



Original Research Article

Study of Profile and Outcome of the Newborns Admitted in Neonatal Intensive Care Unit (NICU) at Tertiary Care Hospital in a City of Maharashtra

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Received: 03/06/2015

Revised: 19/09/2015

Accepted: 24/09/2015

ABSTRACT

Introduction: Neonatal period (0 to 28 days of life) is the most high risk period of life for morbidity and mortality. Almost half of the infant deaths in our country occur within first 28 days of life. India is still among the high infant mortality rate countries.

Objectives: To study the morbidity and mortality pattern of the neonates admitted at tertiary care hospital.

Study design: Cross sectional descriptive study.

Study period: 1st January 2009 to 31st December 2013.

Study Setting: Dr.S.C. government medical college, Nanded, Maharashtra.

Data collection: Data collected from the NICU ward register and the IPD papers.

Data entry: It was done by using MS office - Microsoft Excel – 2007 software.

Statistical analysis: Statistical analysis was carried out with help of statistical measures, such as percentages, proportion, and chi square test using software Graph Pad Prism Version 5.01.

Results: A total of 2682 neonates admitted in NICU in the study period of which 2042 (76%) belong to rural area and 640 (24%) belong to urban area. The major cause of morbidity was Low birth weight baby (29.5%), birth asphyxia with hypoxic ischemic encephalopathy (HIE) (26.8%), Neonatal sepsis (15.1%), congenital anomaly (3.1%). Most of the deaths associated with birth asphyxia with (27.4%), prematurity (22.1%), low birth weight (17%), acute respiratory distress syndrome (13.6%), and septicemia (6.1%).

Conclusion: This study identified Low birth weight, birth asphyxia with hypoxic ischemic encephalopathy and neonatal sepsis are the major cause of morbidity. Birth asphyxia, prematurity, low birth weight, respiratory distress syndrome and septicemia as major contributor to the mortality.

Keywords: profile and outcome of newborn, NICU, Neonatal morbidity and mortality.

INTRODUCTION

Neonatal period (0 to 28 days of life) is the most high risk period of life for morbidity and mortality. Almost half of the infant deaths in our country occur within first 28 days of life. Within the first month, one quarter to one half of all deaths occurs within the first 24 hours of life, and 75% occur in the first week. The 48 hours immediately following birth is the most crucial period for newborn survival. [1] It has been estimated that about 4 million babies die worldwide during the neonatal period annually. [2] Only 2% of these neonatal deaths occur in the developed countries while remaining 98% of the neonatal deaths occur in less developed countries in south Asia and Sub-Saharan Africa. [3] The global burden of neonatal death is primarily concentrated in developing countries, where care of neonates is practically non-existent. [4]

In India alone, of the 25 million babies who are born every year, one million die, accounting for 25% of the mortality around the world. [5] According to the National Family Health Survey - 3 (NFHS-3) report, the current neonatal mortality rate (NMR) in India of 39 per 1,000 live births, accounts for nearly 77% of all the infant deaths (57/1000) and nearly half of the under-five child deaths (74/1000). [6] One of the United Nations Millennium Development Goals is the reduction by two-thirds of the mortality among children <5 years of age by 2015. [7] The extraordinary improvements in child survival over the past 25 years, both in developed and developing countries, has little or no impact on effective health care for the new born in many developing countries. [8] The major causes of neonatal deaths globally were estimated to be infections (25%), pre-term births (31%) and asphyxia (23%), congenital anomaly (7%). India is still among the high infant mortality rate countries (53 in year 2008).

Present study carried out to know the different causes of morbidity in tertiary care hospital so as to take appropriate preventive measures at each level to prevent the morbidity and mortality in the neonatal period.

Objectives:

- 1) Assess the morbidity pattern of the neonates admitted at tertiary care hospital.
- 2) Assess the mortality pattern and causes of mortality.

MATERIALS AND METHODS

Study design: Retrospective cross sectional record based descriptive study.

Study period: 1st January 2014 to 31st July 2014.

Sample Participant: 2682 neonates admitted with some illness during 1st January 2009 to 31st December 2013.

Study Setting: Shri. Guru Gobind Singh Memorial Hospital Nanded is a 550 bed tertiary care government hospital attached with the Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra state. It has separate 40 bed pediatric ward with NICU facility, full time pediatrician, lab facility, X-ray and blood bank facility.

Inclusion criteria: All neonates in age group of 0-28 days admitted in the NICU of the pediatric unit of the Dr. S.C. Govt. Medical College, Nanded during period 1st January 2009 to 31st December 2013.

Exclusion criteria: Neonates admitted whose records are incomplete such as demographic and clinical profile were excluded in the study.

Data collection: Secondary data collected from the NICU ward register and the IPD papers. Secondary data regarding patient's age, sex, type of morbidity, type of delivery, average age at the admission, length of stay, area they belong, type of delivery, Birth weight was collected with prior approval of medical administrator.

Institutional Ethical committee approval:

Ethical approval was obtained from the ethical review committee of the hospital confidentially and anonymity was maintained.

Data entry: It was done by using MS office - Microsoft Excel – 2007 software.

Statistical analysis: Statistical analysis was carried out with help of statistical measures, such as percentages, proportion, and chi square test using software Graph Pad Prism Version 5.01.

RESULTS

Table 1 shows the social and demographic pattern of the babies admitted in the NICU. A total of 2698 neonates admitted in NICU of the tertiary care centre during the 5 year period from 1st January 2009 to 31st December 2013. Out of the 2698 neonates admitted in the study period 16 had incomplete record which is not meeting the inclusion criteria so excluded

from the study and 2682 included in the final analysis. Among admitted neonates male children were 1497 (55.8%) and female children were 1185 (44.2%). The ratio of male to female neonate was 1.25:1. Out of the 2682 neonates admitted in the study period 2042 (76%) belong to rural area and 640 (24%) belong to urban area. Out of the total 2682 neonate 1872 (69.8%) were inborn i.e. from the same institute and 810 (30.2%) were out born i.e. referred from the other institute. Percentage of the neonates with normal delivery was 87.6% and the LSCS was observed in 12.4% of the neonates. Of the 2682 neonates, 36.3 % were admitted within 6 hours of birth and 49.7 % within 72 hours. Fig 1 shows that 76 % of the neonates admitted in the NICU of tertiary care hospital on the day 1 after birth and up to 90% got admitted until day 5. According to availability of the BPL cards on the recorded indoor paper 1254 (46.8%) were APL and 1428 (53.2%) were BPL.

Table 1: Descriptive characteristic of the neonates admitted in NICU (n=2682)

Characteristic	Percentage
Gender	
➤ Male	55.8
➤ Female	44.2
Male : Female	1.26
Mean age at admission in days	2.60 ± 4.05
Place of residence	
➤ Rural	76.1
➤ Urban	23.9
Socioeconomic status	
➤ APL	46.8
➤ BPL	53.2
Gestational age	
➤ Preterm	35.5
➤ Full term	64.5
Mean Birth weight in kilograms	2.08 ± 0.66
Birth weight categories	
➤ Normal (>2500 gm)	34.3
➤ Low birth weight (1500-2499 gm)	46.6
➤ Very low birth weight (1000-1499 gm)	15.7
➤ Extremely low birth weight (<1000 gm)	3.4
Mean Length of stay in NICU in days	2.70± 2.4
Place of delivery	
➤ Own Institute	69.8
➤ Referred from outside	30.2
Type of delivery	
➤ Normal	87.6
➤ LSCS	12.4

Table 2: Morbidity and mortality distribution among neonates admitted NICU

Morbidity	Admission %	Mortality %	Cumulative %
Low birth weight	790(29.5)	201(25.4)	31.9
Birth Asphyxia	718(26.8)	216(30.1)	34.2
Neonatal sepsis	405(15.1)	67(16.5)	10.6
MAS*	197(7.3)	48(24.4)	7.6
Jaundice	164(6.1)	21(12.8)	3.3
HMD**	142(5.3)	38(26.8)	6.0
Congenital anomaly	82(3.1)	12(14.6)	1.9
Severe hypothermia	44(1.6)	15(34.1)	2.4
Congenital pneumonia	39(1.5)	8(20.5)	1.3
IUGR***	19(0.7)	1(5.3)	0.2
Other	82(3.1)	4(4.9)	0.6
Total	2682(100)	631(23.5)	100

* MAS: Meconium aspiration syndrome, **HMD: Hyaline membrane disease, *** IUGR: Intrauterine growth retardation

Table 3: Association between Birth weight and outcome of treatment

Birth weight	Outcome of treatment				Total
	Cured	Referred	Death	DAMA	
>2500	412(44.7%)	37(4.0%)	210(22.8%)	262(28.4%)	921
1500-2499	562(44.9%)	31(2.5%)	249(19.9%)	409(32.7%)	1251
1000-1499	149(33.5%)	1 (0.2%)	120(28.6%)	150(35.7%)	420
<1000	8 (8.9%)	0 (0.0%)	52(57.8%)	30(33.3%)	90
Total	1131(42.2%)	69(2.6%)	631(23.5%)	851(31.7%)	2682

Chi square value=112.7, P – value < 0.001

According to religion of the parents 2012 (75%) neonates were from Hindu family and 670 (25%) were from Muslim family. Most of the babies stayed in the NICU for an average of 2.7 days with standard deviation of 2.4 (Range 12 hours - 22 days). The mean weight of admission was 2.08 kg (SD=0.66). Of the 2682 patients admitted 1131 (42%) cured, 69 (2.6%) referred to higher centre for the further treatment, 631 (23.6%) died and 851 (31.8%) taken discharge against medical advice. The mean age of the time of the neonates on admission was 2.6 days (immediately after birth – 28 days of life). According to birth weight recorded on the indoor history sheet 921(34.1%) neonates were having birth weight 2.5 kg and above, 1251 (46.5%) having birth weight between 1500-2499 gm, 420 (15.7%) having birth weight 1000-1499 gm and 90 (3.4%) had birth weight less than 1000 gm. 951 (35.5%) neonates admitted in the NICU were born prematurely i.e. before 28 wks of gestation and 1731(64.5%) were full term.

Table 2 shows the distribution of the major cause of morbidity and mortality among the neonates admitted in the NICU. The major cause of morbidity was low birth weight baby (29.5%), birth asphyxia (26.8%), neonatal sepsis (15.1%), and meconium aspiration syndrome (7.3%). In this study overall mortality rate of the NICU was 23.52% (631/2682). Table 2 shows the distribution of cause of death among neonates admitted in NICU. The major cause of mortality was birth asphyxia with (27.4%), prematurity (22.1%), low birth weight (17%), acute respiratory distress syndrome (13.6%) and septicemia (6.1%).

Table 3 shows association of birth weight and the outcome of the treatment among the neonates admitted in NICU. It shows that among the 90 neonates admitted with birth weight less than 1000 gm 52 (57.8%) while 120(28.6%) out of 420 neonates died with birth weight of 1000-1499 gm. It shows that outcome of the neonates is adverse with low birth weight and the association is statistically significant.

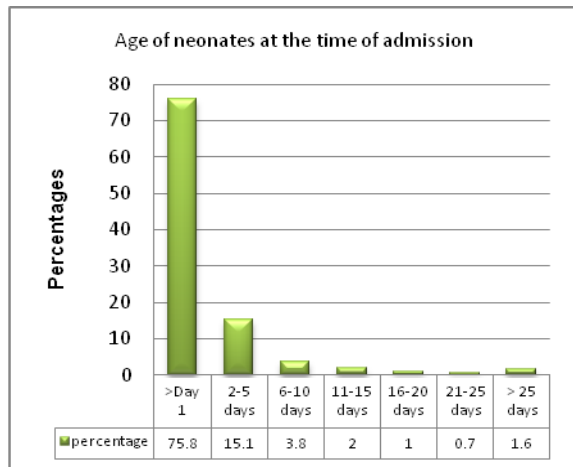


Figure 1: Distribution of the study subjects according to age at admission of neonates in NICU

DISCUSSION

In this study admission of the male neonates were more in number than female neonates it is also documented by Manikant et al [5] and Nath Roy et al. [9] These may be related to the preference for the male children the society and the biological vulnerability of the males to infection. In our study, 66% of the neonates were low birth weight (LBW) and 35.5% neonates were delivered prematurely. Veena Prasad [10] in study conducted at Uttarakhand documented that 65.62% of the neonates admitted were LBW. Similar finding documented by Ramakant et al [5] in their study at Rohtas, Bihar state where they found 40% of the neonates admitted were LBW and 39% of the neonates were born prematurely. According to the UNICEF “The State of the World’s Children 2010” report, 28% neonates are born with low birth weight in India. [11]

In this study the overall mortality was 23.5% which is similar to the finding of studies by Parkash J et al (25%). [12] Veena Prasad [10] found mortality rate of 18.68% which is slightly lower than our study and Garg P et al (35%) [13] observed slightly higher mortality rate. Most common cause of admission was LBW (29.5%) and birth asphyxia (26.8%) followed by neonatal

sepsis (15.1%) and Meconium aspiration syndrome (7.3%). Similar finding observed by AI Omoigberale [14] in study conducted at University of Benin Teaching Hospital, Benin City, Nigeria in 2003-2006 where it was observed that neonatal sepsis, severe birth asphyxia, pre-maturity and neonatal tetanus were the most common morbidities suffered by the neonates. The most common cause of death was birth asphyxia (27.4%) followed by prematurity (22.1%). Narayan R [15] in his study conducted at level II Care NICU at Sikkim Manipal Institute of Medical Sciences at Gangtok from November 2004 to October 2005 also find prematurity (41%) and birth asphyxia (24%) as a leading cause of death. Garg et al, [13] from a community level NICU, have reported birth asphyxia as the leading cause of death, followed by sepsis. This is in accordance with the Indian national figures where prematurity and birth asphyxia are the leading causes of death.

CONCLUSION

This study identified Low birth weight, birth asphyxia with hypoxic ischemic encephalopathy and neonatal sepsis are the major cause of morbidity and birth asphyxia, prematurity, low birth weight, respiratory distress syndrome, septicemia as major contributor to the mortality among the neonates admitted in the neonatal intensive care unit of the hospital. Adequate antenatal care to the high risk mother and advances in the neonatal intensive care will improve the neonatal outcome.

REFERENCES

1. Children: reducing mortality, WHO Media centre [Internet].2012 June [cited 2015 aug 16]. Available from:<http://www.who.int/mediacentre/factsheets/fs178/en/index.html>

2. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: when? Where? Why? *Lancet* 2005;365:891-900.
3. Khan ME, Maheshwari PK, Huma S, Shakeel A, Ali SR. Morbidity pattern of sick hospitalized preterm infants in Karachi, Pakistan. *J Pak Med Assoc.* April 2012; 62(4):386-8.
4. Gauchan E, Basnet S, Koirala D P, Rao K S. Clinical profile and outcome of babies admitted to Neonatal Intensive Care Unit (NICU). *JIOM.*2011;33(2):1-8.
5. Mani Kant, Thakur S, Singh B. Study of the Morbidity and the Mortality Patterns in the Neonatal Intensive Care Unit at a Tertiary Care teaching Hospital in Rohtas District, Bihar, India. *Journal of Clinical and Diagnostic Research.* 2012 April;6(2): 282-5.
6. NFHS-3: Ministry of Health and Family Welfare, Govt. of India. Available at URL: <http://www.mohfw.nic.in/NFHS-PRESENTATION.htm>. Accessed on 3rd September 2011.
7. UN document no. A/56/326. New York: United nation; 2001. UN general assembly 5s. Road map towards the implementation of the United Nations Millennium declaration: Report of the Secretary General.
8. Onasoga O A, Oluwatosin A O, Ojo A. Predictors of Neonatal Morbidity and Mortality in Tertiary Hospital in Ogun State, Nigeria. *Arch. Appl. Sci. Res.* 2012;4 (3):1511-6.
9. Nath Roy R, et al. The mortality pattern of the hospitalised children in a tertiary care hospital of Kolkata. *Indian Journal of Community Medicine* 2008; 33(3):187-89.
10. Prasad V, Singh N. Causes of morbidity and mortality in neonates admitted in government medical college, Haldwaniin, Kumaun region, (Uttarakhand) India. *Journal of pharmaceutical and biomedical science,* 2011; 8(8):1-4.
11. Anish S, Ann T et al. Mortality pattern of hospitalized neonates in a tertiary care hospital in Ernaculam. *Kerla Med J* 2011; 3: 95-102.
12. Parkash J, Das N. Pattern of admissions to neonatal unit. *J Coll Physicians Surg Pak* 2005;15(6):341-4.
13. Garg P, Krishak R, Shukla DK. NICU in a community level hospital. *Indian J Pediatr* 2005; 72(1): 27-30.
14. Omoigberale AI, Sadoh WE, Nwaneri DU. A 4 year review of neonatal outcome at the university of Benin teaching hospital, benin city. *Nigerian Journal of Clinical Practice* Sept. 2010;13(3):321-5.
15. Raghvendra N. A study of the pattern of admissions and outcome in a neonatal intensive care. *Sri Lanka Journal of Child Health,* 2012;41(2): 79-81.

How to cite this article: Salve D, Inamdar IF, Sarawade S et al. Study of profile and outcome of the newborns admitted in neonatal intensive care unit (NICU) at tertiary care hospital in a city of Maharashtra. *Int J Health Sci Res.* 2015; 5(10):18-23.
