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Original Research Article

Socio-demographic factors associated with low birth weight in a tertiary care hospital of Odisha

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ABSTRACT

Background: World Health Organization has defined low birth weight (LBW) as birth weight less than 2,500 grams. Giving birth to a LBW infant is influenced by several factors. Objective of the study was to measure the proportion of low birth weight babies delivered in V.S.S medical college and hospital, Burla and its association with socio-demographic factors.
Methods: Hospital based cross -sectional study comprising of 1030 postnatal women who delivered single live baby in V.S.S Medical College and Hospital, Burla. Selection of study participants was done by systematic random sampling in the study period October 2012 to September 2014. Chi-square test was used to measure association between LBW and socio-demographic factors.
Results: The proportion of LBW was found to be 27.76%. The proportion of LBW babies was high and significant in extremes of age i.e. teenage (44.19%) and 30 years and above age group (39.56%) and Muslim mothers (36.36%), illiterate mothers (53.52 %), manual labourer (67.14%), socioeconomic class IV and V (32.98%), consanguinity history (60.58%), smoky fuel (30.02%), consumption of tobacco (49.11%).
Conclusions: The proportion of LBW (27.76%) was found to be higher than national average (21.5%).

Keywords: Low birth weight, Socio-demographic factors, Cross sectional study

INTRODUCTION

World Health Organization (WHO) has defined low birth weight (LBW) as birth weight less than 2,500 grams.[1] This cut off is based on epidemiological observations that infants weighing less than 2500 g are approximately 20 times more likely to die than heavier babies. LBW has been associated with a high infant mortality, morbidity in childhood and with an elevated risk of diabetes mellitus, hypertension and other cardiovascular disease in adulthood.[2]

On an average, the incidence of LBW is estimated to be 16% worldwide, 19% in the least developed and developing countries and 7% in the developed countries.[2-4] The incidence of LBW varies among countries, ranging from 4% to 6% in Western countries and much higher in developing countries. India accounts more than 40% of the global burden of LBW babies with 7.5 million babies (or 30% of the country's total annual live births) being born with a birth weight less than 2500 grams. In Odisha, the prevalence of LBW varies from district to district with a minimum of 7% in Puri district to a maximum of 26% in Kandhamal district. The prevalence of LBW in

Sambalpur district which includes our study area was 20% but the less percentage could be due to under reporting.[5]

It is known that the etiology of LBW is multi-factorial. Not that all the factors should be present in a given area. The factors vary from one area to another, depending upon geographic, socioeconomic and cultural factors. In a meta-analysis, Kramer identified 43 potential factors which were mainly genetic and constitutional factors, obstetric factors, demographic and psychosocial factors, nutritional factors, maternal morbidity during pregnancy and care during pregnancy etc.[6]

The prevention of LBW is a public health priority, particularly in developing countries with high prevalence. Majority of the studies focused on the maternal factors; there are very few studies that analyzed the socio-demographic variables. Studies done in India suggest that, factors associated with LBW differ from one area to another, again in the state Odisha it differs from district to districts and majority of neonatal mortality in this setup in recent past were LBW and belongs to low socioeconomic status. Hence, the present study was done to measure the proportion of LBW babies and its association with maternal socio-demographic factors.

METHODS

The present study was a hospital based cross-sectional study undertaken in the labor room and postnatal ward of Obstetrics and Gynecology department V.S.S. Medical College and Hospital, Burla. The study was conducted for a period of two years from Oct 2012 to September 2014 after due approval from Institutional Ethical Committee (IEC). The objective of the study was explained to the mothers and informed consent was obtained. Consent from the husband or head of the family was obtained in cases where mothers with age less than 18 years (minor).

The mothers were recruited into the study just before delivery using systematic random sampling methods. All babies were weighed within one hour after the birth. The babies were weighed on calibrated baby weighing machine (max.weight10kgs) up to 10 g accuracy (Docobel company). LBW was defined as a birth weight of <2500 g.

On the bedside mothers were interviewed using predesigned and pretested semi-structured questionnaires and the information regarding the study variables like maternal age, residence, religion, education, occupation, income, type of family, consanguinity history, sex of the baby was collected. Likewise the data was collected on daily basis for a period of 9 months till the desired sample size was achieved.

Taking prevalence of LBW babies in India as 28% and 10% allowable error with 95% confidence interval sample size calculated to be1029 (rounded to 1030), by using the formula: $n=4pq/L^2$.[6]

Data collected was compiled, tabulated and analyzed in the department of community medicine VSS Medical College and Hospital, Burla. Descriptive statistics was performed for each variable and group comparison was done by chi-square test. 'P' value less than 0.05 was considered as statistically significant.

RESULTS

Figure 1 shows out of total 1030 singleton live new born 286 were LBW babies. Thus the proportion of LBW found was 27.76%.

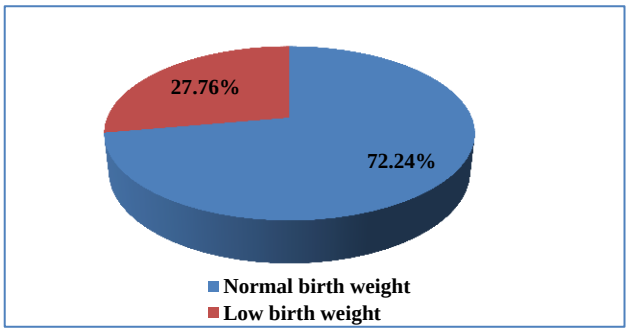

Figure 1: Proportions of low birth weight.

Table 1 shows majority 848 (82.33%) mothers belonged to 20-29 years age and the mean age of mother at time of admission was 24.32 years. The proportion of LBW babies was higher in below 20 years mothers (44.19%) and ≥30 years (39.56%) as compared to 20-29 years (25.0%) and the association between maternal age and LBW was found significant (p<0.05).

Majority of mothers 861 (83.60%) were from rural area. The proportion of LBW babies were found 242 (28.10%) in rural area and 44 (26.04%).urban area and no significant difference was observed in the distribution of place of residence and birth weight of baby (p>0.05).

Majority of mothers were Hindu 989 (96.02%) but the proportion of LBW was found high in Muslims 4 (36.36%) compared to Hindu 276 (27.90%) and Christian 6 (20.0%) mothers but the association was found to be statistically not significant (p>0.05).

Among the study participants, 71 (6.9%) were illiterate, 150 (14.56%) with primary education, 175 (16.7%) with high school, 634 (61.5%) with intermediate and above. The proportion of LBW was high in mothers who were illiterate (53.52%). The LBW proportion decreased as educational standard increased i.e. primary (40.0%), high school (35.42%), intermediate and above (19.22%) respectively. The association between mothers education and birth weight of babies was found statistically significant (p<0.05).

Table 1: Distribution of low birth weight according to Socio-demographic variables of study participants (n=1030).

Socio-demographic variables	Low birth weight(LBW)		Statistical significance
	Present (n=286)	Absent (n=744)	
	No (%)	No (%)	
Maternal age (years)			
≤19	19 (44.19)	24 (55.81)	χ^2=18.668 P-value<0.05
20-29	212 (25.0)	636 (75.0)	
≥30	55 (39.56)	84 (60.44)	
Residence			
Rural	242 (28.10)	619 (71.89)	χ^2=0.302 P-value>0.05
Urban	44 (26.04)	125 (73.96)	
Religion			
Hindu	276 (27.90)	713 (72.10)	χ^2=1.317 P-value>0.05
Muslims	4 (36.36)	7 (63.64)	
Christian/others	6 (20.0)	24 (80.0)	
Education			
Illiterate	38 (53.52)	33 (46.48)	χ^2=59.486 P-value<0.05
Primary	60 (40.0)	90 (60.0)	
High school	62 (35.42)	113 (64.58)	
Intermediate & above	126 (19.88)	508 (80.12)	
Occupation			
House wife	237 (25.10)	707 (74.90)	χ^2=59.304 P-value<0.05
Manual laborer	47 (67.14)	23 (32.86)	
Service	2 (12.50)	14 (87.50)	
Type of family			
Nuclear	87 (37.18)	147 (62.82)	χ^2=18.115 P-value<0.05
Joint	145 (27.46)	383 (72.54)	
Three generation	54 (20.15)	214 (79.85)	
Socioeconomic status			
I, II & III	37 (13.45)	238 (86.55)	χ^2=38.3165 P-value<0.05
IV & V	249 (32.98)	506 (67.02)	
Consanguinity history			
Present	63 (60.58)	41 (39.42)	χ^2=62.088 P-value<0.05
Absent	223 (24.08)	703 (75.92)	
Type of kitchen fuel			
LPG/Biogas/Electric	38 (21.11)	142 (78.89)	χ^2=4.8177 P-value<0.05
Heater smoky fuel	248 (30.02)	578 (69.98)	
Maternal tobacco consumption			
Yes	83 (49.11)	86 (50.89)	χ^2=45.927 P-value<0.05
No	203 (23.58)	658 (76.42)	
Sex of the baby			
Male	159 (26.90)	432 (73.10)	χ^2=0.380, P-value>0.05
Female	127 (28.93)	312 (71.07)	

A vast majority of mothers were housewives 944 (91.65%) followed by manual labourer 47 (6.8%) and only 16 (1.55%) were service class and others. The proportion of LBW was higher in manual labourer (67.14 %) than housewives (25.10%) and service class mothers (12.50%) and the association was found statistically significant (p<0.05).

Most mothers 528 (51.26 %) were from joint family compared to nuclear 234 (22.72%) and three generation family 268 (26.02%). A high proportion of LBW was found in nuclear families (37.18%) followed by joint (27.46%) and three generation families (20.15%). The association between type of family and LBW was found statistically significant (p<0.001).

Majority of mothers 755 (73.3%) were from low SES (class IV and V) as compared to middle (II and III) and upper class (I) 275 (26.70%). The proportion of LBW baby increased with decrease in SES and was highest in lower class (32.98%) and the association was statistically significant (p<0.05).

Only 104 (10.10 %) mothers were with history of consanguineous marriage but the proportion of LBW babies were found high (60.58%) compared to mothers having no such history (24.08%) and the association was found statistically significant (p<0.05).

Among the study participants, only169 (16.40%) mothers gave history of tobacco consumption but the proportion of LBW babies was high (49.11%) in mothers using tobacco than nonusers (29.41%) and the difference was observed as statistically significant (P<0.05).

Out of 1030 study participants, majority 826 (80.2%) were using smoky kitchen fuel and only 204 (19.8%) were LPG/biogas/electric heater users. The proportion of LBW was also high (30.02%) in smoky fuel users in comparison to non-smoky fuel users (21.11%) and the association was found statistically significant (p<0.05)

So far the sex of the newborn is concerned, 591 (57.38%) were found male and 439 (46.62%) were female newborn. The proportion of LBW was marginally higher among female newborns (28.93%) as compared to male (26.90%) but there was no significant difference observed (p<0.05).

DISCUSSION

The proportion of LBW (<2.5 kg in first hour of birth) was found to be 27.76%. Similar finding were reported by Paliwal et al and UNICEF statistical data of India.[7,8] While it was higher than that of NFHS-3 data (21.5%).[9] The higher proportion of LBW could be due to the fact that high risk cases come for the delivery in the tertiary care setting. The variation in the prevalence may be due to varying geographic and socioeconomic differences among the different communities.

Most (25.40%) of the LBW babies found were in the weight group of 1500 to 2499 grams. A similar finding was reported in Jaipur based study.[7] Over all mean birth weight was found to be 2.72 ±0.506.

The mean age of mother at time of admission was 24.32 years. The study results establish that the proportion of LBW is significantly associated with the mother's age. The proportion of LBW babies was higher in mothers below 20 years (44.19%) and ≥30 years (39.56%) age. The findings were in consistent with the studies done by Krammer, Nayak et al and Manna et al.[6,10,11] However some studies could not find a significant association between maternal age and LBW.[7,9,12] Young age of mother, inadequate development of the uterus and inadequate spacing due to marriage at an early age can cause LBW babies. Similarly higher proportion LBW in women over 30 years of age might be due to increased vascular changes and low nutritional status leading to exhibit impaired intrauterine growth or inadequate gestational duration.

In present study, the proportion of LBW was marginally high (28.10%) among mothers residing in rural area and there was no statistically significant association of residential status of the mother and LBW. Similar results also observed by Agarwal et al.[12] Both groups are equally facilitated to enjoy the MCH services that could be the reason of insignificant difference. However few other studies contradicting this study and found a statistically significant association with LBW.[13,14]

Majority 989 (96.02%) of mothers were Hindu. Nayak et al and Nagagorge et al also found Hindu as the major religion in their studies.[10,15] A higher proportion of LBW was found in Muslim (36.36%) but the association was found to be statistically not significant. Studies done by Velankar and Kaushal et al were also in accordance with this results but studies by Padda et al and Hayat et al contradicting this and found a significant association between religion and LBW.[16-19] The higher proportion of LBW in Muslims mothers may be due to the difference in life style based on tradition and beliefs.

The proportion of LBW was found to be high (53.52%) in mothers who were illiterate. As the literacy level of mother increased the proportion of LBW babies decreased and the difference was significant. Padda et al and many other studies also found similar results.[8, 11, 18, 20] The high proportion of LBW in relation to illiteracy may be linked to lower awareness levels regarding the need for antenatal care services and its utilization.

The proportion of LBW (67.14%) was high in mothers who were manual laborer and the association was found statistically significant. This difference may be due to difference in their physical activity. Swarnalatha et al and many others also reported similar findings.[8,20,21]

Out 1030 mothers, 528 (51.26%) were from joint family. Similar results revealed by Agarwal et al in their Meerut based study.[12] The proportion of LBW was high in nuclear families (37.18%) and the association between type of family and LBW was found to be highly significant. Manna et al and Padda et al also reported similar findings.[11,18] The less proportion of LBW in joint and three generation family might be due to fact that, they had received more care from family members or strenuous activities might have shared.

It was evident that SES (modified B.G. Prasad) had significant association with LBW.[22] The study observed 755 (73.3%) mothers belonged to lower SES (class IV and V).The proportion of LBW baby increased with decrease in SES and was high in class IV (34.01 %) and

class V (31.86%). Agarwal et al and many others studies revealed similar findings.[11-13,18,21] The high proportion of LBW in low SES mothers might be due to poor nutrition intake during pregnancy and certain cultural practices.

In current study, though only104 (10.10%) mothers gave history of consanguinity, the LBW proportion was high among those who gave history of consanguinity (60.58%) and it was statistically significant. Swarnalatha et al and Bener et al also found similar results in their study but Paneru et al failed to established association between consanguinity history and LBW.[20,23,24]

Very few 169 (16.40%) mothers were found consuming tobacco throughout pregnancy but the proportion of LBW were high (49.11%) among mothers using tobacco and the association was found statistically significant. Swarnalatha et al and many others showed consistent results with this study.[6,11,12,14,20,25] Here nicotine may be the agents most likely responsible for detrimental effects on intrauterine growth causing LBW.

The proportion of LBW was also high (30.02%) in smoky fuel users and the association was found statistically significant ($p<0.05$).The study finding is consistent with Epstein M.B.et al and others.[26- 28] Sachdeva S et al observed that Carbon monoxide (CO) in particular is regarded as the agent most likely to be responsible for detrimental effects on intrauterine growth.[29] Carbon monoxide results from incomplete combustion of bio-fuels (wood, dung, and fiber residues) as well as fossil fuels such as coal and gas that is used for cooking and heating biomass. Studies have shown that exposure to bio fuels is associated with carboxy-heamoglobin (COHb) levels of 2.5–13%. This compound does not readily give up oxygen to peripheral organs and tissue including foetus thus leading to growth restriction.

So far the sex of the newborn is concerned, the proportion of LBW was found nearly equal among both male and female babies (26.90% vs. 28.93%). This could be explained by the fact that males may be more responsive to growth promoting influences and more susceptible to supply disturbances. However this difference was found to be not significant and was consistent with Nayak et al in a retrospective record based study in Belgaum; North Karnataka.[10] Studies done by Verropoulou and Tsimbos in Greece and recent Indian studies contradict the current study and reported significantly high proportion LBW among female newborn.[11,19,20,30]

CONCLUSION

The proportion of LBW (<2.5 kg in first hour of birth) was found still very high (27.76%). The present study states that different socio-demographic characteristics of the population are still the important factor in causing LBW among the newborn. Out of the different socioeconomic factors studied, significant proportion of LBW was found in maternal age below 20 and above 30 years, illiterate mother's manual laborer, nuclear family, poor socioeconomic status, history of consanguinity, consumption of tobacco, use of smoky fuel. Other factors such as residence, religion and sex of the baby are not significantly associated with LBW. Thus, LBW is a multi-factorial phenomenon. Hence, interventional programs should be encouraged not only in health sectors but in all those sectors concerned with social development and social welfare programs.

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