

Respiratory Outcomes of Low-Birth-Weight Neonates Admitted in A Tertiary Care Hospital

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Abstract

Low birth weight (LBW) has been defined as a birth weight of less than 2.5 kg. Around one fourth of all neonates born in India are low birth weight. They are at risk of unique neonatal problems and need to be monitored for feed intolerance, infection and other metabolic problems. The present study was undertaken to find out the clinical profile and respiratory outcomes of neonates admitted with Low birthweight in a tertiary care hospital in Sub urban parts of Chennai. This was a retrospective study where the obstetrical and perinatal records in a hospitals obstetrics and neonatal database between 2018 and 2019 were studied after approval from the Institutional Review Committee. Convenience sampling was done. Data were collected and entered in a predesigned proforma. Data was then entered in a Statistical Package for Social Sciences for further calculations. A total of 192 Low birth weight neonates were admitted during the study period. Of these 192 neonates, 126 neonates had respiratory distress. Among the neonates with respiratory distress 47 % of the neonates were female and 53 % were male neonates. The mean gestational age was 33 weeks and 5 days and mean weight was 1789grams. Majority of the neonates were appropriate for gestational age (76.2%) rest were small for gestational age (23.8%). The mean duration of hospital stay was 23days. LBW neonates are at higher risk of morbidities and mortalities. Respiratory distress and associated complications are a common problem in low-birth-weight neonates especially preterm low birth weight neonates. The best option to prevent LBW is by improving maternal health. Improvement of perinatal and neonatal services plays a key role in reducing the morbidity related to low birth weight.

Keywords: Low birth weight, Respiratory distress, Preterm, Small for gestational age, Transient tachypnoea of new-born

Introduction

Low birth weight has been defined as a birth weight of less than 2.5 kilogram regardless of gestational age [1]. More than 20 million infants worldwide are born low birth weight

constituting almost 20 % of all live births. Majority of them are born in developing countries like India. The incidence of low birth weight in developing countries (16.5 per cent) is more than double the incidence in developed regions (7 per cent). In India, nearly 8 million babies are born with a low birth weight every year [2]. In India almost 26 % of all neonates born are low birth weight. Birth weight is a strong indicator not only of a mother's health and nutritional status but also a new-born's chances for survival, growth and long-term growth and development. ELBW and VLBW neonates are of major concern because of The significant mortality associated with them [3,4]. Respiratory distress in neonates is defined as respiratory rate of more than 60 per minute associated with features of increased work of breathing like retraction, grunt, cyanosis.

Low birth weight neonates especially the preterm neonates are at risk of respiratory distress due to the deficiency of surfactant. Apart from this other significant causes of respiratory distress in low-birth-weight neonates include transient tachypnoea of neonates, Meconium aspiration, congenital pneumonia, congenital airway problems and sepsis. The goal of INAP⁵ is to reduce the neonatal mortality and morbidity. To achieve this effective care of the low birth weight and preterm neonates would play a key role.

Methods: A cross-sectional study was carried out using a database obtained from the obstetrical and neonatal information in Saveetha Medical College and Hospital, a referral maternity hospital for the region in Kancheepuram, Tamil Nadu.

Obstetrical and Neonatal information system records all data collected during hospitalisation in SMCH and this database contains information from the beginning of ante-natal care through the postpartum period, including demographical information, reproductive history, characteristics of pre- natal care, management of delivery, maternal complications during delivery, delivery and puerperium, as well as neonatal information.

This clinical information is originally collected in a paper-based neonatal case form, which is filled by the clinicians in charge and is ended at the hospital discharge of the woman. After that, the data in the form is checked against the medical records by a medical supervisor. This data is then entered into an electronic database by trained clerical staff and then submitted to consistent tests and corrections if necessary.

Data of all low-birth-weight neonates (< 2500 grams at birth) admitted between 2018 to 2019 were collected after taking approval from the institutional review committee (IRC) of the college. The present study included low birth weight neonates born during the study period.

Low birth weight is defined as birth weight less than 2500 grams at birth. This group includes both preterm babies and small for gestational age babies. The morbidity pattern, demographic characteristic was collected and entered in the predesigned proforma. Relevant investigations report like full blood count, C-reactive protein, blood glucose, blood cultures, blood gases, chest x-ray were also studied. In case of death, the cause of mortality was recorded. Data was checked for any errors or inconsistencies, then entered in Microsoft Excel sheets and analysed using Statistical Package for Social Sciences (SPSS) version 25.0.

Results:

A total of 192 neonates with low birth weight 126 with respiratory distress were admitted during the study period. Of them 102 were male and 90 were female neonates. The mean Gestational age was 33 weeks and 3 days and mean weight was 1789 grams. Among the neonates 146 (76.04%) were appropriate for gestational age and rest 56 (23.96%) were Small for gestational age. 70.8% of the neonates were born by Caesarean section (136) while 29.2% were delivered by labour natural (56) as mentioned in the Table 1.

Table 1: Demographic data

Patient Characteristics	Number (%)
Male, n (%)	102 (53.12%)
Female, n (%)	90 (46.88%)
Weight g, mean (SD)	1789 (490.4)
GA weeks, mean (SD)	33.3 (3.1)
AGA, n (%)	146 (76.04%)
SGA, n (%)	46 (23.96%)
LGA, n (%)	0
LSCS, n (%)	136 (70.83%)
NVD, n (%)	56 (29.16%)

Low birth weight classification and characteristics:

Among the Low-birth-weight neonates 141 were preterm neonates and 41 were term neonates. 34 neonates were less than 1500 grams and 158 neonates were greater than 1500 grams but less than 2500 grams. 18 neonates were of extremely low birth weight. 10 neonates died during the hospital stay [Table 2].

Table 2. Low birth weight Characteristics

Low birth weight characteristics	N=192
Preterm	141 (73.43%)
Term	41 (21.35%)
<1500 grams	34 (17.7%)
<1000 grams	18 (9.37%)
Death	10 (5.2%)

Outcomes of low-birth-weight neonates:

Among the low-birth-weight neonates admitted in NICU 10 babies died. Around 116 neonates survived and were discharged. The mean duration of hospital stay was 23 days [Table 3].

Table 3: Morbidity pattern among Low-birth-weight Neonates

Neonatal Respiratory Outcomes	n =192(%)
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RDS	63 (32.8%)
TTN	46(23.9%)
PNEUMONIA	15 (7.8%)
MAS	1 (0.52%)
PNEUMOTHORAX	1 (0.52%)
LENGTH OF STAY, mean (SD)	23 (18.25)
MORTALITY	10 (5.2%)

Respiratory distress syndrome (50%) and Transient tachypnoea of neonate (36.5%). Other respiratory complication noticed included Meconium aspiration and Pneumonia. Mean duration of hospital stay was 23 days.

Respiratory support requirement:

Among the neonates admitted in NICU 62 babies did not require any respiratory support. 44 babies (22.9%) required ventilator support with mean duration of ventilation being 8 days. 50 babies (26%) required CPAP with mean duration of CPAP days being 3 days and 37 babies (16.6%) required oxygen through hood or nasal cannula with mean duration being 1.2 days. The mean duration of hospital stay was 23 days.

Surfactant requirement:

Among babies with respiratory distress syndrome 31 babies did not require surfactant 32 babies required one dose of surfactant while 13 babies required two doses of surfactant

Table 4. Respiratory Support Characteristics

Respiratory Outcome Characteristics	Total, N = 192
Nil Resp Support	62 (32.2%), 1.2 Days ($\pm$ 0.32)
OXYGEN HOOD, N (%), Mean Days (SD)	32(16.6%), 1.2 Days ($\pm$ 0.16)
CPAP, N (%), Mean Days (SD)	50 (26%), 3 Days ($\pm$ 2.5)
VENT SUPPORT, N (%), Median Days (IQR)	44(22.9%), 8 Days (6)
Length of Stay, Median (IQR)	23 Days, (31)
Surfactant Dose 1	32 (16.6%)
Surfactant Dose 2	13 (6.8%)

Discussion:

Low birth weight neonates (<2500 grams) are an important contributor to neonatal mortality and morbidity and a very important index of maternal and child health status of the country.⁶ Our study was done to determine the respiratory morbidity and mortality pattern among low birth weight in our institute which is a tertiary care hospital catering sub urban population around Chennai.

During the study period out of 1286 deliveries and 322 NICU admissions of which 192 were Low birth weight neonates. The incidence of low birth was around 14.9%. Which is slightly lesser than the overall incidence of low birth weight in our country. This is explainable as most of the mothers had antenatal visits and were monitored during the pregnancy. 141 of the 192 neonates low birth weight were preterm neonates and they contributed significantly to the mortality also as most of the death were in neonates below 1500 grams with only one baby being more than 1500 grams. This is probably the reason for increased mortality noticed in our study compared to other studies.

A study done by Gupta MK et al found that 28.5% LBW infants presented with respiratory distress and 23.5% of LBW infants presented with septicaemia. These findings are not similar to our study probably because of the different pattern of the study population. In our study majority of the low birth weight was due to preterm neonates. This also explains the high number of neonates with respiratory morbidity.

Several studies have been done looking at the epidemiological and maternal factors contributing to the aetiology of Low birth weight [8,9,10,11,12,13] in India. All these studies show findings which are similar to our study.

A study done by Malik et al [14] showed 47.2% incidence of respiratory distress of NICU admissions. These findings are similar to our report when we take the overall incidence of respiratory distress among NICU admission. However considering LBW neonates as high-risk neonates, the incidence of Respiratory distress among LBW neonates is found to be around 65.6%. Other studies have shown incidences ranging from 20 to 50%. Our report is similar to some of the previous reports from India (60.62%) and Bangladesh (50.3%). This high rate may be due to the vulnerability of the preterm and LBW babies predisposing to respiratory problems and infections. Tachypnoea was the most common presentation (78.36%) in most of the studies similar to our findings. Most of the babies with respiratory distress were delivered by caesarean section (70.9%) while normal vaginal delivery accounted for 29.03%. This is in contrast to a study done in India and Nepal which showed that vaginal delivery was more commonly associated with the development of respiratory distress in new-born babies [15,16]. This high rate of caesarean section associated with respiratory distress may be due to that fluid clearance may be a bit delayed in babies contributing to developing distress among late preterm babies.

The need for surfactant was found among 32 neonates with respiratory distress syndrome while 13 required second dose of surfactant also this was because of the extreme prematurity. Around 42 babies settled with CPAP and oxygen through nasal cannula or hood. These findings are similar to other studies.

We did not have data on antenatal steroid coverage as only completed steroid cover data was available and it was not taken for analysis but overall, the steroid cover was close to 60 % which is similar to other studies and probably the reason for many babies settling with CPAP [13,14,15].

Conclusion:

Birth weight is considered as the single most crucial determinant of chances of survival, freedom from morbidity as well as healthy growth and development of a new-born. Magnitude of LBW is a sensitive indicator of public health. The immediate outcomes of low-

birth-weight babies show that with good antenatal follow up and management of maternal complication like anaemia, Gestational diabetes and PIH can significantly reduce the morbidity associated with Low-birth-weight neonates [9,10,11,12]. Respiratory distress is one of the common presentations requiring admission in the NICU. Low birth weight babies especially the preterm and late preterm babies are at risk of respiratory distress inherently due to the surfactant deficiency.

To lessen the morbidity and mortality of the low-birth-weight neonates with respiratory distress intervention like early surfactant, promote antenatal corticosteroid usage and magnesium sulphate usage, recognizing the risk factors as early as possible and early interventions.[13,14]

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