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Original Research Article

Morbidity and mortality profile of neonates in a tertiary care centre in Tamil Nadu: a study from South India

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ABSTRACT

Background: Accurate data on morbidity and mortality pattern are useful for many reasons. The Perinatal and the neonatal period are so short but they are the most critical faces of human life1. It reflects the general health and the socio-biological features of the most vulnerable groups of the society, the mothers and the infants. The objectives of this study was to investigate the morbidity and mortality pattern of neonates admitted in Neonatal Intensive Care Unit (NICU) of tertiary care hospital.
Methods: All the neonates admitted to NICU from July 2013 to June 2015, excluding the neonates referred and discharged against medical advice were retrospectively analysed for demographic profile, short term morbidity and outcome.
Results: 3118 neonates were admitted in the study period. 57.5% were Males, 72.5% were inborn, 69% were term babies and 53.3% had normal birth weight. Important causes for morbidity were Perinatal asphyxia 490 (15.7%), Preterm/LBW 456 (14.6%), Neonatal jaundice 438 (14%) and then sepsis 402 (12.9%). The mortality rate was 10.4% with statistical significant difference between inborn and outborn babies (P<0.0001). The major causes of mortality are Respiratory syndrome 109 (33.6%), followed by birth asphyxia 82 (25.3%) and sepsis 82 (25.3%). The survival of term as well as normal birth weight babies was statistically significant over preterm (P<0.0001) and Low Birth Weight (LBW), Very Low Birth Weight (VLBW), Extreme Low Birth Weight (ELBW) neonates (P<0.0001> respectively.
Conclusions: Birth asphyxia, prematurity, Jaundice and neonatal sepsis respiratory problems were major causes of both mortality and morbidity. There is need to strengthen services to address these problems more effectively.

Keywords: Morbidity, Mortality, Newborn, Neonatal intensive care unit

INTRODUCTION

Accurate data on morbidity and mortality pattern are useful for many reasons. The Perinatal and the neonatal period are so short, but they are the most critical faces of human life.[1] It reflects the general health and the socio-biological features of the most vulnerable groups of the society, the mothers and the infants.[2] Out of 130 million babies born every year about 4 million die in the neonatal period.[3] About ¼th of global neonatal deaths occur in India.[4] According to the Sample Registration System(SRS) statistical report 2016 the current neonatal mortality rate in India is 24 and ranges from 14 in urban to 27 in rural areas.

The percentage of neonatal deaths to infant deaths is 70.6% at national level and varies from 60.9% to 71% in rural areas. Among the bigger states the neonatal

mortality ranges from 32 in Orissa and Madhya Pradesh to 6 in Kerala. The neonatal mortality rate in Tamil Nadu is 17 per 1000 live births , is less than that of the national figure but still there is need for improvement in health care particularly in survival of LBWs and VLBWs.[5] In a report published in the lancet the major direct causes for neonatal deaths were preterm (27%), infection (26%), asphyxia (23%), congenital anomalies (7%), others (7%), tetanus (7%), diarrhoea (3%).[6] However in India the morbidity and the mortality pattern were different ,that too in a state like Tamil Nadu with better health care facilities. The objective of this study was to study the morbidity and mortality patterns in NICU of tertiary care hospital.

METHODS

This is a hospital based retrospective study done in the neonatal intensive care unit in the department of the Paediatrics in government Villupuram medical college and hospital for a period of one year from 1st January 2017 to 31st December 2017.The study has been approved by our institution ethical committee. Our institution is a tertiary care institute situated in rural area which covers Villupuram, Cuddalore and Thiruvanamalai.

Inclusion criteria

- All neonates less than 28 days admitted in Sick Newborn Care Unit (SNCU) during the study period.

Exclusion criteria

- Babies more than 28 days of life.
- Babies discharged against medical advice.
- Babies referred to higher centre.

The babies delivered in our hospital are categorised as inborn and babies delivered elsewhere are categorised as outborn. the data were recorded in a pre-designed performa and was analysed by appropriate statistical in Open Epi statistical software (P value of 0.05 is taken as significant).

World Health Organisation (WHO) guidelines were used in categorising the babies based on Gestational age and Birth weights and National Neonatology Forum (NNF) guidelines were used in diagnosing the disease conditions.

RESULTS

A total of 3242 babies were admitted in our NICU of which 120 babies were referred to higher institute and 4 babies left the hospital against medical advice were excluded from the study. A total of 3118 babies were included for the data analysis. Of these 3118 babies, there were 2260 (72.5%) inborn babies and 858 (27.5%) outborn babies (Table 1).

Table 1: Mode of admission.

Mode of admission	Total	Percentage
Inborn	2260	72.5
Outborn	858	27.5
Total	3118	100

Of the outborn babies, majority are referred from Primary Health Centre (PHC) (441) followed by district hospitals (200) (Figure 1).

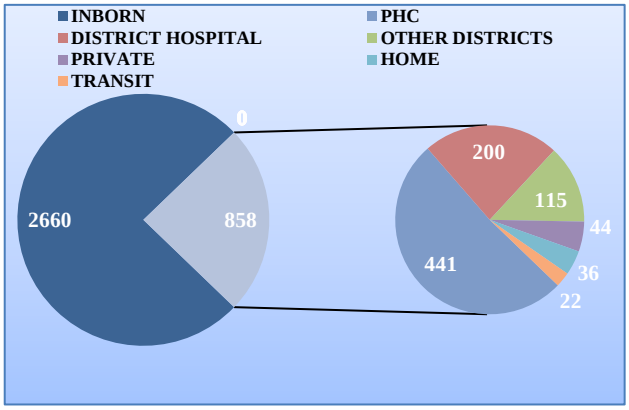

Figure 1: Admission profile.

There were 1794 (57.5%) male babies and 1321 (43.4%) female babies and 3 (0.1%) ambiguous babies and the ratio of male and female was 1.36:1 and difference between admissions of male and female babies was not statistically significant (P value 0.22). 1160 (53.3%) babies had birth weight of more than 2500 grams, 1217 (39.0%), 189 (6%) and 52 (1.7%) belonged to LBW, VLBW and ELBW respectively. There were 953 (30.6%) preterm babies, 2152 (69%) term babies and 13 (0.1%) post-term babies (Table 2).

Table 2: Admission profile based on gender, birth weight and gestational age.

	Inborn	Outborn	Total
Gender			
Males	1317(42.2)	477(15.3%)	1794(57.5%)
Females	941(30.4%)	370(12.0%)	1321(42.4%)
Ambiguous	2(0.07%)	1(0.03%)	3(0.1%)
Birth weight (in grams)			
>2500	1158(37.2%)	502(16.1%)	1660(53.3%)
1500-2499	926 (29.6%)	291 (9.4%)	1217(39.0%)
1000-1499	140 (4.5%)	49(1.5%)	189(6.0%)
<1000	36(1.2%)	16(0.5%)	52(1.7%)
Gestational age (in weeks)			
Pre-term	739(23.7%)	214 (6.9%)	953(30.6%)
Term	1509(48.4%)	643(20.6%)	2152(69.0%)
Post-term	12 (0.27%)	1 (0.03%)	13 (0.1%)

The major causes of morbidity Perinatal asphyxia 490 (15.7%), Preterm/LBW 456 (14.6%), Neonatal jaundice 438 (14%) and then sepsis 402 (12.9%). Prematurity and Neonatal jaundice were major morbidities found in

inborn, whereas Perinatal asphyxia and sepsis were the major morbidities found in outborn. The most common causes of referral for the outborn babies were birth asphyxia (21.9%) followed by Respiratory Distress Syndrome (RDS) (19.9%) and LBW (12.7%). On comparing the morbidity profile of birth asphyxia between inborn and outborn admissions and it was found statistically significant with the Odd's ratio of 0.11 (CI:0.086-0.139 and P value <0.0001) (Table 3).

Table 3: Morbidity profile.

	IM		EM		TOTAL	
	T	Percent	T	Percent	T	Percent
Perinatal asphyxia	320	14.2	170	19.8	490	15.7
Preterm/ LBW	346	15.3	110	12.8	456	14.6
Neonatal Hyperbilirubinemia (NNH)	345	15.3	93	10.8	438	14.0
Sepsis	254	11.2	148	17.2	402	12.9
Transient Tachypnea of the Newborn (TTN)	295	13.1	45	5.2	340	10.9
Meconium Aspiration Syndrome (MAS)	113	5.0	52	6.1	165	5.3
Intra Uterine Growth Retardation (IUGR)	108	4.8	41	4.8	149	4.8
Respiratory Distress Syndrome (RDS)	109	4.8	30	3.5	139	4.5
congenital anomalies	53	2.3	30	3.5	83	2.7
Others	168	7.4	63	7.3	63	2.0
Neonatal Convulsions	23	1.0	21	2.4	44	1.4
ELBW/Extreme preterm	32	1.4	12	1.4	44	1.4
Other Respiratory Distress	31	1.4	11	1.3	42	1.3
Hyperthermia	18	0.8	21	2.4	39	1.3
Infant of Diabetic Mother (IDM) / Low for Gestational Age (LGA)	27	1.2	1	0.1	28	0.9
Pneumonia	11	0.5	8	0.9	19	0.6
Hypoglycaemia	5	0.2	0	0.0	5	0.2
Hemolytic Disease of the Newborn (HDN)	1	0.0	1	0.1	2	0.1
Meningitis	0	0.0	1	0.1	1	0.0
Pneumothorax	1	0.0	0	0.0	1	0.0
Total	2260	100.0	858	100.0	3118	100.0

Table 4: Outcome profile.

Outcome	Inborn	Outborn	Total
Survived	196 (8.7%)	128 (14.9%)	324 (10.4%)
Expired	2064 (91.3%)	730 (85.1%)	2794 (89.6%)

As seen in Table 4, there were 324 deaths and the overall mortality rate was 10.4%. and the outcome of babies born in this hospital and of the babies referred from outside were analysed.

Among 2260 Inborn babies 196 (8.7%) babies died and 128 (14.9%) outborn babies died in 858 babies and there was statistically significant difference in the outcome of inborn and outborn babies (P value <0.0001, Odds ratio 1.84, CI 1.45-2.34).

As seen in Table 5, mortality rate in male babies are higher than female babies. On comparing there was no statistically significant difference (p=0.1228). LBW deaths constitutes 72% the total deaths on comparing the survival among term and preterm babies, it was seen that the statistically significant difference between the groups P<0.0001.

Table 5: Death profile based on gender, birth weight and gestational age.

	Inborn	Outborn	Total
Gender			
Males	117 (59.6%)	84 (65.6%)	201 (62%)
Females	79 (40.4%)	44 (34.4%)	123(38%)
Ambiguous	0 (0%)	0 (0%)	0 (0%)
Birth weight (in grams)			
>2500	41 (20.9%)	50 (39%)	91 (28.1%)
1500 – 2499	61 (31.2%)	38 (29.7%)	100 (30.9%)
1000-1499	63 (32.1%)	25 (19.5%)	88 (27.2%)
<1000	31 (15.8%)	14 (10.9%)	45 (13.8%)
Gestational age (in weeks)			
Pre-term	142 (72.4%)	61 (47.6%)	203 (62.7%)
Term	54 (27.6%)	67 (52.4%)	121 (37.3%)
Post-term	0 (0.0%)	0(0%)	0 (0%)

The major causes of mortality are Respiratory syndrome 109 (33.6%), followed by birth asphyxia 82 (25.3%) and

sepsis 82 (25.3%). Mortality rate due to RDS were more in inborn 76 (39.1%) than outborn 33 (25.2%) and mortality rate due to birth asphyxia (30.7 vs 21.8) were more in outborn than inborn, mortality rates of sepsis, congenital anomalies, Meconium Aspiration Syndrome(MAS) and pneumonia were almost similar in both the groups (Table 6).

Table 6: Mortality profile.

Causes of death	In-born	%	Out-born	%	Total	%
Others	8	4.1	8	6.3	16	4.9
Unknown	1	0.5	0	0.0	1	0.3
Birth asphyxia	43	21.8	39	30.7	82	25.3
Congenital anomalies	10	5.1	8	6.3	18	5.6
MAS	5	2.5	5	3.9	10	3.1
Meningitis	0	0.0	1	0.8	1	0.3
Pneumonia	3	1.5	2	1.6	5	1.5
RDS	77	39.1	32	25.2	109	33.6
Sepsis	50	25.4	32	25.2	82	25.3
Total	197	100.0	127	100.0	324	100.0

There was no statistically significant difference on comparing the mortality rates of male and female babies (P<0.122). Out of 324 deaths 100 (30.9%) were LBW, 88 (27.2%) were VLBW, 45 (13.8%) were ELBW (Table 7).

Table 7: Break-up of preterm deaths.

Gestational age	Inborn	Outborn	Total
<28 weeks	26 (18.3%)	7 (11.5%)	33 (16.2%)
28-32 weeks	43(30.3%)	22 (36.1%)	65(32.1%)
32-34 weeks	36 (25.3%)	16 (26.2%)	52 (25.6%)
34-37 weeks	37 (26.1%)	16 (26.2%)	53 (26.1%)
Total	142(100%)	61 (100%)	203(100%)

Of the total 324 neonatal deaths 203 were preterm and the risk of dying due to prematurity was statistically significant (P<0.0001, ODDS ratio 4.54 CI 95% 3.57-5.77) (Table 8). As the gestational age of the babies increases, the survival rate of the baby increases correspondingly.

On analysing the preterm deaths, the risk of dying preterm babies born before 34 weeks is 4.5% higher than those born after 34 weeks and the rate becomes higher (10.17 times) when analysed at 32 weeks and both were found to be statistically significant (Table 8).

On comparing the survival among the different groups based on birth weights, there were statistically significant difference between LBW and normal birth weight (P <0.004), VLBW and normal birth weight (P <0.0001) and ELBW and normal birth weight (P <0.0001). The relative risk of deaths in the VLBW and ELBW groups as compared to normal birth weight groups were 15.02 and 110.83 times respectively.

Table 8: NICU outcome in different birth weight group.

Birth weight	Admissions	Deaths	Survived	% of death in each group
≥2500 grams	1660	91	1569	5.5
1500-2499 grams	1217	100	1117	8.2
1000-1499 grams	189	88	101	46.6
<1000 grams	52	45	7	86.5
Total	3118	324	2794	10.4

DISCUSSION

Accurate data on morbidity and mortality profile of neonates are important for the health care providers, administrators to decide and design interventions for the prevention and treatment, to implement and evaluate health care programmes.

In present study the admissions of male babies were more than that of female babies. It is due to the biological vulnerability of male gender and may be due to the preference of male child in the society. Similar findings were reported from various studies conducted in different parts of India.[7-13]

Inborn admissions are about 72% and outborn admissions are % in our study, which is similar to the studies done by Sridhar PV et al, Modi R et al, Kumar MK et al.[8,9,12]

According to the United Nation Children's Fund (UNICEF), "The state of world's children's report 28% of neonates were born with low birth weight in India [14]. But in our study 47% of neonates were low birth weight and 31% of neonates are born prematurely. This reflects the poor maternal health, antenatal check-up and socio-economic status of the rural society as our hospital caters people from rural areas and from low socio-economic groups. Various studies from all over India reported much higher LBW rates. As in Modi R et al (72%) and Babu MC et al (70%).[9,11] This may be due much higher pre-term deliveries in their studies.

In present study, the chief morbidities were Perinatal asphyxia (15.7%), prematurity (14.6%), neonatal jaundice (14.0%) and sepsis (12.9%).

Perinatal asphyxia was the most predominant cause of morbidity and mortality and the incidence of Perinatal asphyxia is more in Outborn (19.8%) when compared to inborn (14.2%) which is consistent with Malik S et al and

Babu MC et al.[10,11] The most common cause of morbidity in inborn babies is preterm/ lbw 15.3% These studies are similar to that of Kumar MK et al.[12]

The mortality rate observed in our study was 10.45% which is much less when compared to study conducted by Saharia N et al (13%) and Malik S et al (26%) the causes of mortality were RDS (33.6%), birth asphyxia (25.3%), sepsis (25.3%) which is consistent with studies conducted in South India, Sridhar PV et al.[7,8,10] Babu MC et al in a study conducted in JIPMER, systemic infections (52%) were found to be the major causes of death followed by birth asphyxia (29%), but our present studies shows RDS is the most common cause of death which at be due to more preterm admissions.[11] This reflects poor antenatal care and poor nutritional status, especially in rural areas.

Low birth weights accounted for 60% of the total deaths which is similar to study conducted by Kumar M et al.[16] Present study shows that babies with VLBW and Gestational less than 32 weeks were strongly attached with high mortality which is similar to study conducted by Yasmin S et al.[17]

Neonates who are referred from other centres have a higher mortality when compared to inborn babies and in that Perinatal asphyxia stands first. The outcome of this study reveals the need for the hour regarding the timely perinatal interventions in primary and secondary care. There is a broader agreement that in infants with more than 2500 grams of birth weight and death is influenced by the obstetric management that in those who are LBW, was the quality of the neonatal care that had an important on the bearing of the outcome. With the present study having identified RDS, Birth asphyxia, Neonatal sepsis are the major causes of death. There is a need for the further development in the obstetric and neonatological unit for better care with use of more sophisticated technologies.

Limitation of the present study was that as this is a retrospective institutional study, which caters the patients predominantly from low socio-economic status and rural areas, the results may not reflect the true burden of population. Maternal illnesses contributing the neonatal outcomes are not studied in the present study

CONCLUSION

This study identifies the major causes of morbidity are perinatal asphyxia, Preterm/LBW, Neonatal jaundice and then sepsis. The incidence of preterm and LBW can be prevented by appropriate measures and antenatal checks ups so that the neonatal income can be improved considerably. Training sessions and hands on workshop must be given to all the health care providers involved in delivery as the perinatal asphyxia outcome mainly depends upon the appropriate timing and manner of interventions. Appropriate and recurrent training sessions must be conducted at all district levels in order to ensure proper essential newborn care by imparting adequate knowledge of maintaining warmth, feeding, cleanliness and preventing asphyxia, so that India hopes to achieve its Millennium Development Goal 4.

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