Original Article

Clinical Profile and Outcome of Neonates Admitted in Intensive Care Unit: A Cross Sectional Study in District Hospital

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Abstract

Neonatal period, which is the first 28 days of an infant's life, is the most crucial and vulnerable period. A remarkable decline in mortality rates during neonatal period for the past two decades is due to the advances of obstetric practice in term of medical screening and surveillance and increased neonatal specialization. However, respiratory tract disorders, along with sepsis and other types of infection, are the major causes of neonatal morbidities and mortalities. Hence, this study is aimed to bridge these gaps and provide inputs to the program implementers to design necessary interventions that could contribute to the reduction of neonatal morbidity and mortality.

Aims: To determine the clinical profile and neonatal outcome admitted to NICU in district hospital **Objectives**: 1. To determine the socio demographic factors associated with neonatal outcome 2. To determine the obstetric profile associated with neonatal outcome.

Methods: This hospital based retrospective study was conducted in the NICU of Tumakuru district hospital from Jan to March 2023. Records of all the admitted neonates were reviewed. The details were collected based on a structured questionnaire prepared in English. This contained information regarding obstetric and antenatal care (ANC), gestational age at birth, birth weight, sex, APGAR score, age at admission, admission diagnosis, neonatal outcomes and other related details.

The data collected was entered in Microsoft excel (MS Excel) and quantitative variables was analysed by mean and qualitative variable by proportion by epi in go 3.4.3. Chi square was used to find out the association between the neonatal outcome and other variables. P value <0.05 was considered significant.

Results: A total of 120 neonates were admitted during the study period. 47 (39.1%) mothers of the neonates were aged 21-25years and followed by 34 (28.3%) mothers in the age of 26-30 years. Association between neonatal outcome and socio demographic components was not statistically significant but definitely outcome was better

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with the good socio demographic profile. Regarding ANC follow up, 119 (99.1%) mothers had attended at least one prenatal visit and majority 100 (80%) were having ANC check-up at government hospital. The most common causes of neonatal mortality were respiratory distress syndrome 4(3.33%), followed by low birth weight 4(3.33%), and preterm 3(2.5%).

Conclusion: Inspite of improved technology and facilities available still the neonatal outcome is worst. These all are preventable causes of neonatal mortality and morbidities which has to be taken care bygiving due importance to its predictors. Maternal and environmental factors has to be taken care and dealt.

Keywords: neonatal outcome, neonatal mortality, respiratory distress

Introduction

The neonatal period, which is the first 28 days of an infant's life, is the most crucial and vulnerable period. Children face the highest risk of mortality in their first month of life at an average global rate of 17 deaths per 1,000 live births in 2022. In comparison, the probability of dying after the first month and before reaching age 1 was estimated at 11 deaths per 1,000 and the probability of dying after reaching age 1 and before reaching age 5 was estimated at 9 deaths per 1,000 in 2022. Globally, 2.4 million children died in the first month of life in 2022 – approximately 6,500 neonatal deaths every day – with about a third of all neonatal deaths occurring within the first day after birth, and close to three-quarters occurring within the first week of life [1].

Currently the neonatal mortality rate in India is 26 per 1000 live births [2]. Over 70% of these early neonatal deaths were due to conditions that could be prevented or treated with access to simple and affordable interventions. Majority of these deaths are caused by respiratory disorders, neonatal sepsis, asphyxia, low birth weight and prematurity being the risk factors [3,4].

Neonatal mortality rate remains a challenge in most countries due to the risk factors associated with neonatal mortality which are considered quality indicators for improving health care provided in Neonatal Intensive Care Unit (NICU), as well as an indicator of population health and well-being. The NICU must have highly sophisticated facilities and equipment's to address critical cases, facilitate adjustment of the newborn to the extra-uterine life, and establish and maintain normal respiration of a high-risk newborn. Although NICU helps to reduce preterm mortality, it is scarce and is a financial burden on the healthcare system in a developing country like India with about more than 50% being rural population[5,6].

A remarkable decline in mortality rates during neonatal period for the past two decades is due to the advances of obstetric practice in term of medical screening and surveillance, and increased neonatal specialization. However, respiratory tract disorders, along with sepsis and other types of infection, are the major causes of neonatal morbidities and mortalities. Consequently, the length of hospital stay, intensive care costs, and burden on the healthcare system have increased. The continued reduction in neonatal deaths is critical to the progress of a nation. Therefore, determining causes and predictors of neonatal death is essential. Knowledge about the diseases and early interventions are lacking which should be given priority. Hence, this study is aimed to bridge these gaps and provide inputs to the program implementers to design necessary interventions that could contribute to the reduction of neonatal morbidity and mortality.

Aims: To determine the clinical profile and neonatal outcome admitted to NICU in district hospital.

Objectives: To determine the socio demographic factors associated with neonatal outcome

To determine the obstetric profile associated with neonatal outcome

Methods

This hospital based retrospective study was conducted in the NICU of Tumakuru district hospital from Jan to March 2023. This facility has been providing health services for an estimated population including both urban and rural populations. The NICU affiliated to the hospital has a capacity of Incubators. The facilities provided here are:

respiratory support system including ventillators and CPAP, phototherapy, parenteral nutrition, oxygen gas supply system, monitoring of oxygen and carbon dioxide level in the blood, and laboratory tests.

Records of all the admitted neonates were reviewed. The details were collected based on a structured questionnaire prepared in English. This contained information regarding obstetric and antenatal care (ANC), gestational age at birth, birth weight, sex, APGAR score, age at admission, admission diagnosis, neonatal outcomes and other related details.

Statistical analysis

The data collected was entered in Microsoft excel (MS Excel) and quantitative variables was analysed by mean and qualitative variable by proportion by epi ingo 3.4.3. Chi square was used to find out the association between the neonatal outcome and other variables. P value <0.05 was considered significant.

Results

Table 1: Association of socio-demographic factors with neonatal outcome

Variables	Categories	Condition of baby		Total	Chi-Square, P-value
		Improved	Death		
Age of mother	<=20	26 (100%)	0 (0.0%)	26 (100%)	4.536, 0.209
	21-25	45 (95.7%)	2 (4.3%)	47 (100%)	
	26-30	31 (91.2%)	3 (8.8%)	34 (100%)	
	>30	11 (84.6%)	2 (15.4%)	13 (100%)	
Address	Urban	44 (95.7%)	2 (4.3%)	46 (100%)	0.300, 0.584
	Rural	69 (93.2%)	5 (6.8%)	74 (100%)	
Religion	Hindu	93 (94.9%)	5 (5.1%)	98 (100%)	0.520, 0.471
	Muslim	20 (90.9%)	2 (9.1%)	22 (100%)	
Occupation	Elementary occupation	53 (94.6%)	3 (5.4%)	56 (100%)	2.969, 0.396
	Plant or machine operators	9 (90.0%)	1 (10.0%)	10 (100%)	
	Skilled agriculture	12 (85.7%)	2 (14.3%)	14 (100%)	
	Skilled workers	39 (97.5%)	1 (2.5%)	40 (100%)	
Education	Illiterate	8 (100%)	0 (0.0%)	8 (100%)	11.495, 0.042
	Primary school	2 (66.7%)	1 (33.3%)	3 (100%)	
	Middle school	13 (81.3%)	3 (18.8%)	16 (100%)	
	High school	43 (97.7%)	1 (2.3%)	44 (100%)	
	Intermediate or diploma	31 (93.9%)	2 (6.1%)	33 (100%)	
	Graduate	16 (100%)	0 (0.0%)	16 (100%)	
S.E.Status	16-25 Upper middle	3 (100%)	0 (0.0%)	3 (100%)	7.426, 0.059
	11-15 Lower middle	42 (95.5%)	2 (4.5%)	44 (100%)	
	5-10 Upper lower	67 (94.4%)	4 (5.6%)	71 (100%)	
	<5 Lower	1 (50.0%)	1 (50.0%)	2 (100%)	
Married life	1-5	73 (93.6%)	5 (6.4%)	78 (100%)	0.912, 0.634
	6-10	27 (93.1%)	2 (6.9%)	29 (100%)	
	> 10	13 (100%)	0 (0.0%)	13 (100%)	
Parity	Primigravida	58 (95.1%)	3 (4.9%)	61 (100%)	0.189, 0.664
	Multipara	55 (93.2%)	4 (6.8%)	59 (100%)	

A total of 120 neonates were admitted during the study period. 47 (39.1%) mothers of the neonates

were aged 21-25years and followed by 34 (28.3%) mothers in the age of 26-30 years. 74 (61.6%) the patients were from rural areas .98 (81.6%) belonged to Hindu religion. 56 (46.6%) of the parents were coolie by occupation. 44 (36.6%) mothers attended high school and 8 (6.6%) mothers were unable to read or write. 71 (59.1%) belonged to upper lower class according to modified kuppuswamy classification. 59 (49.1%) neonates were delivered from multiparous mothers. Association between neonatal outcome and socio demographic components was not statistically significant but definitely outcome was better with the good socio demographic profile.

Table 2: Association of antenatal care and clinical factors with neonatal outcome

Variables	Categories	Condition of baby		Total	Chi-Square, P-value
		Improved	Death		
ANC follow up	Yes	112 (94.1%)	7 (5.9%)	119 (100%)	0.062, 0.803
	No	1 (100%)	0 (0.0%)	1 (100%)	
Place of ANC	Government	93 (93.0%)	7 (7.0%)	100 (100%)	1.487, 0.223
	Private	20 (100%)	0 (0.0%)	20 (100%)	
No. Of ANC visits	1-3	19 (86.4%)	3 (13.6%)	22 (100%)	3.736, 0.154
	4-6	25 (92.6%)	2 (7.4%)	27 (100%)	
	>=7	69 (97.2%)	2 (2.8%)	71 (100%)	
TT completed	Yes	109 (94.0%)	7 (6.0%)	116 (100%)	0.256, 0.613
	No	4 (100%)	0 (0.0%)	4 (100%)	
Fe and fc taken	Yes	110 (94.0%)	7 (6.0%)	117 (100%)	0.191, 0.662
	No	3 (100%)	0 (0.0%)	3 (100%)	
Gestational age	Early preterm(<34w)	11 (84.6%)	2 (15.4%)	13 (100%)	5.872, 0.053
	Late preterm(34-36w)	21 (87.5%)	3 (12.5%)	24 (100%)	
	Term(37-42w)	81 (97.6%)	2 (2.4%)	83 (100%)	
Type of delivery	NVD	62 (89.9%)	7 (10.1%)	69 (100%)	5.494, 0.019
	LSCS	51 (100%)	0 (0.0%)	51 (100%)	
Duration of labour (NVD)	<=4	20 (90.9%)	2 (9.1%)	22 (100%)	0.076, 0.963
	5-12	35 (89.7%)	4 (10.3%)	39 (100%)	
	>=12	7 (87.5%)	1 (12.5%)	8 (100%)	
Place of delivery	Government	98 (93.3%)	7 (6.7%)	105 (100%)	1.062, 0.786
	Private	13 (100%)	0 (0.0%)	13 (100%)	
	Home	1 (100%)	0 (0.0%)	1 (100%)	
	Other	1 (100%)	0 (0.0%)	1 (100%)	
Birth attendent	Doctor	59 (98.3%)	1 (1.7%)	60 (100%)	4.169, 0.244
	Nurse	52 (89.7%)	6 (10.3%)	58 (100%)	
	Self	1 (100%)	0 (0.0%)	1 (100%)	
	Others	1 (100%)	0 (0.0%)	1 (100%)	
Amniotic fluid status	Clear	103 (94.5%)	6 (5.5%)	109 (100%)	0.234, 0.629
	Meconium stained	10 (90.9%)	1 (9.1%)	11 (100%)	
Obs complications during pregnancy	Preeclampsia/ eclampsia	16 (84.2%)	3 (15.8%)	19 (100%)	8.947, 0.030
	PROM	2 (66.7%)	1 (33.3%)	3 (100%)	
	APH	1 (100%)	0 (0.0%)	1 (100%)	
	None	94 (96.9%)	3 (3.1%)	97 (100%)	

Regarding ANC follow up, 119 (99.1%) mothers had attended atleast one prenatal visit and majority 100 (80%) were having ANC check-up at government hospital. However only 22(18.3%) had not received the recommended ANC follow up for their current pregnancy (which was 4 or more ANC visits). 4 (3.3%) of them had not taken TT Injections for the present pregnancy and 3 of them did not take any iron and folic acid tablets. Among the newborn, 37 babies were born preterm where by 13 of them were born before 34 weeks of gestation. Lower segment caesarean section and normal vaginal delivery was almost equal where as 50% of the delivery was done by nurse and other trained birth attendant.23 (19.1%) mothers had complications during pregnancy where as Preeclampsia or eclampsia accounted for 19 (15.8%).

Table 3: Association of neonatal morbidity Indications with neonatal outcome

Indication	Condition of baby		Total
	Improved	Death	
Fetal distress	3 (100%)	0 (0.0%)	3 (100%)
Aspiration	4 (100%)	0 (0.0%)	4 (100%)
Cord abnormalities	4 (100%)	0 (0.0%)	4 (100%)
CPD	6 (100%)	0 (0.0%)	6 (100%)
Abnormal lie, presentation	4 (100%)	0 (0.0%)	4 (100%)
Amniotic fluid abnormalities	10 (100%)	0 (0.0%)	10 (100%)
Placental, uterine abnormalities	3 (100%)	0 (0.0%)	3 (100%)
Other(eclampsia/DM/prev LSCS)	21 (100%)	0 (0.0%)	21 (100%)

Table 4: Association of comorbidities among mother with Neonatal outcomes

Variables	Condition of baby		Total	Chi-Square, P-value
	Improved	Death		
DM	9 (100%)	0 (0.0%)	9 (100%)	0.603, 0.438
HTN	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
Thyroid disorder	4 (100%)	0 (0.0%)	4 (100%)	0.256, 1.00
Cardiac disease	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
Anemia	41 (89.1%)	5 (10.9%)	46 (100%)	3.444, 0.063
Infections	14 (87.5%)	2 (12.5%)	16 (100%)	1.494, 0.235
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	-
None	56 (96.6%)	2 (3.4%)	58 (100%)	1.163, 0.441

Table 4 Association of comorbidities with Neonatal outcomes Despite 98(81.6%) mothers had more than 4 ANC visits, 46(46.9%) mothers were anemic and out of which 5(10.8%) newborns delivered by these mothers died.

Table 5: Association between reason for admission and outcome

Reason for admission	Condition of baby		Total	Chi-Square, P-value
	Improved	Death		
RDS	68 (94.4%)	4 (5.6%)	72 (100%)	0.025, 1.000
Neonatal jaundice	16 (100%)	0 (0.0%)	16 (100%)	1.144, 0.285
Neonatal sepsis	13 (100%)	0 (0.0%)	13 (100%)	0.903, 0.342
Meconium aspiration	12 (92.3%)	1 (7.7%)	13 (100%)	0.092, 0.562

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Birth asphysia	16 (94.1%)	1 (5.9%)	17 (100%)	0.000, 1.000
Preterm	26 (89.7%)	3 (10.3%)	29 (100%)	1.417, 0.358
LBW	26 (86.7%)	4 (13.3%)	30 (100%)	4.096, 0.065
Congenital malformation	2 (100%)	0 (0.0%)	2 (100%)	0.126, 1.000
IUGR	8 (100%)	0 (0.0%)	8 (100%)	0.531, 1.000
Convulsions	7 (87.5%)	1 (12.5%)	8 (100%)	0.694, 0.391
Other(excessive cry, refusal of feeds)	16 (100%)	0 (0.0%)	16 (100%)	1.144, 0.592

Among admitted newborn, 7(5.83%) died and the remaining survived from admission to discharge in the NICU. The most common causes of neonatal mortality were respiratory distress syndrome 4(3.33%), followed by low birth weight 4(3.33%), and preterm 3(2.5%).

Table 6: Association factors with neonatal outcomes

Variables	Categories	Condition of baby		Total	Chi-Square, P-value
		Improved	Death		
Complications during labour	Prolonged	7 (87.5%)	1 (12.5%)	8 (100%)	0.855, 0.931
	Obstructed	1 (100%)	0 (0.0%)	1 (100%)	
	Fetal distress	1 (100%)	0 (0.0%)	1 (100%)	
	Cord prolapse	1 (100%)	0 (0.0%)	1 (100%)	
	None	103 (94.5%)	6 (5.5%)	109 (100%)	
Sex of baby	Male	69 (94.5%)	4 (5.5%)	73 (100%)	0.042, 0.837
	Female	44 (93.6%)	3 (6.4%)	47 (100%)	
Age of baby (in days)	<=1	75 (91.5%)	7 (8.5%)	82 (100%)	3.445, 0.179
	2-7	32 (100%)	0 (0.0%)	32 (100%)	
	>7	6 (100%)	0 (0.0%)	6 (100%)	
Birth weight(in g)	<1000	1 (33.3%)	2 (66.7%)	3 (100%)	27.737, <0.001
	1000-1499	6 (75.0%)	2 (25.0%)	8 (100%)	
	1500-2499	47 (95.9%)	2 (4.1%)	49 (100%)	
	2500-3999	58 (98.3%)	1 (1.7%)	59 (100%)	
	>=4000	1 (100%)	0 (0.0%)	1 (100%)	
Temp on adm	<36.5	37 (97.4%)	1 (2.6%)	38 (100%)	1.136, 0.567
	36.5-37.5	75 (92.6%)	6 (7.4%)	81 (100%)	
	>37.5	1 (100%)	0 (0.0%)	1 (100%)	
APGAR score at 5min	<=3	1 (100%)	0 (0.0%)	1 (100%)	8.735, 0.033
	4-6	25 (83.3%)	5 (16.7%)	30 (100%)	
	7-10	71 (97.3%)	2 (2.7%)	73 (100%)	
	Unknown	16 (100%)	0 (0.0%)	16 (100%)	
BF within 1st hour	Yes	34 (91.9%)	3 (8.1%)	37 (100%)	0.504, 0.478
	No	79 (95.2%)	4 (4.8%)	83 (100%)	
Formula Feeding	Yes	27 (96.4%)	1 (3.6%)	28 (100%)	0.340, 1.000
	No	86 (93.5%)	6 (6.5%)	92 (100%)	

Low 5min APGAR score, low birth weight, preterm birth, febrile illness, and feeding status were independent predictors of neonatal mortality in neonatal intensive care units. Newborns with low 5min APGAR score were times more likely to die compared with 5min APGAR score greater than or equal to 7. Low birth weight babies were times more likely to die when compared with normal birth weight. Neonates for whom breast feeding was not initiated within first 24hrs were more likely to die than those who were on exclusive breastfeeding within the first 24hrs of life.

Discussion

73 babies born were male as compared to female (47) which was similar in other studies[7]. 44 (36.6%) mothers attended high school and 8 (6.6%) mothers were unable to read or write. 71 (59.1%) belonged to upper lower class according to modified kuppuswamy classification and 59 (49.1%) neonates were delivered from multiparous mothers which was almost similar to other studies[8,9] .

In a study done by Gebremariam H et all three quarter (75.6%) of the neonates had normal birth weight and 80.0% were term as compared to our study where 60% (60) babies had adequate birth weight. Majority (75.4%) of the neonates was delivered vaginally and 92.7% were delivered at health facility. Neonatal infection (33.0%), birth asphyxia (20%) and prematurity (14.3%) were the top three primary causes of neonatal admission to the Neonatal Intensive Care Unit as compared to the study done by verma et all the major cause of morbidity observed was respiratory distress 555 (39%) , neonatal sepsis 347 (24%) , neonatal hyperbilirubinemia 188 (13%) followed by birth asphyxia 42(3%) and congenital anomaly (2.5%). Birth weight had got a significant predictor for neonatal outcome which was similar to other studies.

Conclusion

Inspite of improved technology and facilities available still the neonatal outcome is worst These all are preventable causes of neonatal mortality and morbidities which has to be taken care by giving due importance to its predictors. Maternal and environmental factors has to be taken care and dealt.

Study limitations: Since this study was a retrospective hospital-basedstudy, the role of awareness about the conditions and where there was delay in recognising the problems to the baby could not be analysed. Prospective studies will give more chance to analyse the socio cultural factors in delay of treating the patients.

Conflict of interest: nil

Ethical clearance: taken from IEC,Sri Siddhartha medical college,Tumkur

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