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Original Research Article

Morbidity Patterns In Neonates Managed In Sick Newborn Care Units Of Lucknow

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Abstract

Neonatal period is the most susceptible period of life as diseases occurring during this period are majorly preventable. Nearly two third of infant deaths occur within first 28 days of life[1], out of which maximum deaths occur within first week of life [2]. Nearly 98% of total deaths in neonatal period are mainly caused by infection, asphyxia, LBW and prematuriy[2].

Objectives:

1) To study the morbidity patterns and treatment outcomes in neonates managed in Sick Newborn Care Units of Lucknow.
2) To suggest measures (if, any) to improve the services provided for management of neonates in Sick Newborn Care Units.

Methods: A descriptive cross-sectional study was conducted among 360 neonates managed in Sick Newborn Care Units of district Lucknow. Out of 5 government SNCUs in Lucknow, 3 were randomly chosen. The schedule was pretested on 10 percent of the total sample of neonates admitted to SNCU.

Results: Out of 360 neonates, 65.8% were directly admitted with presenting complain of low birth weight. Majority (88.1%) of neonates were successfully discharged, while 3.1% got expired. Most of the deaths were reported due to respiratory distress syndrome.

Conclusions: The results of the study indicated that all health care providers need to be extensively trained on sick newborn care. Women need to be educated more on neonatal and early neonatal care. The community needs to be informed and made aware of Sick Newborn Care Units.

Keywords: Sick newborn care units, morbidity patterns, neonates

Introduction

Neonatal period is the most susceptible period of life as majority of diseases occurring during this period are preventable. Nearly two-third of infant die within first 28 days of life [1], out of which deaths occur within first week of life, and about two-fifth of deaths occur below the age of five [2]. Every year, nearly 4 million newborn deaths occur due to lack of skilled care

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during delivery and poor contact with the health system, resulting in majority of deaths taking place at home [2].

For newborns, the three main causes of death are prematurity, intrapartum-related complications and sepsis. Deaths due to congenital anomalies are becoming more common especially in low mortality settings [3].

Majority (98%) of deaths during neonatal period in developing countries are caused by infection, asphyxia, LBW and prematurity [2]. In India, out of total infant deaths, about 66% occur within first 28 days of life, about 40% on first day of life, almost half, 50% within 3 days, and 3/4th in the first week of life [4]. According to WHO, Neonatal mortality rate of India in 2020 was 20.35 per 1000 live births [5].

Out of total neonatal deaths, almost half occur in LBW babies. Causes like hypothermia, asphyxia, sepsis, pneumonia etc. are preventable contributors which contribute significantly to NMR. In developed countries, congenital abnormalities which are mostly non-preventable, form the most common cause of neonatal morbidity and mortality [6]. In India, the most common causes of neonatal mortality are infections including Sepsis and Pneumonia (33%), Asphyxia (21%), Prematurity (15%), Low Birth Weight, Congenital malformations and surgical conditions. Finally, traditional household delivery and newborn care may place the newborn at increased risk of infection, anemia, hypothermia, hypoglycaemia, birth asphyxia and trauma. Newborn survival can be increased by improving household practices and services delivered.

SNCUs are special newborn units, set up in large hospitals, usually district hospitals with a purpose to reduce the case fatality among sick newborns, born outside or within the hospital including deliveries at home within first 28 days of life. Apart from this, SNCUs also serve as training centres for imparting skills in newborn care [7]. SNCU is a separate unit located in vicinity of the labour room, having 12 or more beds to provide 24x7 services for sick newborns, and is managed by adequately trained doctors, staff nurses and support staff. SNCUs are established with a purpose to provide facility-based care to sick newborns.

District and subdistrict hospitals with annual delivery load of more than 3000 are now equipped with SNCUs to provide all types of neonatal care to sick newborns except for assisted ventilation and major surgeries [8].

In the present study, it was found that majority (88.1%) of neonates were successfully discharged, while 3.1 percent neonates expired. Adhikari S *et al*., (2017) [9] in their study showed that out of all admitted neonates, 82.6 percent neonates got successfully discharged, and 6.7 percent neonates expired.

The present study was undertaken to study different types of morbidities with which neonates are getting admitted in SNCUs, mortality associated with them, and their treatment outcomes.

Objectives

1. To study the morbidity patterns and treatment outcomes in neonates managed in Sick Newborn Care Units of Lucknow
2. To suggest measures (if, any) to improve the services provided for management of neonates in Sick Newborn Care Units.

Material and Methods

Study area: The study was conducted in district Lucknow of Uttar Pradesh.
Study duration: The study was conducted from September 2018 to August 2019.
Study unit: Neonates admitted in Sick Newborn Care Units of Lucknow district.
Study setting: Sick Newborn Care Units of Lucknow.
Study Design: A descriptive cross-sectional study.

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Inclusion criteria

1. Neonates less than 28 days admitted in SNCUs directly or referred in during the study period.
2. Mothers who consented to be a part of the study.

Exclusion criteria

1. Babies more than 28 days of age on the first day of admission.
2. Non-cooperative mothers.
3. Newborns who were brought dead with no documented diagnosis.

Sampling technique

Out of five government SNCUs in district Lucknow, three were randomly selected for the study:

1. Veerangana Avanti Bai Mahila Chikitsalaya, Lucknow.
2. Queen Mary Hospital, King George's Medical University, Lucknow.
3. Lok Bandhu Shri Raj Narayan Combined Hospital, Lucknow.

Prior permission was taken from the Chief Medical Superintendent of the hospital/Head of the Department/In-charge of the respective SNCUs. Weekly, three days were randomly selected and random visit was made to each SNCU's per week for data collection. Neonates admitted on the day of visit to SNCU (excluding those who were already enrolled in the study) and fulfilling inclusion criteria were selected for that particular day. The objectives of the study were briefed to the mothers of those selected neonates in local language and informed consent was obtained for the interview. Data was collected from the subsequent mothers in-case of refusal during the interview. Complete confidentiality and anonymity of the respondents was ensured. Clinical records of neonates were utilized for collection of information e.g. birth weight, age and weight on admission, final diagnosis, duration of stay, intervention given, final outcome, age and weight at discharge etc. Study outcomes were obtained at the time of discharge. Data collection was continued until the desired sample size was reached.

Sample size estimation

The sample size was calculated using the following formula-
$n = \{(Z_{1-\alpha/2})^2 \text{ xp x } q/d^2\}$

Where,
q = 1-p
n = Sample size
Z = Value of z statistic at α level of significance. Here, for level of significance of 5%, value of z is 1.96.
p = Prevalence
d = Allowable error, taken here as 2.2%.

Prevalence of least occurring morbidity in neonates (Congenital malformation) admitted in SNCUs for Uttar Pradesh was found to be 4% (inborn + outborn) [10]. With 10% of non-response rate, sample for the study was calculated to be 336. Finally, 360 neonates were

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included in the study.

Pre-testing of interview schedule

The designed schedule was pretested on 10 percent of the total sample. Relevant modifications were made in the schedule to overcome the difficulties faced during pretesting. Result of pre-test was not included in the final study.

Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 24. Descriptive statistics such as mean, standard deviation (SD) for continuous variables and frequencies, proportions for categorical variables were used to present study results. Association between variables was determined using Chi Square test, Fisher's exact test. The level of significance was set at 0.05 at confidence interval of 95%.

Results

Out of 360 neonates, most (67.5%) of them were Hindu by religion, most of (61.9%) them belonged to unreserved category, three-fourth belonged to joint families and almost one-third (33.6%) belonged to Lower Socio-economic class. Relation between type of category and type of admission was found to be statistically significant. (Table 1)

Tables

Table 1: Socio-demographic profile of families of Neonates admitted in Sick Newborn Care Units

Characteristics	Direct Admission (n = 237)	Referred From		Total (N = 360)	p-value
		Other Health Facility (n = 92)	Community (n = 31)		
	n (%)	n (%)	n (%)	n (%)	
Religion					
Hindu	155 (65.4)	72 (78.3)	16 (51.6)	243 (67.5)	0.305
Muslim	79 (33.3)	20 (21.7)	12 (38.7)	111 (30.8)	
Others	3 (1.3)	0	3 (9.7)	6 (1.7)	
Category (NFHS-4)					
SC/ST	19 (8.0)	27 (29.3)	3 (9.7)	49 (13.6)	< 0.001
Other Backward Class	58 (24.5)	17 (18.5)	13 (41.9)	88 (24.4)	
Unreserved	160 (67.5)	48 (52.2)	15 (48.4)	223 (61.9)	
Type of family					
Nuclear	57 (24.1)	22 (23.9)	8 (25.8)	87 (24.2)	0.943
Joint	180 (75.9)	70 (76.1)	23 (74.2)	273 (75.8)	
Socioeconomic Status (Revised BG Prasad Scale for 2019)					
Class I (Upper)	12 (5.1)	7 (7.6)	2 (6.5)	21 (5.8)	0.182
Class II (Upper middle)	31 (13.1)	5 (5.4)	4 (12.9)	40 (11.1)	
Class III (Middle)	38 (16.0)	11 (12.0)	10 (32.3)	59 (16.4)	
Class IV (Lower middle)	71 (30.0)	36 (39.1)	12 (38.7)	119 (33.1)	
Class V (Lower)	85 (35.9)	33 (35.9)	3 (9.7)	121 (33.6)	

Most (65.8%) of the neonates were directly admitted to SNCU's, whereas 25.6 percent were referred from other health facilities and 8.6 percent were referred from the community. Most

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(58.1%) of them were from urban area. Statistically significant relation was found between type of admission to SNCUs and place of residence (Table 2).

Table 2: Distribution of Neonates according to the Type of admission to Sick Newborn Care Units

Type of admission	Rural (n = 151)	Urban (n = 209)	Total (N = 360)	p-value
	n (%)	n (%)	n (%)	
Direct Admission	88 (58.3)	149 (71.3)	237 (65.8)	0.018
Referred from other Health Facility	50 (33.1)	42 (20.1)	92 (25.6)	
Referred from Community	13 (8.6)	18 (8.6)	31 (8.6)	
Total	151 (41.9)	209 (58.1)	360 (100)	

Out of 360 neonates, males (57.8%) were more than females (42.2%). Most (55.6%) of the neonates belonged to birth order first and mean birth order was observed to be 1.69 ± 0.945. Majority (51.4%) of the neonates had birth weight in the range of 1.5 to 2.5 kg. Median birth weight of neonates was 2.12 kg (IQR = 3.61). Association of birth weight of neonates with type of admission was found to be statistically significant. Majority (55.6%) of neonates were term, 81.70 percent were singleton and 39.4 percent had birth spacing of less than 3 years. (Table 3)

Table 3: Distribution of Newborns admitted in Sick Newborn Care Units according to Birth Characteristics

Characteristics	Direct Admission (n = 237)	Referred From		Total (N = 360)	p-value
		Other Health Facility (n = 92)	Community (n = 31)		
	n (%)	n (%)	n (%)	n (%)	
Gender[&]					
Male	131 (55.3)	57 (62.0)	20 (64.5)	208 (57.8)	0.182
Female	106 (44.7)	35 (38.0)	11 (35.5)	152 (42.2)	
Birth order[&]					
1st	138 (58.2)	44 (47.8)	18 (58.1)	200 (55.6)	0.359
2nd	60 (25.3)	29 (31.5)	7 (22.6)	96 (26.7)	
3rd and above	39 (16.5)	19 (20.6)	6 (19.4)	64 (17.8)	
Mean birth order ± SD[#]	1.63 ± 0.904	1.78 ± 0.90	1.87 ± 1.31	1.69 ± 0.945	0.102
Median birth order (IQR)	1 (5)	2.0 (3)	1.0 (4)	1 (5)	
Birth weight (in Kg)[$]					
< 1	2 (0.8)	1 (1.1)	0	3 (0.8)	0.009[@]
1 - < 1.5	48 (20.3)	7 (7.6)	3 (9.7)	58 (16.1)	
1.5- < 2.5	120 (50.6)	48 (52.2)	17 (54.8)	185 (51.4)	
≥ 2.5	67 (28.3)	36 (39.1)	11 (35.5)	114 (31.7)	
Mean birth weight of neonates ± SD[#]	2.12 ± 0.71	2.32 ± 0.62	2.27 ± 0.69	2.19 ± 0.69	0.016[@]
Median birth weight of neonates (IQR)	2.06 (3.61)	2.34 (3.00)	2.27 (2.51)	2.12 (3.61)	

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Gestational age at birth (in completed weeks)[&]					
< 37 (Pre-term)	112 (47.3)	36 (39.1)	12 (38.7)	160 (44.4)	0.235
37- < 42 (Term)	125 (52.7)	56 (60.9)	19 (61.3)	200 (55.6)	
No. of gestations or no. of babies delivered[&]					
Singleton	187 (78.9)	83 (90.2)	24 (77.4)	294 (81.7)	0.06
Twins	50 (21.1)	9 (9.8)	7 (22.6)	66 (18.3)	
Birth spacing with previous child (in completed years)[&]					
	(n = 99)	**(n = 48)**	**(n = 13)**	**(N = 160)**	
1-< 3	36 (36.4)	22 (45.8)	5 (38.5)	63 (39.4)	0.349
3-< 5	28 (28.3)	16 (33.3)	3 (23.1)	47 (29.4)	
≥ 5	35 (35.4)	10 (20.8)	5 (38.5)	50 (31.3)	

[@]p value < 0.05 [&]Chi square test [$]Fisher's exact test [#]Independent T test

Most (50.6%) of the neonates were less than one day at the time of admission and mean age at the time of admission was 2.96 days ± 3.81 days. Out of all admissions, more than half (56.9%) of the neonates had weight in the range of 1.5-2.5 kg at the time of admission with a mean of 2.16 kg ± 0.69kg. Statistically significant relation was observed between type of admission and age, mean age and mean weight at the time of admission. (Table 4)

Table 4: Distribution of Newborns admitted in Sick Newborn Care Units according to Age and Weight Characteristics

Characteristics	**Direct Admission (n = 237)**	**Referred From**		**Total (N = 360)**	**p-value**
		Other Health Facility (n = 92)	**Community (n = 31)**		
	n (%)	**n (%)**	**n (%)**	**n (%)**	
Age on Admission (in days) [&]					
< 1	140 (59.1)	35 (38.0)	7 (22.6)	182 (50.6)	< 0.001[@]
1-< 3	42 (17.7)	19 (20.7)	4 (12.9)	65 (18.1)	
3-< 7	48 (20.3)	20 (21.7)	10 (32.3)	78 (21.7)	
7 and above	7 (3.0)	18 (19.6)	10 (32.3)	35 (9.7)	
Mean age on admission ± S.D[#]	2.02 ± 1.93	4.34 ± 5.26	6.10 ± 6.13	2.96 ± 3.81	< 0.001[@]
Median age on admission (IQR)	1 (14)	2 (28)	5 (26)	1 (28)	
Weight on Admission (in Kgs) [$]					
< 1.5	38 (16.0)	8 (8.7)	4 (12.9)	50 (13.9)	0.120
1.5 – < 2.5	136 (57.4)	52 (56.5)	17 (54.8)	205 (56.9)	
2.5 - < 4	60 (25.3)	32 (34.8)	10 (32.3)	102 (28.3)	
≥ 4	3 (1.3)	0	0	3 (0.8)	
Mean weight on admission ± S.D[#]	2.11 ± 0.702	2.28 ± 0.62	2.22 ± 0.74	2.16 ± 0.69	0.042[@]
Median weight on admission (IQR)	2.04 (3.61)	2.26 (3.00)	2.06 (2.56)	2.1 (3.61)	

[#]Independent T test [@]p value < 0.05 [&]Chi square test [$]Fisher's exact test

Regarding type of intervention received by neonates during their course of treatment, majority (50.8%) received mechanical ventilation, 42.8% received KMC and 31.7 percent received phototherapy (Table 5). Association of type of intervention with type of admission was found to be statistically significant in case of KMC and mechanical ventilation. (Table 5)

Table 5: Distribution of Newborns admitted in Sick Newborn Care Units according to the Type of Intervention Received

Type of Intervention given*	Direct Admission (n = 237)	ReferredFrom		Total (N = 360)	p-value
		Other Health Facility (n = 92)	Community (n = 31)		
	n (%)	n (%)	n (%)	n (%)	
Kangaroo Mother Care[&]	115 (48.5)	28 (30.4)	11 (35.5)	154 (42.8)	0.002[@]
Phototherapy[&]	77 (32.5)	24 (26.1)	13 (41.9)	114 (31.7)	0.641
Mechanical Ventilation[&]	107 (45.1)	60 (65.2)	16 (51.6)	183 (50.8)	0.003[@]

*Multiple responses, [&]Chi square test, [@]p value < 0.05

Out of all admissions, maximum (27.8%) neonates were of Low birth weight, followed by 22.2% neonatal jaundice, 16.7% birth asphyxia, 15.8% neonatal sepsis, 11.4% prematurity and 2.8% with major congenital malformations. Among males, maximum (22.1%) neonates had neonatal jaundice whereas among females, maximum (38.8%) were Low birth weight. Statistically significant relation was observed between Low birth weight and sex of newborn admitted in SNCUs. (Table 6)

Table 6: Distribution of Newborns admitted in Sick Newborn Care Units according to the presence of Morbidity

Morbidity*	Male (n = 208)	Female (n = 152)	Total (N = 360)	p-value
	n (%)	n (%)	n (%)	
Low Birth Weight[&]	41 (19.7)	59 (38.8)	100 (27.8)	< 0.001[@]
ELBW[$]	1 (0.5)	1 (0.7)	2 (0.6)	1.000
Prematurity[&]	19 (9.1)	22 (14.5)	41 (11.4)	0.115
SGA[&]	9 (4.3)	9 (5.9)	18 (5)	0.493
RDS[&]	17 (8.2)	7 (4.6)	24 (6.7)	0.180
TTN[$]	5 (2.4)	3 (2.0)	8 (2.2)	1.000
Birth Asphyxia[&]	40 (19.2)	20 (13.2)	60 (16.7)	0.127
Neonatal Sepsis[&]	32 (15.4)	25 (16.4)	57 (15.8)	0.785
Convulsions of Newborn[$]	7 (3.4)	3 (2.0)	10 (2.8)	0.528
Neonatal Jaundice[&]	46 (22.1)	34 (22.4)	80 (22.2)	0.955
DIC[$]	0	1 (0.7)	1 (0.3)	0.422
Hypothermia of Newborn[$]	2 (1.0)	5 (3.3)	7 (1.9)	0.138
Environmental Hyperthermia of Newborn[$]	5 (2.4)	4 (2.6)	9 (2.5)	1.000
Neonatal Hypoglycaemia[$]	1 (0.5)	0	1 (0.3)	1.000
Neonatal aspiration of meconium[&]	7 (3.4)	5 (3.3)	12 (3.3)	0.968
Primary sleep apnea of newborn[$]	3 (1.4)	0	3 (0.8)	0.266
HIE of newborn[$]	6 (2.9)	1 (0.7)	7 (1.9)	0.246
Meningitis[$]	1 (0.5)	1 (0.7)	2 (0.6)	1.000
Major congenital malformation[$]	7 (3.4)	3 (2.0)	10 (2.8)	0.528
Acquired pneumonia[$]	0	1 (0.7)	1 (0.3)	0.422
Hemolytic disease of newborn[$]	1 (0.5)	0	1 (0.3)	1.000
Acute renal failure[$]	2 (1.0)	0	2 (0.6)	0.511
Shock[$]	1 (0.5)	0	1 (0.3)	1.000

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[@]p-value < 0.05, *Multiple responses, [&]Chi square test, [$]Fisher's exact test

Majority (88.1%) of neonates were successfully discharged after admission to SNCUs. 6.4 percent went into LAMA, 3.1 percent got expired and 2.5 percent were referred to higher centres. (Table 7)

Table 7: Distribution of Neonates admitted to SNCUs according to the Treatment Outcome

Treatment Outcome[$]	Direct Admission (n = 237)	Referred From		Total (N = 360)	p-value
		Other Health Facility (n = 92)	Community (n = 31)		
	n (%)	n (%)	n (%)	n (%)	
Successfully discharged	209 (88.2)	82 (89.1)	26 (83.9)	317 (88.1)	0.156
LAMA	14 (5.9)	6 (6.5)	3 (9.7)	23 (6.4)	
Referred (to higher centre)	4 (1.7)	4 (4.3)	1 (3.2)	9 (2.5)	
Expired	10 (4.2)	0 (0.0)	1 (3.2)	11 (3.1)	

[$]Fisher's exact test

Most (27.3%) of the neonatal deaths were due to respiratory distress syndrome of newborn, 18.2 percent deaths were due to Extremely low birth weight and birth asphyxia each. Neonate referred from community died of respiratory distress. (Table 8)

Table 8: Distribution of Newborns admitted in Sick Newborn Care Units according to Cause of Death

Cause of death	Direct Admission (n = 10)	Referred from Community (n = 1)	Total (N = 11)
	n (%)	n (%)	n (%)
Low Birth Weight	1 (10)	0 (0.0)	1 (9.1)
ELBW	2 (20)	0 (0.0)	2 (18.2)
RDS	2 (20)	1 (100)	3 (27.3)
Primary sleep apnea of newborn	1 (10)	0 (0.0)	1 (9.1)
Birth Asphyxia	2 (20)	0 (0.0)	2 (18.2)
HIE	1 (10)	0 (0.0)	1 (9.1)
Shock	1 (10)	0 (0.0)	1 (9.1)

Abbreviations

SNCUs: Sick Newborn Care Units.
KMC: Kangaroo Mother Care.
ELBW: Extremely Low Birth Weight.
SGA: Small for Gestational Age.
RDS: Respiratory Distress Syndrome of Newborn.
TTN: Transient Tachypnoea of Newborn.
DIC: Disseminated Intravascular Coagulation.
HIE: Hypoxic Ischemic Encephalopathy of newborn.
KMC: Kangaroo Mother Care.

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Discussion

In the present study, it was observed that out of 360 neonates admitted to SNCUs, 237 (65.8%) were directly admitted and 123 (34.2%) were referred either from health facility or community. Hedstrom A *et al*., (2014) [11] in their study showed similar (68%) findings with respect to rate of direct admission to SNCUs.

In the present study, out of 360 neonates, males (57.8%) outnumbered females (42.2%). Similar findings were observed in a study done by Adhikari S *et al*., (2017)[9] which showed that out of total admitted neonates, males were 57.55 percent and females constituted 42.45 percent of the total neonates. Mean birth weight of neonates was 2.19 kg ± 0.69 kg. Similar findings were seen in a study done by Manzar N *et al*., (2012)[12]which showed that admitted neonates had mean birth weight of 2.42 kg ± 1.5 kg.

Overall mean age of neonates at the time of admission was 2.96 days ± 3.81 days. Ekwochi U *et al*., (2014) [13] in their study showed that mean age of admitted neonates at the time of admission was 1.57 days. Majority of (90.4 percent) neonatal admissions were during the first week of life. Almost half (50.6%) of the neonates were admitted within first 24 hours, followed by 21.7 percent within 3 to 7 days after birth. Tran H.T *et al*., (2015) [14] in their study showed that out of all the admitted neonates, more than 70 percent neonates got admitted within first 7 days of life, and nearly 50 percent neonates got admitted within first 24 hours of life. Only 9.7 percent were admitted on 7th day or above after birth.

50.8 percent of the admitted neonates received Mechanical ventilation, 42.8 percent neonates received Kangaroo Mother Care and 31.7 percent neonates received Phototherapy. Kokeb M *et al*., (2016) [15] in their study showed that out of total admitted neonates, 54.8 percent neonates received oxygen as an intervention. Phototherapy was administered to 23.7 percent neonates.

In the present study, out of total 360 neonates, majority (27.8%) were diagnosed with Low birth weight. Second most common (22.2%) diagnosis was neonatal jaundice. Next comes birth asphyxia (16.7%), neonatal sepsis (15.8%), prematurity (11.4%), RDS (6.7%), SGA (5%), neonatal aspiration of meconium (3.3%), convulsions of newborn and major congenital malformation (2.8% each). Similar findings were seen in a study done by Nahar J *et al*., (2007) [16] which showed that out of361 admitted neonates, 23.3 percent neonates were diagnosed with jaundice, 10.8 percent neonates were diagnosed with severe perinatal asphyxia, 6.4 percent neonates were diagnosed with respiratory distress syndrome.

Majority (88.1%) of the neonates were successfully discharged, 6.4 percent left against medical advice, 2.5 percent were referred to higher centre and 3.1 percent expired. Adhikari S *et al*., (2017) [9] in their study showed that out of all admitted neonates, 82.6 percent neonates got discharged after having got treated, 9.7 percent of the total neonates left against medical advice, 6.7 percent neonates expired and 1 percent neonates got referred to other higher centres.

Most (27.3%) of the neonatal deaths were due to Respiratory distress syndrome of newborn, followed by Extremely low birth weight (18.2%) and birth asphyxia (18.2%). Low birth weight (9.1%), Primary sleep apnea of newborn (9.1%), Hypoxic Ischemic Encephalopathy of newborn (9.1%) and shock (9.1%) were other contributors to death. Hussain S (2014) [17] in his study showed that out of all neonatal deaths, Birth asphyxia constituted 21.81 percent of neonatal deaths. Ravikumar S. A *et al*., (2018) [18] in their study showed that primary causes of death were respiratory syndrome (in 33.6%), next comes birth asphyxia (in 25.3%). Birth asphyxia, Jaundice, prematurity, neonatal sepsis and respiratory problems were primary causes of morbidity as well as mortality. More than half (54.6%) of total neonatal deaths occurred within first 7 days of life. Tran H.T *et al*., (2015) [14] in their study showed that out of all deaths in admitted neonates, 57 percent neonatal deaths took place within first 7 days of life. The above mentioned findings by different researchers were in accordance with the findings in the present study.

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Conclusion

In the present study, it was found that nutrition in mothers of lower socioeconomic status should be taken care of so that their newborn admissions in SNCUs can be decreased. As most of the babies getting admitted to SNCUs are getting successfully discharged, so, the community needs to be informed and made aware of existence and functioning of SNCUs, so that they can approach SNCUs for their sick newborns. Association of gestational age of neonates with outcome was statistically significant. The results of the study indicated that all health care providers need to be extensively trained on sick newborn care. Women need to be educated more on neonatal and early neonatal care. Health workers and IEC materials should play role in promoting community to follow appropriate newborn care practices.

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