

Original Research Article

A community-based study for assessment of growth and development of low-birth-weight infants, in Sanwer Tehsil of Indore, Madhya Pradesh

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ABSTRACT

Background: The objective of study was to assess the growth and development of low-birth-weight (LBW) infants.

Methods: The study was conducted in community health center of Sanwer Tehsil (Indore District) in the state of Madhya Pradesh under the department of community medicine of Sri Aurobindo medical college and PG institute, Indore. A total of 150 babies were registered and followed up for study.

Results: Male preponderance was observed in our study with 70 males and 66 females. Out of total 80 LBW neonates (44 males and 36 females), 6 were home deliveries, while similar equal distribution among primipara and bipara (34 and 30 respectively) was noted. It was found that maximum number of LBW infants (11.76%) were found in the mothers age group of 21 and 25.

Conclusions: χ^2 value suggested that parity was not significantly correlated to LBW but multiparas with >3 deliveries were more prone to deliver a low-birth-weight baby. National programmes targeting to address low birth weight are the need of the hour.

Keywords: LBW, Child health, Infant mortality, Maternal health

INTRODUCTION

“Children’s health is tomorrow’s wealth” is one of world health organization (WHO)’s slogans of recent years. However, children’s health is to a great extent decided by the factors that function in utero, well before they are born.^{1,2} Birth weight is considered as a measure of maturity of the child and is a significant causal factor of its mortality and morbidity. This is because of the fact that, low-birth-weight (LBW) has been established to be directly connected to both immediate as well as long-term development and well-being.¹

LBW (birth weight less than 2,500 grams) brings up the

risk of infant death and untoward health outcomes later in life such as type 2 diabetes, asthma, coronary heart diseases and hypertension.³⁻⁷ Long term cognitive abilities such as IQ have also been correlated to the LBW.^{8,9} Thereby, the single most crucial prognosticator of infant mortality, especially of deaths amongst the first month of life, is LBW.^{9,10} Lower birth weight is colligated with more medical problems for instance prematurity, apnea and respiratory distress, hypoglycemia, hypothermia, hyperbilirubinemia, subnormal growth, illnesses, and neuro-developmental delay.¹⁰

Thus, LBW is considered as a public health problem in most developing countries, where an estimated at least 15 per cent of births result in LBW babies. That’s why this

study was planned in the department of community medicine at Sri Aurobindo medical college and PG institute, Indore and conducted at a community health center, Sanwer to determine the growth pattern in LBW infants during first year of life.

METHODS

The study was conducted in community health center of Sanwer Tehsil, Indore, Madhya Pradesh in the department of community medicine at Sri Aurobindo medical college and PG institute, Indore. The center consists of 6 PHC's namely-Shipra, Paliya, Mangliya, Dakacha, Kadana and Chandravatiganj with 28 subcenters. This prospective study was conducted with 4 follow-ups of each study subject. Sanwer block was chosen for the study purpose, as it comprises mainly of rural population with poor socioeconomic status.

After taking permission from the institutional ethical committee and informed consent from respondents, all the LBW babies born during January 2013 to March 2013 in the community health center were included in the study. A total of 150 babies were registered for follow up-out of which 9 mothers denied consent, and 5 failed to complete the study, 136 completed the study.

Data on mother (age, husband's name, address, parity, postnatal prescription) and the born babies' details (place of delivery, mode of delivery, sex, birth weight, involvement of doctor/ nurse, number of post-natal visits to healthcare, motivators if any) were noted on the first visit.

Subsequent examination of height and weight was carried out at quarterly interval (3, 6, 9 and 12 months) up to 12 months.

Statistical analysis

Statistical evaluation of the data obtained was done on SPSS (Statistical Package for Social Sciences) software, version 16.0 (SPSS Inc., Chicago, IL, USA). Descriptive analysis (mean±SD) of the data was done. Chi-square test was applied and the level of significance was set at p<0.05 (highly significant).

RESULTS

Male preponderance was seen in our study with 66 females and 70 males. Ratio of normal and low birth weight in male or female neonate has been depicted in Figure 1.

Out of total 80 LBW neonates (44 males and 36 females), 6 were home deliveries, while out of the remaining 56 normal neonates (26 males and 30 females), 4 were home deliveries.

Thus, out of 10 home deliveries, 4 were male very LBW

and moderately LBW, two each and 6 were female (two MLBW, other four normal). This is statistically insignificant (p<0.05). Distribution of Infants according to place of delivery has been portrayed in Table 1 while ratio of normal and low birth weight in home and institutional deliveries has been depicted in Figure 2.

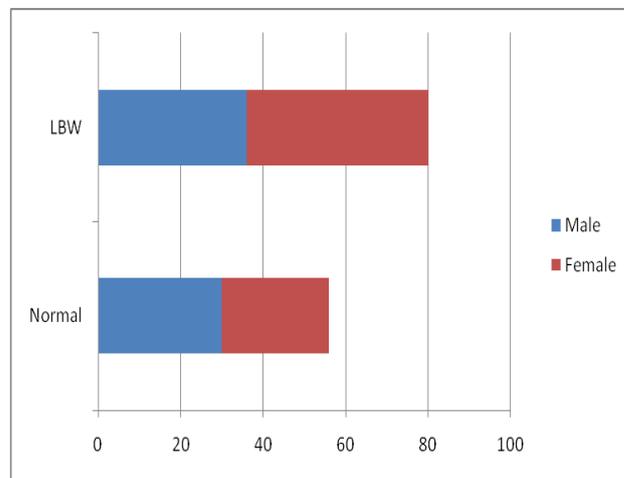


Figure 1: Ratio of normal and LBW in male or female neonate.

Table 1: Distribution of infants according to place of delivery.

Place	Normal birth weight	Low birth weight	Total
Home	4	6	10
Institutional	52	74	126
Total	56	80	136

P=0.937

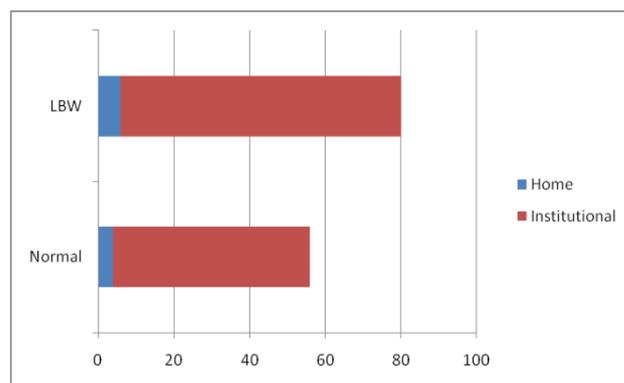


Figure 2: Ratio of normal and LBW in home and institutional deliveries.

Out of total 56 normal birth weight babies, only 4 were born to multipara mothers-remaining 52 mothers were either primipara or bipara (26 each). Out of 80 LBW babies, nearly similar equal distribution among primipara and bipara (34 and 30 respectively) was seen. Remaining 12 were from tripara and 4 from multipara mothers (Table 2). This distribution is statistically insignificant.

Table 2: Parity wise distribution of normal and LBW.

Parity	Normal birth weight	Low birth weight	Total
Primipara	26	34	60
Bipara	26	30	56
Tripara	0	12	12
Multipara	4	4	8
	56	80	136

P=0.024

Table 3 and Figure 3 shows the no. of postnatal visits in normal and low birth weight infants which were followed by mother. It was found that there was maximum 3 visits which were followed by the mother under which NBW was 30 (22.05%) and LBW was 32 (23.52%). Thus, we observed that maximum no. of NBW and LBW was found in 3 postnatal visits.

Table 3: Number of postnatal visits in normal and LBW infants.

Post-natal visits	Normal birth weight (%)	Low birth weight (%)	Total (%)
1	2 (1.47)	2 (1.47)	4 (2.94)
2	14 (10.29)	22 (16.17)	36 (26.47)
3	30 (22.05)	32 (23.52)	62 (45.58)
4	4 (2.94)	18 (13.23)	22 (16.17)
5	4 (2.94)	6 (4.41)	10 (7.35)
6	-	-	-
7	2 (1.47)	-	2 (1.47)

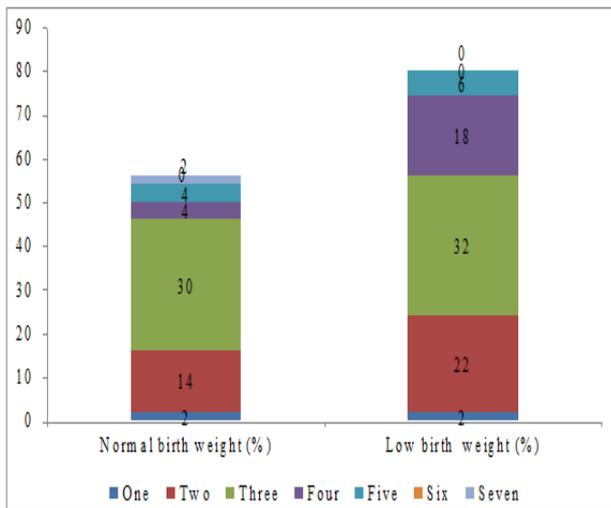


Figure 3: Number of postnatal visits in normal and LBW.

Table 4 and Figure 4 portrays distribution of LBW and normal birth weight infants according to age group of mothers. It was found that maximum number of LBW Infants was found in age group of 21 and 25 which is 16 (11.76%) and maximum number of normal birth weight was found in age group of 20 which is 10 (7.35%).

Table 4: Mother's age-wise distribution of NBW and LBW.

Age (years) (Mothers)	Low birth weight (%)	Normal birth weight (%)	Total (%)
18	-	4 (2.94)	4 (2.94)
19	6 (4.41)	2 (1.47)	8 (5.88)
20	12 (8.82)	10 (7.35)	22 (16.17)
21	16 (11.76)	2 (1.47)	18 (13.29)
22	14 (10.29)	8 (5.88)	22 (16.17)
23	8 (5.88)	6 (4.41)	14 (10.29)
24	2 (1.47)	6 (4.41)	8 (5.88)
25	16 (11.76)	8 (5.88)	24 (17.64)
26	4 (2.94)	2 (1.47)	6 (4.41)
27	-	2 (1.47)	2 (1.47)
28	-	4 (2.94)	4 (2.94)
29	-	-	-
30	2 (1.47)	-	2 (1.47)
31	-	2 (1.47)	2 (1.47)

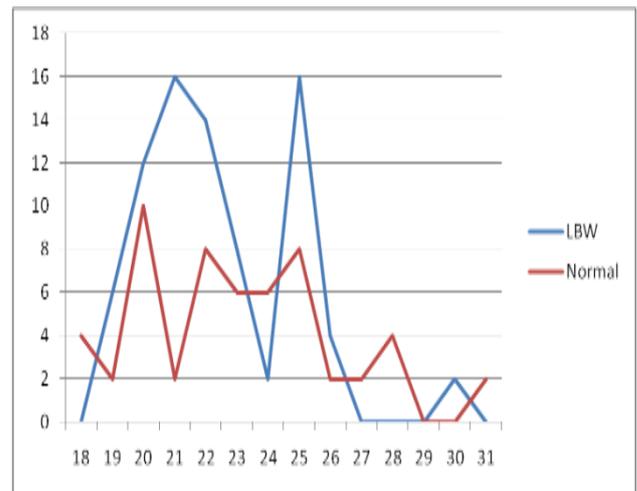


Figure 4: Mother's age wise (x-axis) distribution of LBW and normal birth-weight.

Lower abdominal cesarean section was less common in normal (12) as well as low birth weight (14) cases-normal vaginal delivery was seen in 44 normal and 66 low birth weight cases as pictured in Table 5. This ratio is statistically insignificant.

Table 5: Mode of delivery and LBW.

Mode	Normal birth weight	Low birth weight	Total
LACS	12	14	26
NVD	44	66	110
	56	80	136

P=0.566

DISCUSSION

In India, the prevalence of LBW infants in ground reality is quoted to be between 25-30%.¹¹ Another study conducted in Latur and Nashik (Maharashtra) found the level of low birth weight at 26.78% which agrees with another report from Karachi.^{12,13}

A report by WHO calculates the rate of LBW at 26% by older estimates of 1993 which becomes 30% if those who weigh exactly 2500 grams are excluded.¹³ In a Delhi based study, infants exhibited slow growth during hospital stay as indicated by a fall of approximately one Z score in each of 3 parameters from birth to discharge.¹⁴

It is not surprising that in spite of cash incentive program, incidence of low birth weight due to institutional deliveries from Uttar Pradesh, is still high.¹⁵ Early age of marriage and pregnancy, correlation of which to the LBW cases is well established, is more prevalent in this area.¹⁵

A study from north-eastern states revealed that tribal babies were unexpectedly much better and low birth weight reported to be below 18% compared to their non-tribal counterparts, showing incidence of 33.47%.¹⁶

Most deliveries were institutional and selection bias may be behind higher incidence of low birth weight in institutional deliveries. As it has already been proven, morbid cases coming more for institutional deliveries and advantage of more preterm survival therein has increased rate of low birth weight in institutional deliveries.¹⁴

That's why, out of total 80 LBW neonates (44 males and 36 females), 6 were home deliveries, while out of remaining 56 normal neonates (26 males and 30 females), 4 were home deliveries. Thus, out of 10 home deliveries, 4 were male (VLBW and MLBW two each) and 6 were female (two MLBW, other four normal).

Out of total 56 normal birth weight babies, only 4 were born to multipara mothers-remaining 52 mothers either primipara or bipara (26 each). Out of 80 LBW babies, nearly similar equal distribution among primipara and bipara (34 and 30 respectively) was seen. But remaining 12 were from tripara and 4 from multiparas' mothers.

Thus, seeing the χ^2 value, parity was not significantly correlated to the parity as such but when the same sample is divided into <3 or >3 deliveries, the correlation becomes significant-thus multiparas with >3 deliveries are more prone to deliver a LBW baby. But many large sampled studies on LBW showed that parity is significantly associated with LBW.¹⁶⁻²¹

Maximum 3 post-natal visits were followed by 62 mothers (45.58%) and 4 post-natal visits were followed by 22 mothers (16.17%) and it might be indicative of thorough negligence (due to socio-economic reasons or unawareness). Through pregnancy which continuous even

after delivery.²²

Mothers visited the health care facility but most of them had less than 4 visits a year. Just one visit was uncommon (in 2 normal and 2 low birth weight baby) but most of them either visited twice (14 normal and 22 LBW) or thrice (30 normal and 32 LBW). But surprisingly, 7 visits were taken in 2 normal birth weight cases.)

Mothers under study ranged from the age group of 18 to 31 years. Common age group recorded were 20 to 25 years in which there were 108 (79.41%) mothers. Otherwise, in study involving motherhood at extremes, LBW was significantly less in moderate age group.²³

Normal birth weight was more homogenously distributed through different age groups. Lower abdominal cesarean section was less common in normal (12) as well as low birth weight (14) cases-normal vaginal delivery was seen in 44 normal and 66 low birth weight cases.

Overall, as the sample represents normal age motherhood at an average of 22 years, low birth weight could not be correlated well as the early reproductive outcome. Cesarean section was nearly similar in occurrence in normal of LBW cases-thus saving premature babies to increase the count of LBW was not a sufficient reason in this sample. Normal vaginal deliveries were more low birth weight and this has some prenatal implication like socio-economic reason or genetics.²⁴

As extremely low birth weight was not represented in the population, developmental anomalies of height and weight at 3, 6, 9 or 12 months was not clear neither it could be contrasted against a well thriving control, because even normal birth weight babies in the studied population were mostly just above the cut-off.^{16,24,25}

With this study a growth plot for moderately low birth weight babies at the age of 3, 6, 9 and 12 months was also elicited which might be used for comparison with other similar studies (Figure 5).

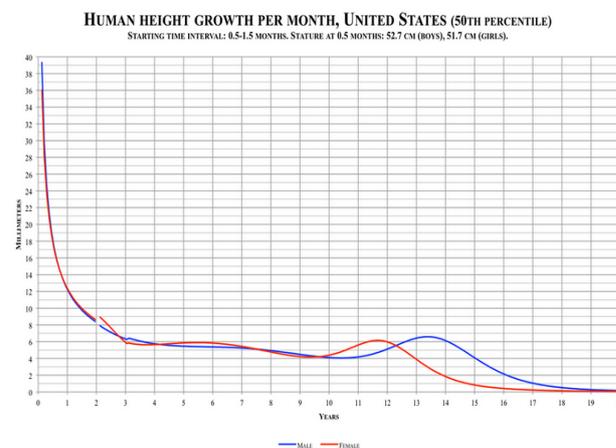


Figure 5: Human height growth per month.

Increase in human growth in males and females are not much different by first year as seen in this figure given below. And even at birth, the difference is just 1 centimeter, as the title information in the figure shows.²⁶

That's why is no difference was significantly elicited in height growth of low birth weight or normal birth weight male or female children. But cursorily seeing, there is a trend of lagging height in both male and female low birth weight babies. Sexual difference of height is also as per expectation-i.e., more in males.²⁶

Limitations

The reproductive age being normal and parity rarely reaching to the extremes of our studied sample, other factors of overall low birth weight should be sought. Our study, being postnatal and observational could not cover this issue. But a large sample prenatal study can do it better, being even more confirmatory, if it is interventional. If the factors are other than genetic, and thus modifiable, appropriate measures to be taken.

CONCLUSION

In the sample, there was slight male (51.47%) preponderance but it was statistically insignificant. The sample is not homogenous around the cut off criteria, and mostly represents a LBW population as concluded earlier. As per critical χ^2 value, sex wise differentiation of birth weight was not significant. Most deliveries were institutional and selection bias may be behind higher incidence of low birth weight in institutional deliveries. Seeing the χ^2 value, parity was not significantly correlated to the parity as such but multiparas with > 3 deliveries are more prone to deliver a LBW baby.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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