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# **Research Article**

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# Morbidities and survival outcome of admitted low birth weight neonates in non-teaching district hospital SNCU

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#### **ABSTRACT**

**Background:** 0.8% of India's health care spending is for universalization of SNCU. The working status of a non-medical college SNCU is still far from satisfaction in relation to manpower, availability, maintenance and utilization of equipment's. There are very few studies on outcome of morbities in non-teaching hospital SNCU and no studies analysing on morbities of LBW neonates in such SNCU with multiple deficiencies. LBW comprises 30% of SNCU admissions, half of perinatal and 1/3<sup>rd</sup> of neonatal deaths.

**Methods:** A retrospective study analyzing morbities and survival outcome of admitted LBW neonates in SNCU of district hospital Madikeri, Kodagu District, Karnataka, India from October 2014 to October 2015. 224 LBW neonates were grouped as per birth weight (<1 kg, 1-1.499 kg, 1.5-1.99 kg, 2-2.499 kg and maturity at birth (<28 weeks, 28-34 weeks, 34-37 weeks, Term). Intrauterine growth charts used to note birth weight for period of gestation and further classified into preterm, and term IUGR. Morbidities and survival outcomes followed until discharge were analyzed by descriptive and analytic statistics with respect to maturity, birth weight and IUGR.

Results: 28.61% of SNCU admissions were LBW. 79.46% of LBW babies were preterm. 8.93%, 37.1%, 33.48% and 20.54% babies were <28 weeks, 28-34 weeks, 34-37 weeks and term neonates. 1.7%, 24.6%, 43.75%, and 29.99% weighed <1 kg, 1-1.499 kg, 1.5-1.99 kg and 2-2.499 kg. Incidence of RDS was 20.09%, Meconium aspiration syndrome was 4.46%, Neonatal sepsis 16.1%, Birth asphyxia 11.61%, Neonatal jaundice 7.59%, Apnoea 2.71%, hypoglyceamia 1.34%, hypothermia 1.79%, Refusal to feed 2.71%, congenital anomalies 1.34%. Discharge, deaths, referrals and LAMA for <1 kg (25%, 25%, 25%, 25%), for 1-1.499 kg (47.27%, 25.45%, 14.54%, 12.73%), for 1.5-1.99 kg (80.61%, 5.1%, 11.22%, 3.06%), for 2-2.499 kg (76.12%, 1.49%, 13.43%, 8.9%). Prevalence of IUGR in admitted LBW neonates was 43.75%. Early preterm <34 weeks were LBW AGA babies and late preterm 34-37 weeks were LBW SGA babies (P value-<0.001). Correlation between ELBW, VLBW and LBW neonates and its relation to deaths and discharge were highly significant (P value -<0.001), LAMA was significant (P value -<0.05). 70.08% cases were successfully discharged, 12.59% referred to tertiary care, 7.59% LAMA. 9.38% babies died. LBW constituted 47.72% of total SNCU deaths.

**Conclusions:** Morbidity and survival outcome of LBW neonates is directly proportional to birth weight and gestational age. Though a low resource non-teaching hospital unit with deficiencies in manpower and functioning equipment's 70.08% of LBW babies were successfully discharged. FBNC units are contributing enormously to bring down neonatal death rates.

Keywords: IUGR, LBW, Morbidities, Preterm, SNCU

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#### INTRODUCTION

There is no indicator in human biology which tells us about the past events and future trajectory of life, as the weight of newborn at birth.1 Preterm births and intrauterine growth retardation contribute to low birth weight. Global prevalence of LBW neonates is 15.5% and in India 27% of live births are LBW.2 About 4 million babies die each year worldwide in first month of life and India alone accounts for 0.76 million neonatal deaths. India carries single largest share of 25-30% of neonatal deaths in world.<sup>3,4</sup> LBW comprises half of all perinatal and 1/3<sup>rd</sup> of all infant deaths. 1 Common illnesses tend to be more severe and last longer in LBW group. These neonates are at higher risk of asphyxia, sepsis, hypothermia and feeding problems.<sup>5</sup> The greatest success of life saving interventions occurs when hospital and community based activities are interlinked.

Creating and running small modern SNCU based on level 2 criteria of NNF India in remote and under developed districts can have a substantial impact on NMR of whole district. Government of India has made huge investment to reduce neonatal deaths by setting up SNCU at district level. There are >500 SNCUs functional all over country. First SNCU was started in Purulia district 2007, universal coverage was achieved by 2013. India spends 40 to 60 lakhs /division for setting up SNCU and 10 lakhs per year for its annual maintainance. O.8% of India's health care spending is for universalization of SNCU. Average cost per neonate is rupees 4581 and each day costs accounts for rupees 818/neonate.

The working status of a non-medical college SNCU is still far from satisfaction in relation to manpower, availability, maintenance and utilization of equipment's. There are very few studies focusing on outcome of morbidities of LBW neonates in non-teaching hospital SNCU.

#### **METHODS**

This was a retrospectively analysed study conducted in District hospital SNCU of Madikeri, Kodagu district, Karnataka, India. Data from October 2014 to October 2015 was collected from records. All LBW neonates <2.5 kg admitted to SNCU were included. 224 LBW neonates were grouped as per birth weight (<1 kg, 1-1.499 kg, 1.5-1.99 kg, 2-2.499 kg) and maturity at birth (<28 weeks, 28-34 weeks, 34-37 weeks, term).

Intrauterine growth charts used to note birth weight for period of gestation and further classified into preterm, and term IUGR. Morbidities in admitted LBW term and preterm babies in form of respiratory distress, me conium aspiration, neonatal sepsis, birth asphyxia, apnoea, neonatal convulsions, hypothermia, hypoglycaemia, congenital anomalies were noted and percentage prevalence according to gestational age were calculated. Survival outcomes such as discharge leave against

medical advice, referral and deaths of LBW neonates according to weight and gestational age were noted separately and percentages calculated under each group. Data analysed using descriptive and analytical statistics using R statistical software and SSPS-16.

Chi square value calculated for deriving correlation between IUGR in early (<34 weeks GA) and late preterm babies (34-37 weeks GA) and survival outcomes between <1.5 kg and 1.5-2.5 kg neonates. A P-value of <0.05 was taken as significant.

#### **RESULTS**

Table 1: Descriptive statistics of admitted low birth weight neonates in non-teaching hospital SNCU.

Variable	Number	Percentage
Caste		
SC/ST	47	20.98
OBC	55	24.55
Other	122	54.46
Sex		
Male	129	57.59
Female	95	42.41
Mode of delivery		
Vaginal	178	79.46
Home delivery	10	4.46
Hospital delivery	168	75
Ceaserian section	46	20.54
Inborn	160	71.08
Out born	64	28.57
Discharged	157	70.08
Referral to higher center	29	12.95
Leave against medical advice (lama)	17	7.59
Death	21	9.38

There were total 783 admissions to SNCU in the year 2014-2015 of which 224 cases i.e. 28.61% of SNCU admissions were LBW neonates.

79.46% of admitted LBW babies were preterm and 20.54% term babies.70.08% cases were discharged. 12.95% cases referred to higher centre. 7.59% cases LAMA and 9.38% cases died (Table 1).

8.93%, 37.1%, 33.48% and 20.54% were <28weeks, 28-34 weeks, 34-37 weeks and term LBW babies. Incidence of RDS was 20.09 %. As maturity increased there was steep fall in incidence of RDS from 35% in <28 weeks to 8.70% among term LBW neonates. Incidence of Meconium aspiration syndrome was 4.46%, the incidence increased as the gestational age increased.

Neonatal sepsis was 16.1%, incidence was higher among the term LBW babies. Birth asphyxia accounted to 11.61%, Neonatal jaundice 7.59%. Apnoea 2.71%,

hypoglycaemia 1.34%, hypothermia 1.79%, refusal to feed 2.71% and congenital anomalies 1.34%. It was seen that mean duration of hospital stay among all LBW neonates was 6-7 days. There was a steep fall in death

rates with increasing gestational age. 45% deaths among <28 weeks and only 2.17% among term LBW neonates, suggesting that maturity was prime factor in survival outcome of LBW neonates (Table 2).

Table 2: Relation of gestational age and morbidity among low birth weight new-borns admitted to district hospital SNCU.

Morbidity	<28 weeks N=20 (8.93%)	28-34 weeks N=83 (37.1%)	34-37 weeks N=75 (33.48%)	Term N=46 (20.54%)	Total N=224	Total Percentage %
Mean weight in kg	1.32 Range (0.9-1.5)	1.721 Range (0.84-2.4)	1.98 Range (1-2.4)	2.08 Range (1.5-2.44)	1.78 Range (0.9-2.44)	-
Only preterm as morbidity	6 (30%)	29 (34.9%)	27 (36%)	0	65	29.01
Only IUGR as morbidity	-	-	-	15 (32.61%)	15	6.7
Respiratory distress	7 (35%)	23 (27.77%)	11 (14.67%)	4 (8.70%)	45	20.09
Meconium aspiration syndrome	0	1 (1.2%)	6 (8%)	3 (6.5%)	10	4.46
Neonatal sepsis	2 (10%)	8 (9.64%)	14 (18.67%)	12 (26.1%)	36	16.1
Birth asphyxia	2 (10%)	9 (10.84%)	11 (14.67%)	4 (8.7%)	26	11.61
Apnoea	3 (15%)	1 (1.2%)	2 (2.67%)	0	6	2.71
Neonatal jaundice	0	4 (4.82%)	6 (8%)	7 (15.22%)	17	7.59
Neonatal convulsion	0	1 (1.2%)	1 (1.33%)	0	2	0.89
Refusal to feed	0	4 (4.82%)	1 (1.33%)	1 (2.2%)	6	2.71
Hypothermia	0	2 (2.41%)	2 (2.67%)	0	4	1.79
Hypoglycaemia	0	2 (2.41%)	1 (1.33%)	0	3	1.34
Congenital anomalies	0	1 (1.2%)	1 (1.33%)	1 (2.2%)	3	1.34
Mean duration of hospital stay	6.104 Range (2 hours-25 days)	6.58 Range (1 hour-30 days)	7.22 Range (2 hour-30 days)	6.54 Range (6 hours -29 days)		
Deaths	9 (45%)	8 (9.44%)	3 (4%)	1 (2.17%)	21	9.4

Table 3: Outcome of low birth weight neonates admitted to SNCU in relation to birth weight.

Birth weight in Kgs	<1 (ELBW) N=4 (1.78%)	1-1.5 (VLBW) N=55 (24.55%)	1.5-2 (LBW) N=98 (43.75%)	2-2.5 (LBW) N=67 (29.91%)
Sex				
Female	0	24	64	26
Male	4	31	34	41
Discharge	1 (25%)	26 (47.27%)	79 (80.61%)	51 (76.12%)
Referral to tertiary care	1 (25%)	8 (14.54%)	11 (11.22%)	9 (13.43%)
Discharge against medical advice	1 (25%)	7 (12.73%) 3	3 (3.06%)	6 (8.96%)
Death	1 (25%)	14 (25.45%)	5 (5.1%)	1 (1.49%)
Mean duration of hospital stay	7.875	8.24	6.76	5.55

1.78%, 24.6%, 43.75% and 29.99% babies were <1 kg, 1-1.499 kg, 1.5-1.99 kg and 2-2.499 kg. As birth weight increased discharge rates increases, referrals and death rate reduced (Table 3).

Prevalence of IUGR among preterm LBW neonates was 29.21%. Correlation between IUGR in early preterm <34 weeks and 34-37 weeks gestation showed to be highly significant P-value <0.001.

Early preterm neonates were LBW appropriate for gestational age and late preterm's are LBW small for gestational age. Correlation between ELBW, VLBW and LBW neonates and its relation to deaths and discharge rates were highly significant (P value -<0.001) and LAMA significant (P value -<0.05) (Table 4-5). 98 of 224 cases i.e. 43.75% cases were IUGR babies. LBW neonates constituted 47.72% of total SNCU deaths.

Table 4A: Percentage prevalence of intrauterine growth retardation and its relation to gestational age in early and late preterm infants in preterm low birth weight babies as per intrauterine growth charts.

Gestational age in weeks	<28 weeks	28-34 weeks	34-37 weeks
Total numbers of preterm (n=178)	20	83	75
Number of IUGR neonates (n=52)	0	12	40
Percentage %	0	14.45	53.33

Prevalence of IUGR in preterm LBW neonates is 52/178 i.e. 29.21%.

Table 4B: Correlation between intrauterine growth retardation in early preterm (<34 weeks) and late preterm (>34 to 37 weeks) infants.

Gestational age in weeks	IUGR in neonates Present	Total	
<34	12	91	103
>34 to <37	40	35	75
Total	52	126	178

X<sup>2</sup> value-36.861, P value <0.001 highly significant. Study shows that maximum intrauterine growth retardation occurs in late pregnancy between 34 to 37 weeks. Early pre terms infants are LBW appropriate for gestational age, late pre terms are LBW small for gestational age.

Table 5: Correlation between ELBW (<1 kg), VLBW (1-1.5 kg) and LBW neonates and its relation to various outcome after SNCU admission.

Outcome	Status	ELBW+VLBW neonates (<1kg,1-1.5 kg)	LBW neonates (>1.5 to 2.5 kg)	Chi square value
Disaharga	Present	27	130	28.357 P value < 0.001
Discharge	Absent	32	35	Highly significant
Deaths	Present	15	6	38.64 P value < 0.001
	Absent	44	159	Highly significant
Discharge against medical	Present	8	9	4.08 P value < 0.05
advice (DAMA)	Absent	51	156	Significant

#### DISCUSSION

There are not many studies which give morbidities of LBW admitted neonates in a non-teaching hospital SNCU. Predominant studies have data of either preterm or IUGR neonates separately and from a tertiary care centre. IUGR contributes to 2/3<sup>rd</sup> of LBW neonates. 980% cases of admitted LBW neonates in our study were preterm and 20% were term LBW neonates. Though IUGR contributes to  $2/3^{\rm rd}$  of LBW, only 14% of neonates weighing <2 kg require NICU admission. 10 IUGR prevalent in preterm neonates in our study was 23.21%. Significant number of preterm IUGR babies was seen in late preterm than early preterm neonates which was highly significant as supported by Rocha et al.11 The number of elective LSCS were higher in late preterm infants increasing LBW rates in this group. >80% of preterm IUGR babies were born between 32 and 37 weeks GA. 11,12 Though Preterm prevalence rates vary from 7-16% which are lower when compared to prevalence of IUGR babies, preterm's contribute disproportionately i.e. 60-70% of all perinatal deaths and majority of NICU admissions as supported by Asalkar MR et al.<sup>13</sup> It was seen in our study that 95 % deaths in LBW were among preterm's The term IUGR neonates had death rate of only <5%. Survival for VLBW infants worldwide ranges between 43% in developing country to 90% in developed country with an average of 73%. 14 India has a survival rate of 63%. 15 As our SNCU is only

level 2 care unit in a remote district with no ventilator care follow-up outcome of neonates referred for need of tertiary care and those leaving against medical advice was not known. Hence the survival up to discharge was lower when compared to national norms. It is 25% among ELBW, 47.27% among VLBW, 80.61% among LBW (1.5-2 kg) and 76.12% among 2-2.5 kg neonates. There are no studies to date quoting survival up to discharge rates according to birth weight in such nonteaching hospital SNCUs.

A study done by Rakoikola et al shows survival until discharge to be 72%, LAMA around 8.06% and deaths of 20.53%. These statistics for total NICU admissions were comparable with outcome for only LBW neonates in our study with 70% survival until discharge, 7.59% LAMA, 12.95% referrals and 9.38% deaths. The Referral rate was high and deaths were halved in our study as our SNCU is only level 2 care unit with referrals whenever needed. Other morbidities among the total admitted cases in tertiary care NICU for RDS ,birth asphyxia ,sepsis as seen by Rakoikola et al, Prasad V et al and Asalkar et al were comparable to our study having similar morbidity outcome for admitted LBW neonates with only level 2 care. 13,16,17 The incidence of neonatal jaundice and Meconium aspiration syndrome was 7.49% and 4.46% in our study when compared to higher rates in studies done by Prasad V etal and Rakoikola et al. 16,17

Majority of studies were done in tertiary care centres studying the morbidities of total admitted neonates. There are no study done in level 2 care non-teaching hospital SNCU and no studies available to compare morbidities in LBW neonates separately in such SNCU. It was seen from available tertiary care unit studies that the survival unto discharge outcome was comparable in our study when compared to tertiary care. This supports up liftment and universalization of level 2 care SNCU at district level so that improvement in maintenance and trained manpower in such units further reduces neonatal mortality to single digit in achieving millennium development goal.

## CONCLUSION

Morbidity and survival outcome of LBW neonates is directly proportional to birth weight and gestational age. Though low resource non-teaching hospital units with deficiencies in manpower and functioning equipment's 70.08% of LBW were successfully discharged. Facility based neonatal care units are contributing enormously to bring down neonatal death rates.

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