitha22384@gmail.com, ³kulkarni AG_kulkarniag@gmail.com, ⁴rekha K_rekhakutti@gmail.com

Abstract

Background: The birth weight of an infant is one of the most important determinants of its chances of survival, healthy growth and development. **Objectives:** To estimate the proportion of babies with low birth weight and to identify the socio demographic risk factors associated with these low birth weight deliveries. **Methods:** The present study is a hospital based case-control study undertaken in the postnatal care wards of K.V.G Medical College Hospital, Sullia. The study subject includes all mothers who underwent normal delivery within study period and their neonates. The study covered a period of one year from January 2010 to December 2010. Data was collected by questionnaire method and analysed. **Results:** Proportion of low birth weight found was 25.64%. The difference in distribution of cases and controls in relation to maternal education, maternal occupation, socioeconomic status was found to be statistically significant ($P < 0.05$). On conditional logistic regression analysis important risk factors associated with low birth weight babies were maternal education status [illiteracy (OR -1.425, 95% CI -1.014 -2.754), Primary and Secondary level education (OR-1.174, 95% CI -1.085 -2.839)], maternal occupation status [coolies (OR -2.743, 95% CI -1.604 -3.730) and agricultural workers (OR -2.667, 95% CI -1.516 -4.649)], socioeconomic status [class IV) (OR -3.168, 95% CI -2.876-4.593) and Class V (OR- 2.24, 95% CI -1.573-4.771)]. **Interpretation and Conclusion:** Since most of these factors can be tackled easily by providing adequate antenatal care the low birth weight problem can be tackled effectively. Thus findings of present study emphasizes the need for improving the quality and utilization of antenatal care, nutritional education to improve the pre delivery body weight, spacing, avoidance of strenuous work during pregnancy, prevention and proper management of risk factor like anaemia along with improving socioeconomic and educational status of mothers.

Keywords: Birth weight; Maternal Age; Education; Socio-economic status; Antenatal care.

Address for Correspondence

Gururaj M S, Assistant Professor, Department of Community Medicine, Sathagiri Institute of Medical Sciences and Research Centre, Bangalore, INDIA.

Email: drgurums@gmail.com

Received Date: 08/01/2015 Revised Date: 17/09/2015 Accepted Date: 10/10/2016

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	DOI:

INTRODUCTION

Low-birth-weight (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 has

been shown to be associated with a higher risk for childhood mortality and morbidity. Number of factors like maternal, socio-environmental and genetic is responsible for the normal health, development and survival of children¹. To achieve this proper care is to be given even before a woman conceives, during pregnancy, delivery and after the birth. The children are at an increased risk of mortality and morbidity than the general population. This is more so in the first year of life. More than half the infant deaths occur in the first 28 days of life. Most of these take place in the first week of life. The major causes of these deaths are due to birth asphyxia, hypothermia, infections and home delivery under supervision of untrained dais. Babies born with a low birth weight are at higher risk of dying. In the developing countries Infant mortality rate is very high compared to

developed countries. Of the various causes of Infant mortality, either in developing or developed countries, birth weight is one of the important factors for the survival, normal growth and development of a child². The low birth weight is considered as sensitive index of nation's health and development³. By international agreement "A low birth weight baby is one with a birth weight less than 2.5kg, the measurement being taken preferably within first hour life: before significant postnatal weight loss occurred².

As per the WHO estimation about 25 million low birth weight babies are born each year, nearly 95% of them in developing countries². With improvement in health services, though there is reduction in infant mortality in India by about fifty percent during the past century, the incidence of low birth weight has not changed much⁴. Therefore present study is undertaken to estimate the proportion of babies with low birth weight and to identify socio demographic risk factors associated with these low birth weight babies.

MATERIAL AND METHODS

A hospital based case-control study conducted during January to December 2010 at K.V.G Medical College Hospital, Sullia to find out the proportion of LBW babies in institutional deliveries and its association with maternal factors. A pilot study was carried out in December 2009 for sample size estimation and also based on this pilot study pretested questionnaire was modified. Study subjects include 100 LBW babies (cases) and 100 NBW babies (controls) among all deliveries within the study period. Maternal age and parity were matched for selection of the controls. If two or more suitable matched controls were available for a case, only one was selected randomly. Irrespective of mode of delivery, all pregnant women who have delivered term singleton low birth weight baby were considered for study. Required minimum sample size was calculated as 97 in each group using the formula for sample size estimation for case-control study⁵ and considering following values: $\alpha = 0.05$ and odds ratio = 3. In the present study 100 cases and 100 controls were studied. A predesigned, pretested questionnaire was used to assess information regarding the study variables (Maternal age, parity, type of family, religion, maternal education, occupation status, place of residence, socioeconomic status, father's education). The available health records were also reviewed. Health education as and when necessary will be provided. Data entry and statistical analysis were performed using the Microsoft Excel and SPSS windows version 14.0 software. Tests of significance (Pearson's Chi-square test) was applied to find out the association. p values <0.05 were considered significant.

RESULTS

Total babies screened for birth weight were 468. Number of LBW babies born during the study period was 120 (25.64%). Out of them 100 LBW babies were included in the study. 20 LBW babies were excluded due to various reasons like premature delivery/gestational age was not known at the time of delivery⁸, unavailability of suitable matched controls⁷ and insufficient data⁵. Majority of the cases and controls were in 19-29 years age group (70% and 72% respectively) and nearly half of cases and controls (50% and 48% respectively) were first time conceiving mothers. Majority of the cases and controls among study population belong to Hindu religion (69% and 80% respectively) and maximum numbers of cases and controls (57% and 65% respectively) belonged to rural population. More than one-third of cases and controls (41% and 37% respectively) were illiterate (39%) and more than half of cases and controls (51% and 59% respectively) were from nuclear families. The difference in distribution of cases and controls in relation to maternal education, maternal occupation, socioeconomic status was found to be statistically significant ($P < 0.05$). 41% cases and 37% controls were illiterate followed by 28% cases and 21% controls with education up to primary and secondary level. A significant association was found between illiteracy, primary and secondary education status of mothers and birth weight of babies ($P < 0.05$). Risk of low birth weight decreased as educational standard increased. The percentage of low birth weight was inversely proportional to educational standard. Maximum number of cases and controls (69% and 80% respectively) were house wives followed by coolie workers. A significant association was found between occupations like coolie workers, agricultural workers and birth weight of babies ($P < 0.05$). Approximately 43% of cases and 38% of controls were from families belonging to lower socioeconomic status (class IV) and 44% cases and 38% of controls belonged to middle class (Class II and III) and less than 10% of mothers belonged to upper class. A significant association was found between socioeconomic status (class IV and class V) and birth weight of baby ($P < 0.05$). Conditional logistic regression analysis was done to eliminate the effects of potential confounders and to identify the independent effect of various risk factors. On conditional logistic regression analysis important risk factors associated with low birth weight babies were maternal education status [illiteracy (OR -1.425, 95% CI -1.014 - 2.754), Primary and Secondary level education (OR -1.174, 95% CI -1.085 - 2.839)], maternal occupation status [coolies (OR -2.743, 95% CI -1.604 - 3.730) and agricultural workers (OR -2.667, 95% CI -1.516 - 4.649)], socioeconomic status [class IV) (OR -3.168, 95% CI -2.

876-4.593)and Class V (OR- 2.24, 95 % CI -1.573-4.771)].

DISCUSSION

This case control study was done to estimate the proportion of babies with low birth weight and to identify the maternal risk factors associated with these low birth weight babies. In present study, out of total 468 live new born, 120 were low birth weight babies. Thus the proportion of low birth weight found was 25.64%, which is more than the prevalence of LBW (21.5%) observed in National Family Health Survey (NFHS-3)⁶. Munesh *et al*⁷ (2009) carried out a study in a setting similar to present study. The overall proportion of LBW found in it was 23.8% which is more than national prevalence similar to present study. Our findings are compatible with those of Ghosh *et al*⁸(1977), Ashtekar *et al*⁹, Tyagi *et al*¹⁰(1985), Hirve and Ganatra¹¹(1994), Malik *et al*¹²(1997), and Deswal *et al*¹³(1999).These studies reported the proportion of low birth weight which varied from 23% to 29%. In this study, 41% cases and 37% controls were illiterate mothers. Birth weight of babies was significantly association with illiteracy, primary and secondary education status of mothers. Hence maternal education showed inverse relation to birth weight of baby. Mothers with lower educational status were at more risk of delivering low birth weight babies compared to mothers with higher educational status. Low educational status of mother leads to low health consciousness, lower nutritional status and low antenatal attendance leading to the increased risk of LBW babies². Dasgupta *et al*¹⁴(2004) for kolkatta and Idris *et al*³(2000)carried out hospital

based studies in setting similar to present study and found significant association between low maternal education and LBW similar to present study. Present study has identified maternal occupation as significant risk factor for delivering LBW babies. A significant association was found between nonprofessional maternal work with heavy physical activity (coolie workers, agricultural workers) and birth weight of babies. This findings confirms the finding of Ghosh *et al*¹⁰(1977), Fedric and Adelstein¹⁵(1978), Dougherty and Jones¹⁶(1982), Anand and Garg¹⁷(2000), Khatun and Rahman¹⁸(2008).These studies found that risk of LBW babies was lower in housewife and mothers engaged in professional work compared to mothers engaged in nonprofessional work with heavy physical activity. In present study, A significant association was found between socioeconomic status class IV, class V and birth weight of baby. Hence socioeconomic status of mother showed inverse relationship to birth weight of baby. Mothers with lower percapita income were at increased risk of delivering low birth weight babies compared to mothers with higher percapita income.

Findings of the present study in terms of low literacy level, low per capita income as risk factors of LBW agree with findings of NFHS-3 survey¹⁹. Thus findings of present study emphasizes the need for improving the quality and utilization of antenatal care, nutritional education to improve the predelivery body weight, spacing, avoidance of strenuous work during pregnancy, prevention and proper management of risk factor like anemia along with improving socioeconomic and educational status of mothers.

LIMITATIONS

- Present study is a hospital based study, so it was not possible to calculate exact prevalence of low birth weight babies.
- The health status of women before present pregnancy and maternal biological determinants associated with LBW were not taken into consideration as our objectives were to identify the sociodemographic determinants of low birth weight in study population.

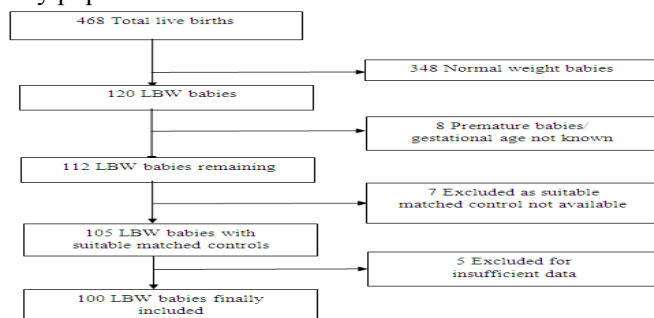


Figure 1: Flow chart showing process of case selection

Table 1: Distribution of low birth weight and normal birth weight infants in relation to socio demographic characteristic of study population

Variables	Cases (LBW) n=100(%)	Controls (Normal BW) n=100(%)	Total n=200(%)	Statistical tests*
Religion				
Hindu	69(69)	80(80)	149(74.5)	$\chi^2=3.763, df=2, p>0.05$
Muslim	26(26)	15(15)	41(20.5)	
Others	5(5)	5(5)	10(5)	
Place of residence				
Urban	43(43)	35(35)	78(39)	$\chi^2=2.061, df=1, p>0.05$
Rural	57(57)	65(65)	122(61)	
Type of family				
Nuclear	51(51)	59(59)	110(55)	$\chi^2=5.983, df=2, p>0.05$
Joint	29(29)	33(33)	62(31)	
Three generation	20(20)	8(8)	28(14)	
Maternal education				
Illiterate	41(41)	37(37)	78(39)	$\chi^2=17.242, df=4, p<0.05$
Primary and Sec	28(28)	21(21)	49(24.5)	
High school	15(15)	23(23)	38(19)	
PUC	9(9)	10(10)	19(9.5)	
Graduate	7(7)	9(9)	16(8)	
Father's education				
Illiterate	6(6)	3(3)	9(4.5)	$\chi^2=3.007, df=4, p>0.05$
Primary and Sec	16(16)	14(14)	30(15)	
High school	41(41)	40(40)	81(40.5)	
PUC	22(22)	31(31)	53(26.5)	
Graduate	15(15)	12(12)	27(13.5)	
Mothers occupation				
House wife	68(68)	72(72)	140(70)	$\chi^2=14.656, df=4, p<0.05$
Coolie	12(12)	7(7)	19(9.5)	
Agriculture	10(10)	6(6)	16(8)	
Service	5(5)	8(8)	13(6.5)	
Others	5(5)	7(7)	12(6)	
Socioeconomic status[#]				
I-Upper class	5(5)	14(14)	19(9.5)	$\chi^2=19.290, df=4, p<0.05$
II-Upper middle	8(8)	10(10)	18(9)	
III-Lower middle	28(28)	36(36)	64(32)	
IV-Upper lower	51(51)	30(30)	81(40.5)	
V-Lower	8(8)	10(10)	18(9)	

Figure in parenthesis represent percentages within the group

*Chi-square test # as per modified B.G. Prasad classification (2010)

Table 2: Association of maternal education with birth weight of baby in study population

Maternal education	Cases n=100(%)	Controls n=100(%)	Odds ratio	Adjusted Odds ratio	P-value
Illiterate	41(41)	37(37)	1.425(1.014-2.754)	2.943 (1.576- 15.039)	0.019
Primary and Secondary	28(28)	21(21)	1.174(1.085-2.839)	4.463 (1.879- 22.664)	0.031
High school	15(15)	23(23)	0.859(0.011-7.343)	5.000 (.790-31.627)	0.087
PUC	9(9)	10(10)	1.157(0.099- 5.734)	0.383(0.286- 1.836)	0.118
Graduate	7(7)	9(9)	-	-	-

Figure in parenthesis represent percentages within the group

Table 3: Association of maternal occupation with birth weight of baby in study population

Maternal occupation	Cases n=100(%)	Controls n=100(%)	Odds ratio	Adjusted Odds ratio	P-value
House wife	68(68)	72(72)	1.511(0.035-2.460)	0.460 (0.164- 3.778)	0.213
Coolie	12(12)	7(9)	2.743(1.604- 3.730)	3.864 (1.290- 4.836)	0.023
Agriculture	10(10)	6(6)	2.667(1.516-4.649)	3.121 (2.176- 5.394)	0.035
Service	5(5)	8(8)	-	-	-
Others	5(5)	7(7)	1.143(0.869- 7.027)	1.027(0.330-2.769)	0.16

Figure in parenthesis represent percentages within the group

Table 4: Association of socioeconomic status with birth weight of baby in study population

Socioeconomic status	Cases n=100(%)	Controls n=100(%)	Odds ratio	Adjusted Odds ratio	P-value
I	5(5)	14(14)	-	-	-
II	8(8)	10(10)	2.24(0.328-6.452)	.734 (0.693- 3.452)	0.204
III	36(36)	28(28)	3.6(0.583 -4.419)	2.165 (0.424- 3.612)	0.481
IV	43(43)	38(38)	3.168(2. 876-4.593)	2.593 (1.274- 5.392)	0.031
V	8(8)	10(10)	2.24(1.573-4.771)	2.941(1.443-3.591)	0.043

Figure in parenthesis represent percentages within the group

REFERENCES

- UNICEF (US). Malnutrition in South Asia: A regional profile. New Delhi: Rosa publications, 1997.
- Park K. Park's Text book of preventive and social medicine. 19th Ed., Jabalpur: M/s Banarsidas Bhanot, 2007.
- Idris MZ, Gupta A, Mohan U, Kumar A, Srivastava, Das V. Maternal Health and low birth weight among institutional deliveries. *Indian J Community Med* 2000; 25(4): 156-60.
- Sharma Rk, Cooner pps, Dhaliwal DS, Singh K. A study of effect of maternal nutrition on incidence of low birth weight. *Indian J Community Med* 1999; 24 (2): 64-8.
- Zodpey SP. Sample size and power analysis in medical research. *Indian J Dermatol Venereol Leprol* 2004; 70:123-8.
- International Institute of Population Sciences, National Family Health Survey, India. 2005-06 (NFHS-3, Vol. 1)2007:225.
- Sharma MK, Kumar D, Huria, Gupta P. Maternal Risk Factors Of Low Birth Weight In Chandigarh India. *The Internet Journal of Health*.2009:9(1).
- Ghosh S, Hooja V, Verma RK. Biosocial determinants of birth weight. *Indian Paediatrics* 1977; 14(2): 107-14.
- [Ashtekar SV](#), [Kulkarni MB](#), [Sadavarte VS](#), [Ashtekar RS](#). Analysis of birth weights of a rural hospital. *Indian J Community Med* 2010; 35(2):252-5.
- Tyagi NK, Bhatia BD, Sur AM. Low birth weight babies in relation to nutritional status in primipara. *Indian paediatrics* 1985; 22: 507-14.
- Hirve SS, Ganatra BR. Determinant of low birth weight: A community based prospective cohort study. *Indian paediatrics* 1994; 33: 1222-25.
- Malik S, Ghidiyal RG, Udani R, Waingankar R. Maternal Biosocial factors affecting low birth weight. *Indian Journal of paediatrics* 1997; 64: 373-7.
- Deswal BS, Singh JV, Kumar D. A study of Risk factors for low birth weight. *Indian Journal of community medicine* 1999; 24(3): 127-31.
- Gupta 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): 218-20.
- Fedric J, Adelstein P. Factors associated with low birth weight infants at term. *British journal of obstetrics and Gynaecology* 1978; 85 (1): 1-7.
- Dougherty CRS, Jones AD. The determinants of birth weight. *American journal of obstetrics and Gynaecology* 1982; 144: 190-200.
- Anand K, Garg BS. A study of factors affecting low birth weight. *Indian J Community Med*. 2000 ; 25(2) : 57-62
- Khatun S, Rahman M. Socio-economic determinants of low birth weight in Bangladesh: A multivariate approach. *Bangladesh Med Res Counc Bull* 2008; 34:81-6.
- International Institute of Population Sciences, National Family Health Survey, India. 2005-06 (NFHS-3, Vol. 1) 2007:225.

Source of Support: None Declared
Conflict of Interest: None Declared