



Clinical and Demographic Profile of Extramural Neonates Admitted in NICU of Tertiary Care Hospital in Central Rajasthan

Surender S Kajla, BS Karnawat* and Sharath Babu

Department of Pediatrics, JLN Medical College, Ajmer, Rajasthan, India

***Corresponding Author:** BS Karnawat, Department of Pediatrics, JLN Medical College, Ajmer, Rajasthan, India.

Received: August 11, 2020

Published: October 16, 2020

© All rights are reserved by **BS Karnawat, et al.**

Abstract

Objective: This study was undertaken to know the clinical and demographical profile of outborn neonates admitted in Neonatal Intensive Care Unit (NICU).

Method: This prospective study was conducted in NICU of department of pediatrics, JLN medical college and hospital, Ajmer from April 2018 to September 2018.

Results: Of the 1386 neonates admitted, 64.9% were males and 35.1% were females. Most cases (65.2%) belonged to the socio-economic class upper middle and lower middle. 46.7% mothers had primary education and 44% mothers had secondary education while 4.0% mothers were illiterate. Among 1386 neonates, majority of neonates (65.6%) were term while 30.7% were preterm and 3.7% were post term. Rural residency (68.8%) was far more as compared to urban residency (31.2%). Majority of neonates (80.1%) were delivered vaginally while 19.9% were delivered by caesarean section. Majority of neonates (84.2%) were delivered at government hospitals while 12.6% and 3.2% neonates were delivered at private hospitals and at home respectively. As per birth weight, 46.3% neonates were between 1.5-2.49 kg, 38.1% neonates had birth weight more than 2.5 kg while 3.7% neonates were <1 kg. Majority of neonates (78.8%) were admitted in early neonatal period. Major causes of NICU admission were Birth asphyxia (14.1%), Respiratory Distress Syndrome (RDS) of newborn (12.6%), Neonatal Jaundice (10.2%). As far as mortality is concerned, RDS of Newborn (26.8%), Neonatal Sepsis (21.4%) and Birth Asphyxia (19.6%) were found to be major culprits. Majority (61%) of neonates were successfully discharged, while 24.2% died during treatment.

Conclusion: The majority of morbidities and subsequently the mortalities can be reduced by improving maternal care and essential newborn care, appropriate primary interventions and timely referral to tertiary care centers for high risk cases, with better transport facilities for sick neonates.

Keywords: Extramural Newborns; Neonatal Morbidity; Neonatal Mortality

Introduction

Childhood mortality and morbidity reflect overall development of a nation. Globally 2.5 million children died in the first month of life in 2018, out of them approximately 1 million dying on first day and close to 1 million dying within the next 6 days. Of these about 6 lakhs are Indian (UNICEF 2018) [1]. UNICEF (2014) estimate that leading causes of newborn deaths are-

- Prematurity (35%).
- intrapartum complications like asphyxia (24%).
- Infections (23%).
- Other causes such as birth defects etc (18%).

After the launch of Janani-Shishu Suraksha Karyakram (JSSK), Institutional deliveries doubled between 2005-06 to 2015-16, from

39% to 79% (NFHS-4). The rollout of Integrated Management of Newborn and Childhood Illness (IMNCI) has also leads to increased contact of newborns at their households and improved detection and referral of sick newborns to health facilities. The proportion of postnatal care increase from 37% in 2005-06 to 65% in 2015-16 (NFHS-4) [2]. It has been estimated that health facility based interventions can reduce neonatal mortality by as much as 25 - 30% [3].

In this regard it would be useful to have insight into demographic and clinical profile of outborn (extramural) neonates requiring NICU admission. Therefore, the present study was carried out at tertiary care hospital in central Rajasthan.

Materials and Methods

This prospective study was conducted in neonatal intensive care unit (NICU) of department of pediatrics, JLN medical college and hospital, Ajmer from April 2018 to September 2018.

After taking informed consent from mothers of the neonates, their details were recorded on a specially designed pretested performa. These include residential address with distance from NICU, age, parity, previous obstetric history, socioeconomic status (assessed by Kuppuswamy scale), education status, associated medical or obstetrical illness, antenatal care during pregnancy and the duration of gestation.

Labour and delivery details about presentation and duration of labour, peripartum complications were recorded. Details regarding newborn like birth weight, gestational age, cry status at birth, neonatal reflexes, cord condition, congenital abnormalities etc were also recorded.

Thorough physical examination was done and findings were recorded. Gestation age was assessed by new Ballard scoring system for those newborn who were admitted at birth [4]. For those who presented after 72 hours of birth it was estimated by calculation from last menstrual period. Cause of admission viz. Prematurity, low birth weight, birth asphyxia, sepsis, respiratory distress, neonatal jaundice, hypoglycemia, hypothermia, intracranial hemorrhage, congenital heart disease etc. was recorded. Any relevant investigations done during hospital stay were also recorded.

Data entry and statistical analysis was performed with the help of Microsoft Excel and SPSS version 25 (IBM SPSS Statistics inc. Chicago, Illinois, USA). Categorical variables were presented as number and percentage. Chi-square test was used to compare dif-

ferences in categorical variables and independent t-test, p value < 0.05 (at 95% confidence interval) was considered to indicate statistical significance.

Prior approval for the study was taken from institutional ethical committee of JLN Medical collage Ajmer. Informed consent was taken from mothers.

Results

Among 1386 neonates admitted in NICU, 64.9% were males and 35.1 were females. High M:F ratio (1.85:1) was observed (Figure 1).

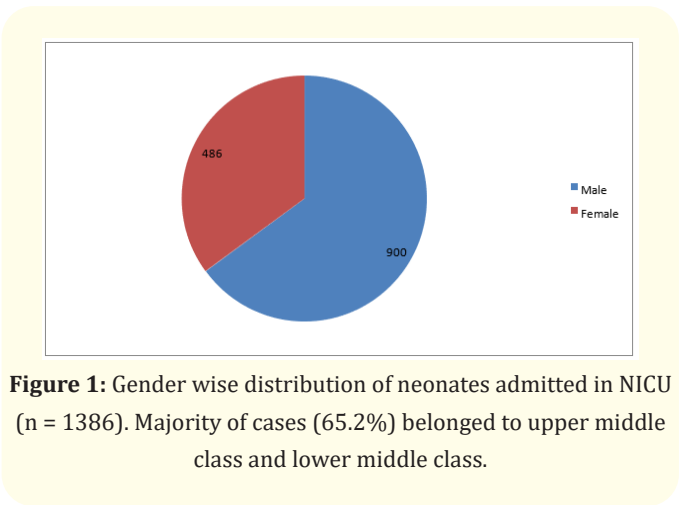


Figure 1: Gender wise distribution of neonates admitted in NICU (n = 1386). Majority of cases (65.2%) belonged to upper middle class and lower middle class.

Majority of cases (65.2%) belonged to upper middle class and lower middle class (Figure 2).

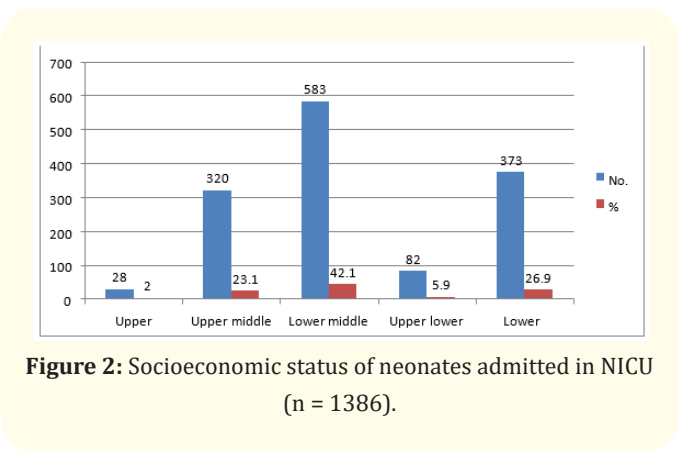


Figure 2: Socioeconomic status of neonates admitted in NICU (n = 1386).

46.7% mothers had primary education and 44% mothers had secondary education while 4.0% mothers were illiterate (Table 1).

Education status of mothers	No.	%
Illiterate	56	4.0
Primary education	610	44.0
Secondary education	647	46.7
Graduates	73	5.3

Table 1: Education status of mothers of neonates admitted in NICU (n = 1386).

Among 1386 neonates, majority of neonates (65.6%) were term while 30.7% were preterm and 3.7% were post term (Figure 3).

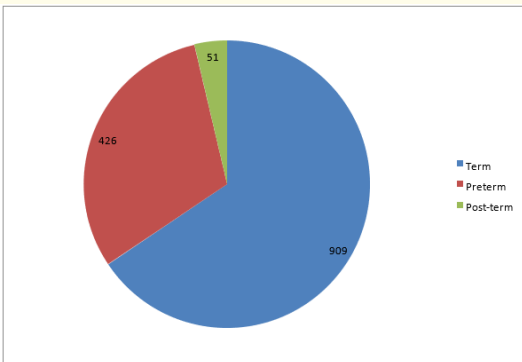


Figure 3: Gestational age of neonates admitted in NICU (n = 1386).

Rural residency (68.8%) was far more as compared to urban residency (31.2%) (Figure 4).

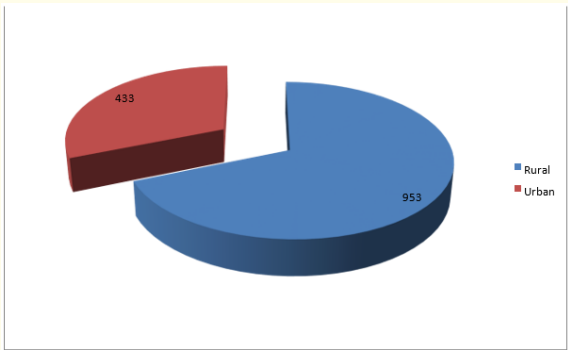


Figure 4: Area of residence of mothers of neonates admitted in NICU (n = 1386).

Majority of neonates (80.1%) were delivered vaginally while 19.9% were delivered by caesarean section (Table 2).

Mode of delivery	No.	%
NVD	1026	74.0
LSCS	276	19.9
AVD	84	6.1

Table 2: Mode of delivery of neonates admitted in NICU (n = 1386).

Majority of neonates (84.2%) were delivered at govt. hospitals while 12.6% and 3.2% neonates were delivered at private hospitals and at home respectively (Figure 5).

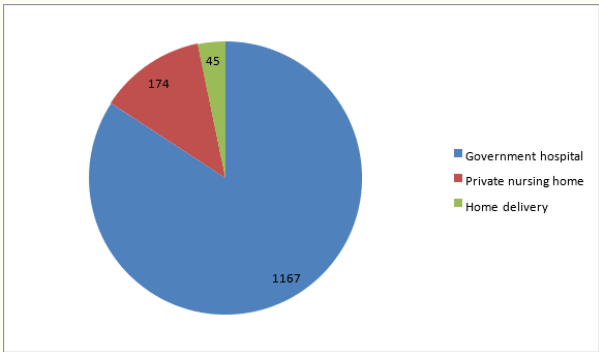


Figure 5: Place of delivery of mothers of neonates admitted in NICU (n = 1386).

As per birth weight, 46.3% neonates were between 1.5 - 2.49 kg, 38.1% neonates had birth weight more than 2.5 kg while 3.7% neonates were < 1 kg (Table 3).

Birth weight	No.	%
< 1 kgs	51	3.7
1.0 - 1.49 kgs	165	11.9
1.5 - 2.49 kgs	642	46.3
≥ 2.5 kgs	528	38.1

Table 3: Weight of neonates admitted in NICU (n = 1386).

Majority of neonates (78.8%) were admitted in early neonatal period while 21.2% neonates were admitted in late neonatal period (Table 4).

Age of neonate on admission	No.	%
0 - 3 days	873	63.0
4 - 7 days	219	15.8
8 - 14 days	156	11.3
15 - 28 days	138	9.9

Table 4: Age of neonate on admission in NICU (n = 1386).

Major causes of NICU admission were Birth asphyxia (14.1%), RDS of newborn (12.6%), Neonatal Jaundice (10.2%), Congenital malformations (8.7%), Environmental hyperthermia of Newborn (8.2%), Prematurity (8.2%) and Acute renal failure (7.6%) (Table 5).

Morbidity profile	No.	%
Birth Asphyxia	195	14.1
Neonatal Sepsis	174	12.6
RDS of Newborn (HMD)	168	12.1
Neonatal Jaundice	141	10.2
Congenital Malformation	120	8.7
Environmental Hyperthermia of Newborn	114	8.2
Prematurity	114	8.2
Acute Renal Failure	105	7.6
Transient Tachypnoea of Newborn	75	5.4
Other Low Birth Weight (1000 gm - 2499 gm)	36	2.6
Convulsions of Newborn	30	2.2
Neonatal Aspiration of Meconium	24	1.7
E.L.B.W. (999 gm or less)	24	1.7
Acquired Pneumonia	15	1.1
Hypothermia of Newborn	12	0.9
Meningitis	9	0.6
Neonatal Hypoglycaemia	9	0.6
Small for Gestational Age (IUGR)	6	0.4
Congenital Pneumonia	6	0.4
Intraventricular Haemorrhage	3	0.2
Shock	3	0.2
Pneumothorax	3	0.2

Table 5: Morbidity profile of neonates admitted in NICU (n = 1386).

RDS of Newborn (26.8%), Neonatal Sepsis (21.4%), Birth Asphyxia (19.6%), Congenital Malformations (7.1%), Acute Renal Failure (7.1%) and ELBW (6.2%) were found to be major causes of mortality among neonates admitted in NICU (Table 6).

Mortality profile	No.	%
RDS of Newborn (HMD)	90	26.8
Neonatal Sepsis	72	21.4
Birth Asphyxia	66	19.6
Congenital Malformation	24	7.1
Acute Renal Failure	24	7.1
E.L.B.W. (999 gm or less)	21	6.2
Neonatal Aspiration of Meconium	12	3.6
Prematurity (28-<37 Weeks)	12	3.6
Acquired Pneumonia	6	1.8
Shock	3	0.9
Congenital Pneumonia	3	0.9
Intraventricular Haemorrhage	3	0.9
Total	336	100.0

Table 6: Mortality profile of neonates expired in NICU (n = 336).

Out of 1386 neonates admitted, 61% were successfully discharged, while 24.2% neonates died during treatment. Remaining 11.9% left against medical advice (LAMA) and 2.8% were referred for further management mostly for surgical interventions (Table 7).

Outcome	No.	%
Discharged	846	61.0
Expired	336	24.2
LAMA	165	11.9
Referred	39	2.8

Table 7: Outcome of neonates admitted in NICU (n = 1386).

Discussion

A total of 1386 extramural babies were admitted in NICU during period of 6 months, out of whom 900 (64.9%) were male and 486 (35.1%) were female which is in concordance to National Neonatal-Perinatal Database (NNPD) and other studies of rural India [5,6]. This study shows a high male: female ratio (1.85:1). Further studies are needed to determine whether this is due to gender bias prevalent in India where boys are given more care or greater tendency of male children to fall sick.

In the present study, most cases (65.2%) belonged to the socioeconomic class upper middle and lower middle. This may be due to the fact that representation of most of the population belongs to this class. In this study literacy rate of mothers is 96%, out of

which 44% have primary education, 46.7% have secondary education and 5.3% were graduated. Purohit, *et al.* (2014) commented that health and survival of the newborn babies depends upon the education, socioeconomic status and health status of mothers [7].

It was observed that 68.8% patients admitted were from rural areas and 31.2% were from urban areas. This finding is understandable as the rural population outnumbers the urban population in the catchment area of the NICU of JLN medical college Ajmer. These findings are corroborating with the study of Salve, *et al.* from Nanded (Maharashtra) who observed that 76% neonates were from rural areas and only 24% from urban areas [8].

In this study about two third of the neonates were full term (65.6%) and about one third (30.7%) were preterm which was similar to another study conducted by Gauchan, *et al.* [9] in which there were 67.5% term babies and 31.3% preterm babies. In contrast to this finding a study conducted by Seyal, *et al.* found that 42.8% neonates were preterm [10]. Finding in current study is understandable because probably Janani Suraksha Yojana (JSY) and Janani-Shishu Suraksha Karyakram (JSSK) of National Rural Health Mission (NRHM) has enhanced the ante-natal check up, hospital deliveries and neonatal care among the general population.

This study revealed that most of the admitted neonates were delivered in health institutions (96.8%) out of which 84.2% at govt. hospitals and 12.6% delivered at private hospitals. Only small numbers of babies were born at home 3.2%. Similarly, Kotwal YS, *et al.* (2017) from Srinagar (Jammu and Kashmir) reported that 90% babies were delivered at health institutions and 10% were delivered at home [11]. Again, credit for more institutional deliveries can be attributed to JSY and JSSK schemes.

The weight parameter analysis revealed that the number of neonates having extremely low birth weight (< 1000 gm) were 3.7%, very low birth weight (1000-1499 gm) were 11.9%, low birth weight (1500 - 2499 gm) were 46.3%, normal weight (> 2500 gm) were 38.1%. According to the UNICEF, 28% of neonates are born with low birth weight in India [12]. But in our study total 61.9% of neonates were low birth weight which is similar to Veena Prasad and Nutan Singh's study in Uttarakhand [13]. Similarly, Rakholia R, *et al.* (2014) revealed that extremely low birth weight were 3.19%, very low birth weight were 15.40%, low birth weight were 42.02% and normal weight were 39.39% [14].

Present study revealed that 63% neonates were admitted within 3 days of birth, 15.8% neonates were age group of 4 - 7 days, 11.3% neonates were age group of 8-14 days and 9.9% neonates were age group of 15 - 28 days. Similar findings are found in study by Anjum, *et al.* (2009) [15] and by Kotwal YS (2017) [11]. These findings are expected as neonates in early neonatal period have greater chances of presenting with perinatal complications and neonatal problems.

Top five cause of admission of neonates in this study are birth asphyxia (14.1%), neonatal sepsis (12.6%), RDS of newborn (12.1%), neonatal jaundice (10.2%), and congenital malformations (8.7%). The other cause of admission are prematurity (8.2%), environmental hyperthermia of newborn (8.2%), acute renal failure (7.6%), transient tachypnoea of newborn (5.4%), low birth weight (2.6%), convulsions of newborn (2.2%), neonatal aspiration of meconium (1.7%), acquired pneumonia (1.1%) and others (3.5%).

The type of diseases in this study is similar to other studies conducted by Parkash, *et al.* [16], Islam, *et al.* [17], Anjum, *et al.* [15], Elhassan, *et al.* [18], Hoque, *et al.* [19], Gauchan, *et al.* [9], Prasad, *et al.* [13], Seyal, *et al.* [10], Narayan, *et al.* [20], Aijaz, *et al.* [21], and Kotwal, *et al.* [11]. The major cause of morbidity 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 [15]. The commonest indications for admission were neonatal jaundice (24.7%), sepsis (21.4%), and perinatal asphyxia (19.2%) in Gauchan, *et al.* study [9]. In Seyal, *et al.* [10] study the main cause of admission was prematurity (23.5%), sepsis (21.9%), birth asphyxia (18%) and neonatal jaundice (11.3%) respectively. The most common disease was sepsis (19.9%), followed by respiratory distress syndrome (18.9%), birth asphyxia (17.02%), meconium aspiration syndrome (15.2%), neonatal jaundice (9.44%), pneumonias (3.46%) in a study by Aijaz, *et al.* [21]. Kotwal, *et al.* [11] reported that the main cause of admission was neonatal jaundice (26.7%), septicemia (19.1%), prematurity (12.5%), birth asphyxia (7%) Respiratory Distress Syndrome (5.7%). The pattern of disease in our study was not similar to the above mentioned studies, which is probably due to different racial stock, socioeconomic status, education status, health care facilities and climatic conditions etc.

In this study it was observed that out of 1386 neonates admitted, 846(61%) of the neonates were discharged, 336(24.2%) died,

165(11.9%) left against medical advice (LAMA) and 39(2.8%) neonates were referred mainly for surgical interventions.

The mortality rate observed in present study was 24.2% which is similar to studies conducted by Prakash., *et al.* (25.5%) [16], Malik S., *et al.* (26%) [22], Soni LK., *et al.* (20.19%) [23]. Much lower mortality rates were observed in studies by Kotwal YS., *et al.* (9.73%) [11], Sarkar., *et al.* (9.7%) [24], Ravikumar SA (10.45%) [25], and Sridhar PV., *et al.* (7.16%) [26]. In above studies both inborn and outborn neonates were included and higher mortality was observed in outborn neonates as compared to inborn neonates. Higher mortality in current study is understandable as only outborn neonates are admitted at NICU of JLN medical college Ajmer which are referred from other health centers mainly in serious conditions.

Conclusion

Present study revealed that birth asphyxia, RDS of newborn, neonatal jaundice, prematurity were common causes of morbidities in newborn babies. RDS of newborn, neonatal sepsis, birth asphyxia and congenital malformations were leading causes of neonatal mortality.

The majority of morbidities and subsequently the mortalities can be reduced by improving maternal care and essential newborn care, appropriate primary interventions and timely referral to tertiary care centers for high risk cases, with better transport facilities for sick neonates.

Funding

Nil.

Conflict of Interest

Nil.

Ethical Approval

This study was approved by institutional ethical committee.

Bibliography

1. UN – Interagency Group For Child Mortality Estimation (UN-IGME 2019).
2. BR_fact sheet.pdf.
3. Lawn JE., *et al.* "Lancet Neonatal Survival Streening Team 4 million neonatal deaths When? Where? Why?" *Lancet* 365 (2005): 891-900.
4. Ballard JL., *et al.* "New Ballard Score expanded to include extremely premature infants". *Journal of Pediatrics* 119.3 (1991): 417-423.
5. "Morbidity and mortality among outborn neonates at 10 tertiary care institutions in india during the year 2000". *Journal of Tropical Pediatrics* 50 (2004): 170-174.
6. Bhatia BD., *et al.* "Neonatal mortality pattern in rural based Medical college hospital". *The Indian Journal of Pediatrics* 51 (1984): 309-312.
7. Purohit U., *et al.* "Study on knowledge, attitude and practice of rural and urban population in care of newborn". RUHS, Rajasthan (2014).
8. Salve D., *et al.* "Study of profile and outcome of the Newborns admitted in Neonatal Intensive care Unit at tertiary care Hospital in a city of Maharastra". *International Journal of Health Sciences and Research* 5.10 (2015): 18-23.
9. Gauchan E., *et al.* "Clinical profile and outcomes of babies admitted to Neonatal Intensive Care Unit". 33 (2011): 1-8.
10. Seyal T., *et al.* "Audit of Neonatal Morbidity and Mortality at Neonatal Unit of Sir Gangaram Hospital Lahore". *Annals of King Edward Medical University* 1 (2011): 9-13.
11. Kotwal YS., *et al.* "Morbidity and Mortality among Neonates admitted to a tertiary care teaching hospital of jammu and Kashmir (india)". *Neonatal and Pediatric Medicine* 3 (2017): 136.
12. UNICEF. The state of the world's children 2010. New York: UNICEF (2010): 925.
13. Prasad V and Singh N. "Causes of morbidity and mortality in neonates admitted in government medical college Haldwaniin Kumaon Region (Uttarakhand) India". *Journal of Pharmaceutical and Biomedical Sciences* 8 (2011): 1-4.
14. Rakholia R., *et al.* "Neonatal morbidity and mortality of sick newborns admitted in a teaching hospital of Uttarakhand". *CHRISMED Journal of Health Research* 1 (2014): 228-234.
15. Anjum ZM and Shamoan M. "Pattern of Neonatal unit of Allied hospital Faisalabad Pakistan". *Annals of Punjab Medical College* 3 (2009): 129-131.
16. Prakash J and Das N. "Pattern of admission to neonatal unit". *Journal of the College of Physicians and Surgeons Pakistan* 15 (2005): 341-344.
17. Islam MN. "Situation of neonatal health in Bangladesh". *The Orion Medical Journal* 6 (2000): 3-6.

18. Elhassan EM., *et al.* "Morbidity and Mortality Pattern of Neonates Admitted into Nursery Unit in Wad Medani Hospital, Sudan". *Sudan JMS* 5 (2010): 13-15.
19. Hoque M., *et al.* "Causes of neonatal admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa". *Southern African Journal of Epidemiology and Infection* 26 (2011): 26-29.
20. Narayan R. "A study of pattern of admission and outcome in a neonatal intensive care unit at high altitude". *Sri Lanka Journal of Child Health* 41 (2012): 79-81.
21. Aijaj N., *et al.* "Disease Burden of NICU at a Tertiary Care Hospital, Karachi". *Journal of the Dow University of Health Sciences (JDUHS)* Karachi 6 (2012): 32-35.
22. Malik S., *et al.* "Morbidity profile and mortality of neonates admitted in Neonatal Intensive Care Unit of a Central India Teaching Institute: A prospective observational study". *Journal of Clinical Neonatology* 5 (2016): 168-173.
23. Soni LK., *et al.* "Neonatal Morbidity and Mortality Profile of Newborns Admitted in NICU @ It. Lam Government Medical College, Raigarh, Chhattisgarh". *International Journal of Recent Scientific Research* 10.1 (2019): 30581-30585.
24. Sarkar S., *et al.* "NICU Outcome in a Low resource Teaching Hospital Setting". *Pediatric Oncall* (2010).
25. Ravikumar SA., *et al.* "Morbidity and mortality profile of neonates in a tertiary care centre in Tamilnadu: a study from south India". *International Journal of Contemporary Pediatrics* 5 (2018): 377-382.
26. Sridhar PV., *et al.* "Morbidity pattern and hospital outcome of Neonates Admitted in a Tertiary Care Teaching Hospital, Mandya". *International Journal of Scientific Study* 3.6 (2015): 126-129.

Assets from publication with us

- Prompt Acknowledgement after receiving the article
- Thorough Double blinded peer review
- Rapid Publication
- Issue of Publication Certificate
- High visibility of your Published work

Website: www.actascientific.com/

Submit Article: www.actascientific.com/submission.php

Email us: editor@actascientific.com

Contact us: +91 9182824667