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Morbidity and Mortality Among Neonates Admitted to a Neonatal Intensive Care Unit of a Tertiary Care Teaching Hospital of Jammu and Kashmir (India)

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Abstract

Context: World over, four million newborn babies die in the first month of life out of which India contributes to about 1.2 million deaths every year. India thus accounts for a quarter of global neonatal deaths and thus faces the biggest newborn health challenge of any country in the world.

Aims: The study was under taken with the objective to determine the morbidity and mortality pattern of among the neonates admitted to a NICU.

Settings and design: The study was conducted at Neonatal Intensive Care Unit of Sher-i-Kashmir Institute of Medical Sciences Srinagar (Jammu & Kashmir). This NICU is a level-III NICU center is a tertiary health care institute, where most of the babies referred are high-risk babies.

Methods and material: For the objective a descriptive case series, hospital based prospective study was conducted at NICU of SKIMS Srinagar w.e.f. 1st Jan-31st Dec 2013 by following neonates from admission to discharge, LAMA or death collecting the data by using a predesigned standardized proforma.

Statistical analysis used: The data collected was analyzed by SPSS version 20 and the frequency and percentages of various parameters of morbidity and mortality were calculated.

Results: 1017 neonates were admitted in the NICU during the year 2013. Neonatal Jaundice (NNJ) (26.7%) was the most common cause of admission to NICU followed by Septicemia (19.1%) and Prematurity (12.5%) whereas Prematurity (24.2%) was the most common cause of death followed by Septicemia (18.2%), Birth Asphyxia (11.1%) and Meconium Aspiration Syndrome (10.1%).

Conclusions: The Neonatal Jaundice (NNJ) was the commonest causes of admission and Prematurity was the most common cause of death and Meconium Aspiration Syndrome was the most common cause of case fatality in NICU in a Tertiary Care Teaching Hospital in Jammu and Kashmir.

Keywords: NICU; Morbidity; Mortality; Fatality; Admission

Introduction

World over, four million newborn babies die in the first month of life-99% in low and middle-income countries every year [1]. In India, 26 million babies are born every year, and 1.2 million die in the first four weeks of life, which accounts for a quarter of global neonatal deaths. India thus faces the biggest newborn health challenge of any country in the world [2]. Neonatal deaths constitute two-thirds of infant deaths in India; 45% of the deaths occur within the first two days of life [3]. The common cause of neonatal mortality in India are asphyxia, prematurity and low birth weight, infections like pneumonia and gastroenteritis and a variety of surgical problems. It has been observed that improved level of newborn care can bring down the mortality rates [4]. While high infant mortality rates were recognized by the British medical community at least as early as the 1860s, modern neonatal intensive care is a relatively recent advance [5]. The neonatal intensive care units have a role in developing countries like India; although neonatal intensive care is among the more expensive services that any health care systems can provide [6]. The cost of establishing a neonatal intensive care unit runs into cores of rupees in India in which equipment cost formed two-thirds of the establishment cost and ancillary personnel salary comprised the largest proportion of the running costs [7]. Neonatal intensive care is cost intensive and rational use of neonatal unit services by targeting its utilization for the very low birth weight neonates and maintenance of community based home-based newborn care is required [8]. High neonatal mortality rate in a country reflects the poor availability of quality and quantity of infrastructure and utilization of neonatal care of that country. Improved neonatal care can lead to increased infant survival. In developing countries where budgetary constraints limit technological

advances, the judicious implementation of neonatal intensive care measures can result in reduction of morbidity and mortality. To determine the burden of neonatal disease, understand patient needs, planning and organization the present study was under taken at SKIMS Srinagar to determine the morbidity and mortality pattern of among the neonates admitted to a NICU. The present study will help us to find out gaps if any in the required infrastructure for NICU of SKIMS Srinagar. The study was under taken with the objective to determine the morbidity and mortality pattern of among the neonates admitted to a NICU.

Methods

This descriptive case series, hospital based prospective study was conducted over a period of one year from with effect from 1st January 2013 to 31st December 2013 in NICU of SKIMS Srinagar (Jammu & Kashmir). This NICU is a level-III NICU center is a tertiary health care institute, where most of the babies referred are high-risk babies. The NICU has facilities of intensive care, ventilation, and exchange transfusion. Facilities available in the NICU include 10 incubators, 2 resuscitaires, and 5 locally constructed phototherapy units. The NICU has 18 cots/beds, with a nurse: Patient ratio which varies from 1:7 in the morning shift to 1:15 during the afternoon and night shifts. In addition, there are usually, 2 Consultants, 1 or 2 Senior Residents, and 2 Junior Residents including PG Residents, covering the neonatal unit depending on the rotations.

The data was collected in a predesigned standardized proforma. The progress of the patient and eventual outcome following the management of the child were also recorded. On arrival in neonatal unit, baby was examined by PG Resident/Senior Resident and then by neonatologist/pediatrician. The neonates were followed from the time of admission up to the time of discharge or LAMA or death. Neonatal data was collected at time of admission and finalized after discharge or LAMA or death. Diagnosis was made primarily on the basis of clinical findings. The diagnostic support from laboratory and radiology was taken to confirm the clinical diagnosis and the diagnosis was modified based if necessary based on the result of the patient's laboratory and radiology findings or clinical response to instituted therapy. Primary disease was considered as final diagnosis even the baby developed complications of primary disease or having more than one disease. WHO definitions were used for prematurity, low birth weight (LBW), very low birth weight (VLBW), extreme low birth weight (ELBW) and congenital malformation. Diagnosis of Pre-maturity was clinical or based on WHO definition for pre-maturity (live born neonates delivered before 37 weeks from 1st day of last menstrual period) and low birth weight with birth weight less than 2500 grams. Weight of neonates was measured using electronic weighing machines having gram as smallest division. Gestational age was calculated from last menstrual period (LMP) and clinical assessment was made by modified Ballard scoring.

The inclusion criteria was all the sick neonates brought alive to neonatal unit with definitive symptomatology and diagnosis. Neonates brought dead to the neonatal unit were excluded from the study. No Financial assistance was taken from any individual or association. Approval for the study was obtained from the hospital's ethical committee. The data collected was analyzed by SPSS version 20 and the frequency and percentages of various parameters of morbidity and mortality were calculated.

Results

The data analysis showed that there were 1017 neonates admitted to NICU during the one-year period of study i.e. 1st January-31st December 2013. The average length of stay (ALS) of the neonates admitted to NICU was 5.7 days. The average age on admission of the neonates was 4.84 days. The age wise distribution of admitted neonates revealed that about four-fifth (79.4%) of the neonates were in the age group of 0-7 days. About one-fifth (20.6%) of the neonates admitted were in the late neonatal period. Majority of neonates were males (58%). The ratio of males (58%) and female (42%) neonates was 1:0.7. It was observed that the average gestational age of the neonates admitted to NICU was 36.15 weeks. The minimum and maximum gestational age of the neonates was 25 and 43 weeks respectively. Majority (60.6%) of the neonates were born at full term of gestation. The study showed that the average weight on admission of the neonates was 2525.7 grams. The minimum and maximum weight of the admitted neonate was 920 and 4350 grams respectively. Majority (58.3%) of the neonates were of normal weight (2500-3500 grams). Most (90%) of the neonates were born in health institutions. The study also showed that two-third (71.8%) of the neonates belonged to joint families whereas about one-third (28.2%) belonged to nuclear type of families. The distribution of neonates according to dwelling place revealed that two-third (68.3%) of the neonates admitted to NICU belonged to the families living in rural dwelling areas whereas approximately one-third (31.7%) belonged to the families living in urban dwelling areas (Table 1).

Characteristic	Variable	Frequency (N)	Percentage (%)
Age of the neonate on admission	0-7 days	808	79.4
	8-14 days	124	12.2
	15-21 days	64	6.3
	22-28 days	21	2.1
Neonatal Period	Early (0-7 days)	808	79.4
	Late (8-28 days)	209	20.6
Gender	Male	590	58
	Female	427	42

Gestational Age at birth	Pre-term (<37 weeks)	392	38.5
	Full Term (37-42 weeks)	616	60.6
	Post-term (>42 weeks)	9	0.9
Weight on admission	High Weight (>4000 g)	17	1.7
	Normal Weight (2500-4000 g)	593	58.3
	Low Weight (1500-2499 g)	335	32.9
	Very Low Weight (1000-1499 g)	68	6.7
	Extremely Low Weight (<1000 g)	4	0.4
Place of delivery	Health Institution	915	90
	Home	102	10
Type of family	Joint Family	730	71.8
	Nuclear Family	287	28.2
Dwelling Place	Rural	695	68.3
	Urban	322	31.7
Grand Total		1017	100

Table 1: Socio-demographic distribution of neonates admitted to NICU.

Disease	Frequency (N)	Percentage (%)
Neonatal Jaundice (NNJ)	272	26.7
Septicemia	194	19.1
Prematurity	127	12.5
Birth Asphyxia	71	7
Respiratory Distress Syndrome (RDS)	58	5.7
Hypernatremic Dehydration	43	4.2
Hypoglycemia	40	3.9
Seizure Disorder	35	3.4
Transient Tachypnoea of Neonates (TTN)	33	3.2
Meconium Aspiration Syndrome (MAS)	30	2.9
Congenital Anomalies	26	2.6
Pneumonia	24	2.4
Polycythemia	19	1.9
Meningitis	14	1.4
Diarrhea	8	0.8
Others	23	2.3
Grand Total	1017	100

Table 2: Patterns of disease among neonates admitted to NICU.

The data analysis for the morbidity showed that the Neonatal Jaundice (NNJ) (26.7%) was the most common cause of admission to NICU followed by Septicemia (19.1%) Prematurity (12.5%), Birth Asphyxia (7%) and Respiratory Distress Syndrome (RDS) (5.7%) (Table 2). The data was analyzed for outcome of the total admitted neonates during the study period. It was observed that out of 1017 neonates admitted most were discharged (90.07%) whereas as 9.73% expired and only 0.2% left against medical advice (LAMA) (Table 3).

Outcome	Frequency (N)	Percentage (%)
Discharged	916	90.07
Expired	99	9.73
LAMA	2	0.2
Grand Total	1017	100

Table 3: Outcome of the neonates who were admitted to NICU.

The mortality among the neonates admitted to NICU was studied and it was found that prematurity (24.2%) followed by Septicemia (18.2%), Birth Asphyxia (11.1%), Meconium Aspiration Syndrome (10.1%) and Respiratory Distress Syndrome (9.1%) were the top five major contributors to the mortality (Table 4). There were 1017 neonates admitted out of which the two (2) neonates that left against medical advice (LAMA). Being insignificant in numbers these two neonates were excluded from further analysis for the case fatality rate.

Congenital Anomalies	Total	Expired	Mortality Rate
Neonatal Jaundice (NNJ)	272	2	2
Septicemia	194	18	18.2
Prematurity	127	24	24.2
Birth Asphyxia	71	11	11.1
Respiratory Distress Syndrome (RDS)	58	9	9.1
Hypernatremic Dehydration	43	2	2
Hypoglycemia	40	1	1
Seizure Disorder	35	1	1
Transient Tachypnoea of Neonates (TTN)	33	3	3
Meconium Aspiration Syndrome (MAS)	30	10	10.1
Congenital Anomalies	26	6	6.1
Pneumonia	24	2	2
Polycythemia	19	1	1
Meningitis	14	1	1
Diarrhea	8	0	0
Others	23	8	8.1
Grand Total	1017	99	100

Table 4: Showing disease wise mortality pattern among neonates admitted to NICU.

The data was analyzed for the case fatality rate and it was observed that out of 1015 neonates it was observed that case fatality rate was more in MAS (33.3%) followed by Congenital Anomalies (23.1%), Prematurity (18.9%), Birth Asphyxia (15.5%), RDS (15.5%), Septicemia (9.3%), TTN (9.1%) and Pneumonia (8.3%), Meningitis (7.1%), Polycythemia (5.3%). The Chi-squared test ($\chi 2$) was 89.49585 (df=15) and the two-tailed p-value was less than 0.0001 indicating that disease type is very strongly associated ($p<0.0001$) with the outcome i.e. discharge or death of a neonate (Table 5).

Disease	Outcome				Total	
	Discharged		Expired			
	N	%	N	%	N	%
NNJ	269	99.3	2	0.7	271	100
Septicemia	176	90.7	18	9.3	194	100
Prematurity	103	81.1	24	18.9	127	100
Birth Asphyxia	60	84.5	11	15.5	71	100
RDS	49	84.5	9	15.5	58	100
Hypernatremic Dehydration	40	95.2	2	4.8	42	100
Hypoglycemia	39	97.5	1	2.5	40	100
Seizure Disorder	34	97.1	1	2.9	35	100
TTN	30	90.9	3	9.1	33	100
Meconium Aspiration Syndrome	20	66.7	10	33.3	30	100
Congenital Anomalies	20	76.9	6	23.1	26	100
Pneumonia	22	91.7	2	8.3	24	100
Polycythemia	18	94.7	1	5.3	19	100
Meningitis	13	92.9	1	7.1	14	100
Diarrhea	8	100	0	0	8	100
Others	15	65.2	8	34.8	23	100
Total	916	90.2	99	9.8	1015	100

Table 5: Showing disease wise case fatality rate of the neonates admitted to NICU.

Discussion

Accurate data on the neonatal disease volume and pattern are useful for many reasons. It is important for the providers of care, investigators, local and national health administrators, and for decision makers to design interventions for prevention and treatment and to implement and evaluate health care programs.

The data from NICUs of hospitals in India is very limited and there are very few published reports from these hospitals. Perhaps this is the first published data concerning Neonatal Intensive Care Unit issue in Jammu and Kashmir. This is a hospital-based study and may not present what is going on in the community. So, the results of this study should be compared cautiously with other similar studies, because NICU of SKIMS Srinagar doesn't have a birthing site and only out-born neonates are admitted here.

This one-year prospective study was done in order to document the most common type of diseases with which the neonates are admitted, treatment/interventions the neonates received and outcome of those neonates admitted in the Neonatal Intensive Care Unit (NICU) of SKIMS Srinagar.

It was found that a total of 1017 neonates were admitted in the NICU during the period of study i.e. 1St Jan-31st Dec 2013. Only out born neonates are admitted in SKIMS Srinagar. The volume of patients admitted was similar to various national and international studies.

A study conducted by Aijaz et al. [9] at Karachi found that the average length of stay (ALS) was 6.5 days whereas the average length of stay (ALS) of the neonates admitted to NICU in our study was 5.7 days which is lesser. Aijaz et al. [9] also found that the average age of admission was 3.5 days whereas it was 4.84 days in our study.

A study by Anjum, et al. [10] found that 85% neonates were in the age group of 0-7 days followed by 6% in 8-14 days age group. The age wise distribution of admitted neonates in our study revealed that most the neonates were in the age group of 0-7 days (79.4%) group followed by 12.2% in 8-14 days age group. Thus the findings of our study were similar to the study by Anjum, et al. [10].

In our study it was observed that about one-fifth (79.4%) of the admitted neonates were in the early neonatal period group and about one-fourth (20.6%) presented in late neonatal period for admissions which is similar to a study by Anjum, et al. [10]. These findings are logical and expected as neonates in early neonatal period are at risk of contracting diseases and at risk neonates are identified by healthcare workers immediately if they are born in hospitals.

Our study also showed that males (58%) outnumber their female (42%) counterparts. It is consistent with local literature reported by Kumar et al. [11] (60% male versus 40% female) and international

studies from Pakistan by Seyal et al. [12] (59.55% male versus 40.5% female) and by Ugwu GiMG [13] of Nigeria (54.3% male versus 45.7% female).

The ratio of males (590) and female (427) neonates was 1:0.7 almost similar to a study conducted by Nahar et al. [14]. In contrast to our findings, Aijaz et al. [9] found that the female's babies outnumbered their male's counterpart with a ratio of 2:1.3.

The average age of gestation of neonates was 36.15 week which was similar to a study conducted by Nahar et al. [14] in which it was 35.6 ± 3.4 weeks.

In this study about two-third of the neonates were of full term (60.6%) gestation and one-third were preterm (38.5%) which was similar to another study conducted by Gauchan et al. [15] in which there were 67.5% term babies and 31.3% preterm babies. In contrast to our findings a study conducted by Seyal et al. [12] found that 42.8% neonates were preterm. Our findings are understandable because probably Janani Suraksha Yojana (JSY) and Janani Shishi Sawasthaya Karyakram (JSSK) Scheme of National Rural Health Mission (NRHM) has enhanced the Ante-natal check up, hospital deliveries and neonatal care among the general population.

The average weight of the neonates on admission in our study was 2525.7 grams which was similar to a study conducted by Nahar et al. [14] in which it was 2420 ± 808 gm. The weight parameter analysis revealed that the number of neonates having weight Extremely Low Weight (<1000 grams), Very Low Weight (1000-1499 grams) and Low Weight (1500-2499 grams), Normal Weight (2500-4000 grams) and High Weight (>4000 g) was 0.4%, 6.7% and 32.9%, 58.3% and 1.7% respectively. The results of our study are comparable to a similar study done by Hussain [16] which revealed that 2.25% were <1000 grams, 12.2% were between 1000-1499 gram, 39.35% were between 1500-2499 grams, 42.25% between 2500-4000 grams, and 3.95% were more than 4000 g. The weight parameter analysis by Rahim et al. [17] found that the number of babies with Extremely Low Birth Weight (ELBW), Very Low Birth Weight (VLBW) and Low Birth Weight (LBW) was 0.17% and 4.66% and 41.20% respectively.

Our study also revealed that most of the admitted neonates were delivered in health institutions (90%) and only small number was delivered at home (10%). The findings of our study are comparable the findings of Rahim et al. [17] and Seyal et al. [12] studies. Rahim et al. [17] at Khyber Teaching Hospital Peshawar found that 27.03% of the neonates were homes delivered whereas Seyal et al. [12] at Sir Ganga Ram Hospital Lahore found that only 3.9% were delivered at home. Nahar et al. [14] found that most of the babies were born in hospital (83%) whereas Jan et al. [18] found that 66% were delivered at hospital, 28% were delivered in home and 6% were delivered at other place. The findings of more number of health institution deliveries in our study are probably due to Janani Suraksha Yojana and Janani Shishu Sawasthaya Karyakram Scheme of National Rural Health Mission.

It was also found in our study that approximately two-third (71.8%) of the neonates belonged to joint family background whereas about one-third (28.22%) were of nuclear family background which is understandable in keeping with the traditional family system i.e. joint family system in Kashmir. It was also found that about two-third (68.3%) of the neonates were of rural background whereas about one-third (31.7%) were of urban background which is logical in keeping with the geographical situation of SKIMS Hospital. This finding is understandable as the rural population outnumbers the urban population in the catchment area of the NICU of SKIMS Srinagar.

It is reasonable to accept that the disease pattern in neonates can change with time and geographical location. Reporting of neonatal disease pattern from time to time contributes to identify deficiencies and assists health planners and workers to pay their due attention. In our study it was observed that most common indication for admission was Neonatal Jaundice (26.7%) similar to other studies by Gauchan, et al. [15] and Narayan [19]. This may probably be due to location of the population at higher altitude in all these studies. In contrast to our study Respiratory Distress Syndrome was the most common cause of admission in Aijaz et al. [9] Study Prematurity was the most common cause of admission in Nahar et al. [14] and Seyal et al. [12] studies. Birth Asphyxia was the most common cause of admission in Anjum ZM and Shamoon [10], Quddusi et al. [20] and Tabassum et al. [21] Studies.

In our study it was also revealed that Neonatal Jaundice (26.7%), Septicemia (19.1%), and Prematurity (12.5%), Birth Asphyxia (7%), Respiratory Distress Syndrome (5.7%) were the top five most common indications for admission to NICU which constitutes about three-fourth of the total admissions. The other indications were Hypernatremic Dehydration (4.2%), Hypoglycemia (3.9%), Seizure disorder (3.2%), Transient Tachypnoea of Neonates (3.2%), Meconium Aspiration Syndrome (2.9%), Congenital Anomalies (2.6%), Pneumonia (2.4%), Polycythemia (1.9%), Meningitis (1.4%) and others.

The type of diseases in our study is similar to other studies conducted by Islam et al. Parkash et al. Nahar et al. Anjum et al. Elhassan et al. Hoque et al. Gauchan et al. Prasad et al. Seyal et al. Narayan et al. Aijaz et al. Quddusi et al. Jan et al. Rahim et al., Ali et al. Tabassum et al., and Hussain [9-12,14-27].

However, the pattern of disease in our study was not similar to the above-mentioned studies, which is probably due to different racial stock and climatic conditions of Kashmir. The major causes of morbidity were prematurity (60.7%), LBW (48.2%), jaundice (23.3%), SPA (10.8%), TTN (10.8%), RDS (6.4%) and sepsis (6.4%) in Nahar et al. [14]. Major indications of admission were birth asphyxia (30%), Neonatal sepsis (30%) and prematurity along with Jaundice, pneumonia, meningitis, congenital heart disease, diarrhea and hemorrhagic disease of newborn in Anjum ZM and Shamoon [10] study. The commonest indications for admission were neonatal Jaundice (24.7%); Sepsis (21.4%) and Perinatal Asphyxia (19.2%) in Gauchan et al. [15] study. In Seyal et al. [12] study the main causes of admission was Prematurity (23.5%), Sepsis (21.9%), Birth Asphyxia (18%) and NNJ (11.3%) respectively. The most common disease was Sepsis (19.9%), followed by Respiratory Distress Syndrome (RDS) (18.9%), Birth Asphyxia (17.02%), Meconium Aspiration Syndrome (15.2%), Neonatal Jaundice (9.44%), Pneumonias (3.46), Hyaline Membrane Disease (3.4%), Congenital Malformations (2.8%) and miscellaneous (4.3%) in Aijaz et al. [9] study. In Quddusi et al. [20] the causes of neonatal admission were Birth Asphyxia (34.5%), Sepsis (28.3%), Preterm RDS (10.4%), Jaundice (6.60%), Pneumonia (4.7%), Prematurity (3.7%), Meconium Aspiration Syndrome (2.07%), Respiratory Distress Syndrome (1.2%), Pulmonary Hypertension (1.29%), Congenital Heart Diseases (1.01%), Meningitis (0.84%), Tetanus Neonatorum (0.7%), Necrotizing Enterocolitis (0.61%), Hemorrhagic disease of newborn (0.5%), Tracheoesophageal fistula (0.42%) and Miscellaneous (3.16%). In a study by Tabassum et al. (2013) [21] Birth Asphyxia (B.A) (47.69%), Preterm babies (18.90%), Sepsis (17.44%), Tetanus (1.35%), Meconium Aspiration Syndrome (MAS) (3.15%) and premature babies (5.17%) were the most common

causes of admission to NICU. In Ali, et al. [27] study Prematurity, infections, Birth asphyxia and NNJ were the main causes of admission to the neonatal unit, at 27.9%, 20.33%, 13%, and 11.3% respectively.

It is essential to know the outcome of the admissions for evaluating the effectiveness of care provided in a hospital setting. There is a great variation in neonatal mortality statistics between NICUs from different parts of the world. This variation probably reflects the difference in the attending population, antenatal care, admission criteria, specific exclusion and inclusion criteria and level of neonatal care.

In our study it was observed that out of 1017 neonates admitted, 916 (90.07%) of the neonates were discharged, 99 (9.73%) died and 2 (0.2%) left against medical advice (LAMA). However, there were only 63 (6.19%) were institutional deaths.

The neonatal mortality (9.73%) in NICU of SKIMS Srinagar is similar to a study conducted by Sarkar, et al. (9.7%), Tariq, et al. (9%). Unlike observations in our study higher rates have been reported by Arafa, et al. (22.4%), Kasirye-Bainda E, et al. (24.6%) Agbere et al. (27%) Aijaz, et al. (13.8%) Islam, et al. (20.6%) Kumar, et al. (13.6%) Hoque et al. (13.8%) Rahim, et al. (14.87%) Parkash, et al. (25.5%), Seyal, et al. (30.9%) and Prasad, et al. (18.69%) [9,11,12,17,22,23,25-32]. Low neonatal mortality rates were found by Sankaran, et al. [33] (4%) and Zullini, et al. [34] (6%) respectively.

The type of diseases contributing of neonatal mortality provides us an indication for the area of neglect and the need to take corrective measures in this regard. Prematurity (24%) followed by Septicemia (18%), Birth Asphyxia (11%), Meconium Aspiration Syndrome (10%) and Respiratory Distress Syndrome (9%) were the top five major contributors to the mortality in our study. The most common cause of neonatal mortality was prematurity in our study which is similar to studies conducted by Nahar, et al. [14], Seyal, et al. [12], Prasad, et al. [26], Narayan [19], and Ali, et al. [27].

Studies by Anjum, et al. [10] and Hoque, et al. [25] have found that birth asphyxia is the most common cause of neonatal mortality.

The type of diseases contributing to mortality in our study are similar to type of diseases observed by other studies conducted at different places nationally and internationally by Nahar, et al. [14], Anjum, et al. [10], Prasad, et al. [26], Hoque, et al. [25], Seyal, et al. [12], Narayan [19], Ali, et al. [27].

The contribution of Prematurity, Septicemia, Congenital Heart Disease, Birth Asphyxia, Meconium Aspiration Syndrome, and Respiratory Distress Syndrome to mortality was not similar to the above mentioned studies which is probably due to different racial stock and climatic conditions of Kashmir.

The case fatality rate of a disease indicates the killing power of that disease and demands breakthrough technology and drugs to reduce the case fatality rate. Our study showed that Meconium Aspiration Syndrome (MAS) (33.3%) followed by Congenital Anomalies (23.1%), Prematurity (18.9%), Birth Asphyxia (15.5%) and Respiratory Distress Syndrome (RDS) (15.5%) were the top five most common conditions having high case fatality rate.

Conclusion

It was found that a total of 1017 neonates were admitted in the NICU during the period of study i.e. 1st Jan-31st Dec 2013. The average length of stay (ALS) of the neonates admitted to NICU was 5.7 days.

Socio demographic profile of the neonates admitted to NICU showed that most of the neonates were in the age group of 0-7 days (79.4). Majority of the neonates were males (58%). The average gestational age of the neonates admitted to NICU was 36.15 weeks with a range of 25-43 weeks. Majority of the neonates admitted were born at full term (60.6%) of gestation. The average weight on admission of the neonates was 2525.7 grams with a range of 920 and 4350 grams. Majority of the neonates were of normal weight (2500-3500 grams) (58.3%). Most of the neonates were born in health institutions (90%). Most of the neonates belonged to joint families (71.8%). Majority of the neonates admitted to NICU belonged to the families living in rural (68.3%) areas. Maximum of the neonates belonged to Srinagar (27.6%) and least belonged to Kulgam (0.8%) district of Kashmir region.

The disease pattern shows that Neonatal Jaundice (NNJ) (26.7%) was the most common cause of admission to NICU followed by Septicemia (19.1%) and Prematurity (12.5%). This study showed age, gender, gestational age, dwelling place, weight, place of delivery, type of family, monthly income of the family, education level of mother, education level of father, occupation of mother, occupation of father and socio-economic class of the family of neonate was very strongly associated ($p<0.001$) with disease pattern.

It was observed that out of 1017 neonates admitted most were discharged (90.07%) whereas as some expired (9.73%) and least left against medical advice (LAMA) (0.2%). Prematurity (24.2%) followed by Septicemia (18.2%), Birth Asphyxia (11.1%), Meconium Aspiration Syndrome (10.1%) and Respiratory Distress Syndrome (9.1%) were the top five major contributors to the mortality. Our study showed that Meconium Aspiration Syndrome (MAS) (33.3%) followed by Congenital Anomalies (23.1%), Prematurity (18.9%), Birth Asphyxia (15.5%) and Respiratory Distress Syndrome (RDS) (15.5%) were the top five most common conditions having high case fatality rate. It was found that the age, gestational age, weight, place of delivery, educational level of mother, education level of father, occupation of mother, occupation of father and socio-economic class, type of disease and type of treatment/intervention was strongly associated ($p<0.001$) with outcome i.e. discharge and death of a neonates. However the gender, dwelling place, type of family and monthly income of families was not associated ($p>0.05$) with outcome i.e. discharge and death of a neonates.

Limitations of Study

This is a hospital based study and may not represent what is going on in community. We were unable to diagnose inborn errors of metabolism due to lack of diagnostic facilities

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Competing Interests:

None.

Ethics Approval

The study was approved by the Ethics Committee of the Sher-i-Kashmir Institute of Medical Sciences Srinagar (Deemed University)

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