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Study of Sociodemographic Factors Affecting Low Birth Weight Babies in Tertiary Care Centre

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ABSTRACT

Introduction: The birth weight of an infant is the single most important determinant of its chances of survival, healthy growth and development. Low birth weight is mainly caused by prematurity (short gestation) or intrauterine growth retardation. The incidence of low birth weight in India varies between 25-30% and of which 60-65% are because of intrauterine growth retardation.There are numerous maternal and foetal factors resulting in low birth weight babies. This study is aimed to assess the sociodemographic factors affecting the low birth weight.

Methods: The present study was a hospital based observational descriptive study. The study was undertaken in neonatal intensive care unit of department of paediatrics of tertiary care centre. The study period was from January 2016 to December 2016 i.e. total period of one year. The low birth babies according to WHO criteria i. e. less than 2500g admitted in neonatal intensive care units in one year were selected which were 360.Among the 360 babies admitted, there was male preponderance with male to female ratio of 1.3:1. There was statistically significant association found between sex, low socioeconomic status, religion, maternal risk factors like age, primigravida, less than 2yrs spacing, bad obstetric history, pregnancy induced hypertention and low birth weight babies ($p < 0.05$).

Keywords: Low birth weight, Neonatal intensive care unit, Tertiary care centre, Sociodemographic factors.

INTRODUCTION

The birth weight of an infant is the single most important determinant of its chances of survival, healthy growth and development. Low birth weight is mainly caused by prematurity (short gestation) or intrauterine growth retardation[1].

The incidence of low birth weight in India varies between 25-30% and of which 60-65% are because of intrauterine growth retardation. There are numerous maternal and foetal factors resulting in low birth weight babies. Weight at birth is directly influenced by maternal nutritional status of the mother.

Maternal antenatal care and obstetric factors are most important determinant of birth weight, and factors that prevent normal circulation across the placenta cause poor nutrient and oxygen supply to the fetus causing intrauterine growth restriction.

The maternal risk factors are biologically and socially interrelated; most are, however, modifiable.

Thus, we felt the need to conduct this study at our hospital to assess the sociodemographic factors affecting the low birth weight.

The need of NICU care is now increasing and mandatory for each referral health center. To study common morbidity, mortality, average duration of stay of the LBW babies in NICU and associated sociodemographic factors, parental attitude becomes essential in this regard. Hence the current study is undertaken.

A better understanding of low birth weight could contribute to a more effective approach to saving these lives. A country needs sound sociodemographic information to prioritize, plan and implement public health programmes. There is a paucity of information about direct causes of low birth weight in developing countries.[2] This information also provides the basis for patient care and helps the administration in managing day-to-day hospital affairs.[3]

The present study was aimed at finding the sociodemographic factors of low birth weight babies admitted in neonatal intensive care unit and to find out preventive strategies.

METHODS

The present study was a hospital based observational descriptive study.

The study was undertaken in neonatal intensive care unit of department of paediatrics of tertiary care centre. The study period was from January 2016 to December 2016 i.e. total period of one year. The low birth babies according to WHO criteria i. e. less than 2500g[4] admitted in neonatal intensive care units in one year were selected which were 360.

The unit was divided in three sections for inborns (delivered in this tertiary care centre), outborns (referrals) and isolation section for seriously ill infectious newborns. Daily visits were done to the neonatal intensive care unit for data collection of new admissions and follow up of case records for knowing the outcome. The purpose of the study was explained to the parent or guardian of the neonate and informed consent was taken before enrolling them in the study. The sociodemographic and epidemiological information of the cases were collected by interviewing the parents or guardians of the child. The information regarding the study variables was recorded on a predesigned, pretested questionnaire. Neonatal information was collected at time of admission and outcome of the baby was later known from case paper of the baby. On arrival in neonatal unit, baby was examined by attending neonatologist/paediatrician of the paediatric department in NICU.

With the help of pretested, predesigned proforma, detailed history and clinical examination was done.Physical examination was undertaken after the interview of attending parent. It included anthropometric measurements such as length and weight of the baby, head circumference, chest circumference etc. For final diagnosis and management, the help of attending paediatrician was taken. The admitting unit carried out the investigations and gave the treatment as per the need. The reports of the investigations were studied and the important findings were recorded from the case paper of the baby. The data extracted included sociodemographic characteristics, gestational age, birth weight, neonatal morbidity, diagnosis on discharge or death, duration of stay, investigations done, and management events such as antibiotic use , intravenous fluids, blood transfusions, exchange transfusion, phototherapy, oral feeds or nasogastric feeds etc, and age at death of the enrolled new born. Apart from the neonatal variables, other variables like father's education and occupation, socioeconomic status, type of residence, type of family, mothers age at marriage and age at first conception, mothers height and weight, parity, spacing between pregnancies, gestational age, no. of ANC visits, iron and folic acid tablets received, anemia, physical activity during pregnancy, parental habits of tobacco/alcohol in any form, residential details , bad obstetric history, obstetric complication during pregnancy, mode of delivery were also obtained .

Medico-legal cases (orphans, unknown babies, illegitimate babies etc.), multiple pregnancies, twins, brought dead neonates, patients parents or guardian not giving consent or not willing to take part in the study were excluded from the study.

Ethical committee approval was taken prior to the study. Permission of Head of Department of Paediatrics was taken. Informed verbal consent of each parent or guardian of the baby was taken before the interview and nature and purpose of study was explained to them. Privacy, confidentiality and anonymity were maintained throughout the study.

The birth weight of new born was recorded within one hour by baby weighing machine. Before taking weight clothes were stripped off and zero was confirmed. Machine was standardized from time to time.

Statistics: The detailed data was entered into the Microsoft Excel sheets, presented in the form of tables and figures and subsequently analyzed statistically using percentages, Z test for a population proportion equivalent, Chi-square test in SPSS format. For all the statistical tests, a 'p value' of less than 0.05 was considered as statistically significant and p value of less than 0.01 was considered as statistically highly significant.

RESULTS

Table 1 shows that among the 360 babies admitted, there was male preponderance with male to female ratio of 1.3:1**.** There was statistically highly significant association found between sex and low birth

Table 1: Sociodemographic data of low birth weight babies (n=360)

Sociodemographic data	Cases (%)
Sex	
Male	216 (60)
Female	144 (40)
Religion	
Hindu	144 (0.398)
Muslim	140 (0.3914)
Buddha	36 (0.098)
Sikh	18 (0.058)
Jain	14 (0.04)
Christian	8 (0.0142)
Socioeconomic class	
Class II	16 (2.7)
Class III	70 (19.3)
Class IV	145 (40.3)
Class V	135 (37.5)
Mode of delivery	
Normal vaginal delivery	182 (50.85)
LSCS	104 (29.04)
Assisted vaginal delivery	72 (20.09)
Sex wise mortality of babies	
Male	20 (50.27)
Female	19 (49.72)

Table 2: Birth weight of the babies in grams

Birth weight	Cases (n=360)(%)
Upto 999gm	15 (3.9)
1000- 1.499gm	45 (12.61)
1500-1.999gm	66 (18.35)
2000-2.499gm	234 (65.14)

Table 3: Maternal risk factors for low birth weight (n=360)

Variable	LBW (%)
Age(years) <20/>30 years	72 (20)
Height <145cm	79 (22)
Lower socio-economic status (Class IV+V)	280 (78)
Heavy Physical activity during pregnancy	50 (14)
Maternal education-illiterate/primary	226 (63)
Nuclear family	165 (46)
Pre pregnancy weight< 45 kg	216 (60)
Interval < 2yrs between pregnancies.	306 (85)
Primi-gravida	108 (30)
Late ANC registration	244 (68)
< 4 ANC visits	214 (59.52)
Bad obstetrics history	54 (15)
Antenatal complications	58 (16.38)
Prematurity	115 (32)
Premature rupture of membrane (PROM)	164 (45.66)
Tobacco exposure	39 (11)
PIH	79 (22)
Anaemia	298 (83)
Previous H/O LBW	79 (22)
Previous H/O Preterm	57 (16)

Table 4: Outcome of total LBW babies (n=360)

Outcome of total LBW babies	Cases (%)
Cured and discharged	296 (82.32)
Expired	39 (11.01)
DAMA	25 (7.18)
Referral	0 (0)

weight babies ($p < 0.01$). It also shows that LBW admissions seen in Hindus were 144 (39.80%) followed by Muslims 140(39.14%), Buddha 36 (09.80%), Sikh 18(5.80%), Jain 14(4%) and Christian 8(1.42 %).

A statistically highly significant association was found between religion and LBW admissions ($p < 0.01$).

Table No. 1 shows that the maximum numbers of neonates were from socioeconomic class IV i.e. 145 (40.3%) followed by socioeconomic class V 135(37.5%) and socioeconomic class III 70 (19.3%). There were less number of neonates from socioeconomic class II 16 (2.7%) and no cases from S.E. class I

A statistically highly significant association was found between socioeconomic class and LBW babies ($p < 0.01$). Table no.1 also shows that 20(50.27%) were males out of 39 deaths and 19(49.72%) were females with male to female mortality ratio of 1.03:1. Statistically no significant association was found between sex of baby and mortality ($p>0.05$) in LBW. Mortality was same in both the sexes of LBW babies.

Table no.2 shows that maximum 234(65.14%) number of babies were in the birth weight group 2000-2499 gm. But 66(18.35%) babies were having birth weight 1500-1999 gm and 45(12.61%) 1000-1499 gm (VLBW) and 15(03.90%) upto 999 gm (ELBW).

Table no.3 shows that there is statistical significance of association (p value<0.05) between age of mother<20/>30, height <145cm, nuclear family, low socioeconomic status, illliteracy,<4 ANC visits, tobacco consumption, bad obstetric history, prematurity, PROM, PIH, aneamia and low birth weight.

Table no.4 shows that out of total 360 LBW babies, 296 (82.32%) babies were cured and discharged. While fatality rate of LBW was 39 (11.01%), 25(07.18%) babies were taken against medical advice discharge and 62 (05.90%). Significantly high number of neonates were cured and discharged ($p<0.01$).

DISCUSSION

Accurate data on sociodemographic factors of LBW is useful for many reasons. It is important for the providers of primary care, investigators, local and national health administrators, and for decision makers to design interventions for prevention and treatment and to implement and evaluate health care programs.

The present hospital-based observational descriptive study was carried out from 1st January 2016 to

31st December 2016 in the neonatal intensive care unit of tertiary care hospital, under department of Community Medicine, Medical College with the aim to study sociodemographic factors of LBW babies admitted in neonatal intensive care unit and to find out preventive strategies. All the LBW babies admitted during the study period (360) were taken as sample size.

In the **present study**, among the 360 LBW babies admitted, there were 216 (60%) males and 144 (40%) females showing male preponderance with male to female ratio of 1.3 : 1 in favour of males which could be related to the biological vulnerability of males to infections or discrimination against female offspring. The male preponderance of admission has been documented in **various studies.**[5] There was statistically highly significant association between sex of baby and neonatal admissions ($p<0.01$).

Okechukwu AA et al (2009)[6] studied morbidity and mortality patterns of admissions into the Special Care Baby Unit of University of Abuja Teaching Hospital, Gwagwalada, Nigeria. Out of the total 654 LBW admissions, there were 351(53.7%) males and 303(46.3%) females given a male to female ratio of 1.2 : 1.the study findings were parallel to the **present study.**

Our study showed that LBW admissions seen in hindus were 144 (39.80%) followed by muslims 140 (39.14%), buddha 36 (09.80%), sikh 18 (5.80%), jain 14 (4%) and christian 8(1.42 %).

A statistically highly significant association was found between religion and LBW admissions ($p < 0.01$). This may be because of different fertility, nutritional patterns and customs affecting maternal health.

ARCHANA S NIMBALKAR et al (2012)[7] studied Newborn Care Practices and Health Seeking Behavior in Urban Slums and Villages of Anand, Gujarat in which Multiple logistic regression model revealed that lack of care seeking behavior was common in Hindus (OR8.71, 95% CI 1.11,68.07, P=0.04) and Illiterate mothers(OR 4.71, 95% CI 2.06,10.80, P<0.0001). Study findings were similar to **the present study**.

Nitin Joseph et al (2014)[8] has done a longitudinal study of Factors Associated with Morbidities Among Infants in Three Sub Centre Areas of Belgaum District of South India and found that majority of the LBW 148 (76.3%) were Hindus. Study findings were comparable to **the present study**.

Our study showed that the maximum numbers of neonates were from socioeconomic class IV i.e. 145 (40.3%) followed by socioeconomic class V 135 (37.5%), socioeconomic class III 70(19.3%) and socioeconomic class II 16 (2.7%). There were no cases of S.E. class I. This may be probably due to the affluent mothers were not opting to admit in the general hospital as they prefer the private hospital.

A statistically highly significant association was found between socioeconomic class and LBW **(**$p < 0.01$).

Archana S Nimbalkar et al (2012)[7] studied Newborn Care Practices and Health Seeking Behavior in Urban Slums and Villages of Anand, Gujarat in which the socioeconomic status of the slum dwellers were significantly lower (P<0.001). The study findings were comparable to the **present study.**

Nitin Joseph et al (2014)[8] has done a longitudinal study of Factors Associated with Morbidities Among Infants in Three Sub Centre Areas of Belgaum District of South India and found that majority 174 (89.7%) were of poor socio-economic class. The incidence of LBW was found to decrease with increase in socio-economic status (P =0.305) of their mothers. However, these results were not statistically significant. The study findings were comparable to the **present study.**

Our study showed that 182 (50.85%) of the babies were delivered by normal vaginal delivery followed by 104 (29.04%). While assisted vaginal delivery was done in 211 (72%) cases**.** A statistically highly significant association was found between mode of delivery and LBW($p < 0.01$).

M Hoque et al (2011) [9] studied Causes of LBW admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa and found that most of the babies were delivered by normal vaginal delivery 59.7% followed by LSCS in 33.2% and assisted vaginal delivery in 6.9%. The study findings were comparable to the **present study**.

Our study showed that 20 (50.27%) were males out of 39 deaths and 19 (49.72%) were females with male to female mortality ratio of 1.03 : 1. In the present study no significant difference in risk between two sexes was observed.

In contrast to our study, M Hoque et al (2011)[9] studied Causes of LBW admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa and found that 63% male contributed to neonatal mortality as compared to 37 % females.

There is a broad agreement that in infants with more than 2500 g of birth weight, the death is influenced by the obstetric management and that in those who are LBW, it was the quality of the neonatal care that had an important bearing on the outcome. With the **present study** having identified LBW as the major causes of death, there is a need for further developments in obstetric and neonatological units for better antenatal (obstetric) and

intensive neonatal care with the use of more sophisticated technology.

Our study showed that 234(65.14%) babies were having birth weight 2000-2499 gm, 66 (18.35%) 1500-1999 gm and 45 (12.61%) 1000-1499 gm(VLBW) and 15 (03.90%) upto 999 gm (ELBW).

A statistically highly significant association was found between birth weight and neonatal admissions ($p<0.01$).

M Hoque et al (2011)[9] studied Causes of neonatal admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa and found that maximum number of babies 47.5% were in the birth weight group >2500 gms followed by 19.3% in 1500-1999 gm, 13.9% in 1000-1500 gms, 13.2 % in 2000-2500 gms and 6.1% upto 999 gm.The study findings were parallel to **our study**.

Our study showed that 72 (20%) of mothers of LBW babies were in age group <20/>30years. A statistically highly significant association was found between maternal age and LBW ($p<0.01$).

Dhall K. Bagga R (1995)[10] prepared birth weight charts of uncomplicated singleton pregnancies (N= 3293) prepared from subjects who delivered between 30 and 42 weeks of gestation. The youngest mothers in the sample (<20 years) had babies 131 gm lighter than those of reference category (20-35 years). This was statistically significant ($p < 0.01$) but through the older mothers (> 35 years) had babies 8 gm lighter than the reference category, the difference was not significant. Thus there was a trend of increasing birth weight with advancing maternal age till the age of 35 years. After the age of 35 years, this trend had disappeared. The study findings were parallel to the **present study**.

Deswal B. S. et al (1999)[11] carried out a study to find out risk factors for LBW. The maximum (30.9%) LBW babies were born to mothers below 20 years of age with decreasing trend with advancement in maternal age. The study findings were similar to the **present study**.

Joshi S et al (2000) [12] conducted a cohort study in an organized slum. It was seen that the incidence of low birth weight was higher in teenage pregnancies (47%). The birth weight improved with an increase in maternal age. The percentage of low birth weight steadily decrease in the age group 25-29 years (29%) and in 30 + age group (19%). Maternal age was found to be significantly associated with low birth weight.The study findings were parallel to the **present study.**

In another study in Lucknow,[13] India extremes of neonatal age for prematurity was less than 18 years and more than 35 years.

Our study showed that 226(63%) of the mothers were illiterate .A statistically highly significant association was found between illiteracy of mother and LBW ($p < 0.01$).

Joshi S and Pai N (2000) [12] observed that education had a significant effect on the birth weight of newborn. The percentage of low birth weight was as much as 52 % in illiterate women. The incidence of LBW decreased rapidly in women who were educated upto secondary level (19%) higher. The study findings were parallel to the **present study**.

Our study showed that, 50 (14%) mothers were in heavy physical activity.

A statistically highly significant association was found between physical activity of the mother during pregnancy and LBW **(**$p < 0.01$).

Idris et al (2000) [14] the incidence of LBW was highest (47.5%) among mother engaged in moderate to heavy activity, followed by those in sedentary activity (26.6%) and was lowest among those having normal or mild activity during their pregnancy. The difference between moderate to hard working mothers and either those engaged in sedentary or mild work was statistically highly significant ($Z = 7.01$, $P < 0.01$ and $Z = 5.35$, $P < 0.01$). The study findings were comparable to the **present study**.

Our study showed that maximum numbers of neonatal admissions were from nuclear family i.e. 165(46%) which may be probably due to less familial support to the mothers throughout their reproductive carrier. There are more chances of LBW in such mothers as they didn't get any advice for diet, nutrition, proper care and familial support etc. to allay anxiety during and after pregnancy from nuclear family.A statistically highly significant association was found between type of family and LBW ($p < 0.01$).

In contrast to **our study, Gagan agrawal et al (2012)** [15] has done a study on Maternal Risk Factors Associated with Low Birth Weight Neonates in aTertiary Care Hospital, Northern India and found that LBW neonates were higher in mothers (52.39%) who belonged to joint families.

Our study showed that 108 (30%) mothers were primigravida. A statistically highly significant association was found between parity of mother and neonatal morbidities **(**$p < 0.01$).

Anand K, Garg B.S. (2000)[16] found maximum number of mothers were primipara (41%) with more number of LBW. The association was found to be highly significant.

In our study, as out of 360 mothers, 108 were primipara, so among the rest 252 mothers maxi-

mum 215 (85%) had 1-2 years interval between pregnancies followed by 23 (9%) between 2-3 years, 12(5 %) >3 years and 2(1%) ≤ 1year.

A statistically highly significant association was found between spacing and LBW (p<0.01).

Hirve S, Ganatra B (1993)[17] found that the unadjusted relative risk for neonatal morbidity was significantly higher when last pregnancy interval less than 6 months (R.R. = 1.48).

Our study showed that 214 (59.52%) mothers had < 4 ANC visits while 127(35.23 %) had ≥ 4 ANC visits and 19 (05.23%) mothers were not registered at all. A statistically highly significant association was found between number of ANC visits and LBW (p<0.01). As the number of ANC visits decreased the number of LBW increased.

Malik et al (1997)[18] studied that when ANC visits were 4 or more, the chances of neonatal morbidities were less (25%) in comparision to an unregistered mother (35.9). Further on multiple regression analysis using stepwise method, number of ANC visits had significant effect on weight of newborn. The study findings were parallel to the **present study.**

Anand K, Garg B.S. (2000)[16] found that LBW babies were influenced significantly by the number of antenatal visits made by the mother (p < 0.01).

Our study showed that Multiple coexistent morbidities were seen. Anemia during pregnancy 298 (83%) was found to be the most common maternal high risk factor. Statistically highly significant association was found between maternal risk factors and LBW (p<0.05).

Anand K, Garg B. S. (2000)[16] found significant relationship between Hb concentration and birth weight of newborn.

Corrective measures must start right at conception of a new life. Hence, an increased awareness of the effects of maternal disease states on fetal growth and development is necessary as it will improve both our ability to make prenatal diagnosis of foetal morbidity and to plan for improved antenatal care and appropriate care of those neonate who are at high risk, which in turn will definitely improve the outcome of the pregnancy and reduce neonatal morbidity and loss.[19]

Among **Indian population [20](2008),** a very high incidence of maternal anemia (65%) has been noticed and is a known cause of prematurity and growth retardation. The study findings were similar to the **present study**.

In o**ur study** 79 (22%) pregnancy induced hypertention accounted for LBW.

Idris M. Z. et al (2000)[14] found that toxaemia of pregnancy was associated with highest incidence of LBW.

In one study in **Malaysia [21](2001),** 35 % preterm babies were SGA due to maternal hypertension during pregnancy.The study findings were similar to the **present study**.

In **our study**, bad obstetric history comprised of previous h/o preterm 57(16%) and previous h/o LBW 79 (22) contributed to LBW.

Idris M et al (2000)[14] studied a total 259 mothers who had previous adverse obstetric history and 44.40% of them had LBW deliveries. The difference between normal history and history of stillbirth, neonatal death, previous LBW delivery was found to be statistically significant (Z = 3.94, p < 0.01, Z = 3.4, p < 0.01 respectively). The study findings were similar to the **present study**.

One study [22] showed that 10 % had one preterm delivery and 4.8% had two or more preterm deliveries. 14.4% had history of previous abortion out of which 3.6% had second trimester abortions. The study findings were parallel to the **present study**.

The **present study** shows that, out of the total 360 LBW neonatal admissions, 296 (82.32%) babies cured and discharged, 39 (11.01%) expired, 25 (7.18 %) DAMA and 00 (00%) referred.

Gauchan E et al (2012)[23] studied Clinical profile and outcome of babies admitted to Neonatal Intensive Care Unit (NICU) of the total 182 babies. . Out of the total 83 babies of LBW, 51(61.4%) cured and discharged, 22(26.5%) expired and 8(9.6%) took DAMA. The study findings were comparable to the **present study.**

LIMITATIONS OF STUDY

As it was a hospital based study and as most of the patients had a low socio-economic status, the results of this study may not reflect the true burden which is prevalent in the community as a whole.

CONCLUSION

In a nutshell, in the present study, it was found that most common cause of neonatal mortality was low birth weight. Maternal socio-demographic factors responsible for this were age, primigravida, spacing, <4 antenatal visits, illiteracy, low socio-economic status of family, nuclear family and maternal high risk factors mainly anemia during pregnancy, pregnancy induced hypertention, bad obstetric history etc. So women empowerment, awareness and 100% utilization of antenatal care are recommended. Need of the hour is to make

people aware of the facilities for maternal and newborn care particularly ANC, Navjat Shishu Suraksha Karyakram (NSSK) and fully utilise them. Proper rapport with peripheral health centre and tertiary centre must be maintained.

There is need to strengthen Information, Education and Communication (IEC) activities in general population.

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