

# Morbidity and Mortality Pattern of Newly Born Babies in a Teaching Hospital

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## Abstract

**Background:** To determine the disease pattern and causes of neonatal mortality in a teaching hospital.

**Methods:** In this prospective hospital based observational study all the new born babies admitted because of illness were enrolled. Data was collected on a predesigned proforma including information about weight, sex, gestational age, and mode of delivery. Neonatal information was collected at time of admission. A single most appropriate diagnosis was given by the senior physician. The inclusion criteria was all the neonates brought for admission to the neonatal unit. Diagnosis was mainly clinical and based upon the WHO criteria. Laboratory diagnostic tests and radiology were used to confirm the diagnosis. Primary disease was considered as final diagnosis even if the baby developed complications of primary disease or had more than one disease. Meconium aspiration syndrome was diagnosed on basis of history, clinical and radiological findings. Birth asphyxia was diagnosed clinically and APGAR score. Sepsis evaluation was based on clinical and laboratory indices like complete blood counts, C- reactive protein (CRP) and blood cultures collectively.

**Results:** A total of 53395 babies were delivered during this period. Out of this only 5595 babies were admitted for treatment. Out of 5595 admitted sick neonates, 3024 (54%) were male and 2571 (46%) were female. Premature were 3260 (58%) and low birth weight were 2635(47%). Neonatal sepsis (25%), birth asphyxia (19%) and respiratory distress syndrome (19.4%) were the leading causes of morbidity. The rest was contributed by meconium aspiration syndrome (9.3%), neonatal jaundice (7.8%), congenital pneumonia (7.8%) and transient tachypnea of newborn (TTN) (4.7%). A total of 1074 babies died which is 2% of all deliveries and 19.2% of all admitted babies. The three major causes of mortality were RDS (30%), birth asphyxia (22.4%), sepsis (16.8%). Congenital pneumonia and MAS

contributed 19% each. The case fatality for prematurity was 18% and for low birth weight 16%.

**Conclusion:** Neonatal sepsis, birth asphyxia, prematurity and the low birth weight were the leading causes of neonatal mortality. Deaths due to severe respiratory distress syndrome (RDS) was high so interventions to reduce preterm delivery, low birth weight and birth asphyxia should be planned. Establishment of level II neonatal care units at tehsil and district levels will definitely reduce the neonatal deaths.

**Key Words:** Neonatal morbidity, Neonatal mortality, Prematurity, Neonatal sepsis

## Introduction

The neonatal period is the most crucial period of life and 60 to 70 % of the infant deaths in our country occur within this period. It is estimated that globally 130 million neonates are born each year and out of these 4 million die in first 28 days of their life. Almost half of all neonatal deaths occur within the first 24 hours while 75% die within first 7 days of life.<sup>1-4</sup>

Globally important causes of neonatal mortality are sepsis (34%), prematurity (28%) and birth asphyxia (24%) in the low income countries whereas prematurity and malformations are leading causes of death in the developed countries.<sup>5</sup> Sepsis is probably responsible for 30-50% of the total neonatal deaths each year in developing countries.<sup>2</sup> Like other developing countries, majority of the causes of neonatal morbidity in our country are preventable.

With an estimated 298000 neonatal deaths annually and a reported neonatal mortality rate of 48 per 1000 live births, Pakistan accounts for 7% of global neonatal deaths and ranks 3<sup>rd</sup> highest in the global scenario.<sup>7</sup> Birth weight is one of the main factors in neonatal mortality. It has been proved by different studies of WHO that low birth weight contributes 15% to the neonatal mortality.<sup>4</sup>

Unfortunately, the data available on neonatal deaths in Pakistan comes primarily from hospital studies, which have a selective referral bias. Community based data is difficult to obtain in our setup, so hospital based data

is used to assess burden of this problem. In spite of this limitation we should keep on reporting the pattern of admissions to our neonatal units. This way we would have an idea of our mortality pattern and identify our deficiencies as well.

### Patients and Methods

This prospective hospital based observational study was conducted over a period of 48 months from January 2011 to December 2014 in the neonatal unit of Pakistan Institute of Medical Sciences, Islamabad. We included only those babies in the study who were born in our hospital and admitted because of some illness. Data was collected on a predesigned proforma including information about weight, sex, gestational age, and mode of delivery. Neonatal information was collected at time of admission. All babies were examined by the registrar and then by the neonatologist. A single most appropriate diagnosis was given by the senior physician. The inclusion criteria was all the neonates brought for admission to the neonatal unit. Diagnosis was mainly clinical and based upon the WHO criteria. Laboratory diagnostic tests and radiology were used to confirm the diagnosis. Primary disease was considered as final diagnosis even if the baby developed complications of primary disease or having more than one disease. Meconium aspiration syndrome was diagnosed on basis of history, clinical and radiological findings. Birth asphyxia was diagnosed clinically plus APGAR score. Sepsis evaluation was based on clinical and laboratory indices like complete blood counts (CBC), C- reactive protein (CRP) and blood cultures collectively. Every newborn, who was delivered by LSCS or instrumental delivery, was kept under observation. Only those babies were admitted who showed signs of illness.

### Results

A total of 53395 babies were born in our MCH center during the study period. Out of the total deliveries 13316 babies were born by lower segment caesarean section whereas the rest 40079 were born vaginally. Out of all deliveries 47800 (90%) babies were observed and discharged and only 5595 (10%) babies were admitted due to some illness. Among these 5595 admitted neonates, 3024(54%) were male and 2571(46%) were female. Out of admitted babies 3245(58%) were born by lower segment caesarean section (LSCS) and 2350(42%) by vaginal (SVD) or instrumental deliveries.

**Table 1: Demographic analysis of admitted babies**

Gender	Male = 3024(54%)	Female= 2571 (46%)
Mode of delivery	SVD=2350 (42%)	LSCS =3245 (58%)
Gestation	Full term=2335(41.80%)	Preterm = 3260 (58.20%)
Birth weight	Normal weight =2960(53%)	Low birth weight=2635 (47%)

**Table 2: Disease pattern of admissions per year**

Disease	2011	2012	2013	2014	Total	Percentage
Neonatal sepsis	362	342	313	380	1397	24.9 %
RDS	221	267	314	286	1088	19.4 %
HIE	259	262	267	270	1058	19 %
MAS	157	131	108	121	517	9.3 %
NNJ	101	121	103	112	437	7.8%
Pneumonia	118	106	113	102	439	7.8 %
NEC	38	41	39	43	161	2.9 %
TTN	72	59	69	63	263	4.7 %
Miscellaneous	58	61	54	62	235	4.2 %

HIE: Hypoxic ischemic encephalopathy; NNS: Neonatal Sepsis; RDS: respiratory distress syndrome; NNJ: Neonatal Jaundice; MAS: Meconium Aspiration syndrome; NEC: Necrotizing enterocolitis; TTN: Transient tachypnea of newborn

**Table 3: Outcome of major neonatal diseases**

Disease	Total cases	Discharged	Deaths
NNS	1397	1161(83.2%)	236 (16.8%)
RDS	1088	762 (70%)	326( 30%)
HIE	1058	821 (77.6%)	237( 22.4%)
MAS	517	419 (81%)	98(19%)
Pneumonia	439	353 (80.5%)	86(19.5)
NNJ	437	437 (100%)	0
NEC	161	155 (96.3%)	6( 3.7%)
TTN	263	261( 99.2%)	2( 0.8%)
Miscellaneous	235	164 (69.8 %)	71( 30.2%)

HIE: Hypoxic ischemic encephalopathy; NNS: Neonatal Sepsis; RDS: respiratory distress syndrome; NNJ: Neonatal Jaundice; MAS: Meconium Aspiration syndrome; NEC:

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Weight parameter analysis revealed that 2635(47%) of admitted babies were of low birth weight (LBW) whereas out of total admitted babies 971(17.4%) were less than 1.5 Kg. Majority of admitted babies, 3260(58.2%) were premature (Table 1).Disease pattern of admission showed that 1397(25%) babies had sepsis, 1058 (19%) had birth asphyxia and 1088(19.4%) had respiratory distress syndrome (Table 2).Respiratory distress syndrome was the commonest cause of mortality (Table 3) .

## Discussion

A total of 53395 babies were born in our center in the last four years from 2011 to 2014. Babies born through spontaneous vertex delivery(SVD) were 40079(75%) and babies born by lower segment were 13316(25%). This was an unexpected finding as most of the mothers are referred here because of complicated obstetric cases . Low rate of LSCS in our setup reflects a good monitoring and unnecessary C sections.All the deliveries in our centre are attended by the resident of neonatology. Babies with some problem are brought to the nursery for observation and seen by the seniors. Babies needing admission are kept in the nursery whereas the rest are discharged after few hours of observation. Out of total 53395 babies born only 5595 (10.5%) babies were admitted.

In our study out of all admissions, 54 % were male which showed a male preponderance . This is consistent with local literature reported by Ali Akbar et al (68.73% male), Tallat et al (59.55 % male), and international studies from Nigeria (54.3% male) and India (60 % male).<sup>20,29,30</sup> Preponderance of male babies in outborn setup can be due to biological, cultural and social factors but male predominance in inborn babies is significant.

The three main causes of admissions in our set up were neonatal sepsis(25%), respiratory distress syndrome(19.4%) and birth asphyxia(19%). Meconium aspiration syndrome, pneumonia and neonatal jaundice were among the other three causes contributing 25% of the admissions.

Large number of babies with sepsis shows that these babies were born with infections in their blood. The mothers referred are usually in sick condition and most of them are septic as well. This shows that a proper antenatal is must where these septic mothers can be identified and treated early thus preventing neonatal sepsis. Neonatal sepsis is one of the most common reasons for admission to a neonatal unit in

developing countries.<sup>8</sup> Almost 22-66% of all admissions in neonatal units are due to infections and almost 70% of all neonatal deaths are attributable to infectious causes.<sup>9,13</sup>

Locally available studies revealed sepsis contribution to admission as 37.82% in Rawalpindi ,30.64% in Karachi, 26.3% in Peshawar, and 21.9 % in Lahore.<sup>3,14,17,22</sup> Case Fatality for sepsis in our study is 16.8 % . It is low when compared with 30.75% from Karachi, 18.9% Bangladesh and 34.4% from India, but comparable to 14.9% from Nigeria.<sup>3,18,20,21</sup> This low rate is understandable because our babies were all inborn.Neonatal sepsis is also related to lack of antiseptic measure practices in neonatal units and during birth. Therefore, anti septic measures and practices should be implemented in our delivery areas.

Out of the total deliveries only 6% babies were born premature but constituted 58% of the total admissions. Preterm birth has a major impact on neonatal mortality and accounts for 35-70% of neonatal deaths.<sup>16</sup> Case fatality in our study for prematurity is 18% which is less when compared to reported 38.7% from Rawalpindi , 38.51% from Karachi<sup>16</sup>, 46.9% from India, 60.7 % from Bangladesh by Nahar et al and 27.8% from Nigeria. <sup>16,18,21,22</sup> The main reason of mortality in these preterm babies was sepsis and respiratory distress syndrome. The variations in mortality of preterm babies is probably due to availability of modern facilities like ventilation and surfactant use in the neonatal units. The low mortality in our setup was probably because of early ventilation and surfactant therapy. However due to limited capacity in our NICU we could not ventilate all babies with RDS thus increasing the mortality.

In our study out of total 53395 deliveries LBW babies were 5% but constituted 47 % of the admissions. Out of 2635 low birth weight babies 906 babies died which is 16% of all admissions. Low birth weight babies constitute a major burden of our admissions.and is one of the leading problems in almost all the developing countries. <sup>9</sup> The study done at National Institute of Child Health (NICH), Karachi in 2005 showed low birth weight babies topping the list (55.4%), followed by septicemia (30.64%).<sup>3</sup>

Tallat et al have reported 49.3% and Rahim et al had 41.2% low birth weight babies in their study. <sup>17,29</sup> Our mortality is low as compared to Bangladesh (28%) and far low from India where it was 59.2%.<sup>20</sup> This difference may be due to available neonatal services in neonatal intensive care units (NICU) and associated diseases with LBW. The birth weight of babies is a direct reflection of the maternal health so need

interventions improving the maternal health of our country.

Out of 53395 deliveries, 1058 babies were born with birth asphyxia which is 0.01 % of all deliveries but 19 % of the admissions. This low incidence of birth asphyxia is probably due to the fact that all of our deliveries are attended by the neonatology resident. The case fatality rate due to birth asphyxia in our study is 22% and almost all deaths are due to grade III asphyxia. Unfortunately most of these mothers are unbooked and come in emergency with distressed fetus. Birth asphyxia is one of the leading causes of admission in neonatal units with high morbidity and mortality all over the country and a major contributor to peri-natal and neonatal mortality. It reflects the socioeconomic, educational and perinatal care of a community.

Our percentage of birth asphyxia is less when compared to other local studies like Tallat et al observed 18%, Parkash et al documented 18.85%, and Fazalur Rahim et al reported 16.52%.<sup>3,17,29</sup> International studies Islam et al reported 18.38.7%, Ugwu from Nigeria observed 11.8.3%. It is comparable to Nepal where the incidence is 2-9/1000 live births.<sup>21,23,25</sup>

Our case fatality for birth asphyxias is low when compared to 43.8% reported by Rubina et al and 36% by Parkash et al.<sup>3,22</sup> It is comparable to 27.6% reported by Ugwu et al from Nigeria, 22.8% by Islam et al<sup>23</sup> from Bangladesh and 31% from India,<sup>20,21,23</sup> It is almost same from developing countries. Reason for these variations are related to standard of perinatal care. We had 517 cases of meconium aspiration syndrome (MAS) which is less than 1% of our total deliveries but case fatality was 19%. Our case fatality for MAS is comparable with local data i.e. 17.3% from Rawalpindi<sup>22</sup> and 19.17% from Peshawar.<sup>17,22</sup> It reflects community based perinatal health care standards and indicates that there is a need to monitor progress of labour by trained people.

Neonatal jaundice was seen in 7.8% of our cases but fortunately no baby died because of neonatal jaundice. All babies were delivered in the hospital settings so early recognition and management saved all neonates. NNJ has been reported high from other places like Peshawar who reported 19.95% and Karachi documented 13.5%.<sup>3,17</sup> Unfortunately the reported case fatality reported from Rawalpindi is 10.27% and 20.0% from Nigeria.<sup>21,22</sup> This high mortality is usually due to the differences in neonatal condition at admission, public awareness of disease and our local practices.

Mortality was low in our study. Only 2% (1074) of babies died out of all delivered but this constituted 19% of all admissions. Literature reports different rates from different places. Tallat et al has reported 30.9%, Parkash et al 25.85%, Rubina et al from Rawalpindi has reported 23.48% and , Fazal ur Rahim et al<sup>17</sup> observed 14.87% from Pakistan.<sup>3,17,22,29</sup> From neighboring countries Bangladesh has reported 20.6% , Nigeria, 20.3% , and India observed 13.6%.<sup>18,20,21</sup> This variation may be due to facilities available in neonatal unit because survival of neonates also depends upon care provided to them.

Due to the number of ventilators all babies with RDS could be saved so it is required to establish neonatal ICU at the district level also. Sepsis has a significant contribution in neonatal mortality rate (NNMR). In an evaluation of neonatal deaths from a community based study in and around Lahore, Jalil et al recorded an infectious etiology in almost 75% of all deaths.<sup>15</sup> Hospital based data indicate 30-38% overall mortality associated with neonatal sepsis.<sup>8</sup> This can be prevented by early recognition of septic mothers and treating them. Clean deliveries and early neonatal care can reduce the incidence of neonatal sepsis tremendously.

## Conclusion

1. Neonatal, especially early neonatal, mortality is very high in our region. Sepsis, birth asphyxia and LBW or prematurity are the main causes of this mortality in our study. All these etiologies are preventable by adequate antenatal, perinatal and neonatal care.
2. It is required to augment our community health services for early detection and management of these problems. We also need to establish level II neonatal care facilities at our tehsil and district level.

## References

1. Bhutta ZA. Priorities in newborn care and development of clinical neonatology in Pakistan: where to now? *J Coll Physician Surg Pak* 1997; 7:231-34
2. Jamal M and Khan N. Neonatal morbidity and mortality in high risk pregnancies. *J Coll Physician Surg Pak* 2002; 12:657-61.
3. Parkash J, Das N. Pattern of admission to neonatal unit. *J Coll Physician Surg Pak* 2005; 15:341-44.
4. Imtiaz J, Hillary H, Sohail S, Amna Z, Naushaba M. Neonatal mortality, risk factors and causes: a prospective population-based cohort study in urban Pakistan. *Bulletin of the World Health Organization* 2009; 87:130-38.
5. World health report 2005: Make every mother and child count. Geneva: WHO 2005.
6. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: When? Where? Why? *Lancet* 2005; 365:891-900.
7. Neonatal and perinatal mortality: country, regional and global estimates. Geneva: WHO 2006.

8. Anwer SK, Mustafa S, Pariyani S, Ashraf S, Taufiq KM, Neonatal sepsis:an ethiological study. J Pak Med Assoc 2000;50:91-94
9. Bhutta ZA. Epidemiology of neonatal sepsis in Pakistan:an analysis of evidence and implications for care. J Coll Physicians Surg Pak 1996;6:12-17
10. Waseem R, Izhar TS, Khan M, Qureshi AW. Neonatal Sepsis; Professional Med J Dec 2005; 12:451-46.
11. El-Jadba AH, El-Yazji MS. Neonatal Septicemia in Gaza City Hospitals. Pak J Med Sci 2009; 25:226-31.
12. Malik MA, Hussain W, Izhar M. Ten years surveillance of bacterial isolates from blood cultures of neonates. Pak Ped J 2002; 26:113-18.
13. Naushad UA, Azad C, Mahbul H, Dramstadt GL. Clinical & bacteriological profile of neonatal septicemia in a tertiary level paediatric hospital in Bangladesh. Indian Pediatrics 2002; 39:1034-39.
14. Ejaz I, Khan HI, Baloch GR. Neonatal Mortality : Report from a tertiary hospital in Lahore/ causes and outcome. Pakistan Ped J 2001;25:35-38
15. Jalil F. Perinatal health in Pakistan: a review of current situation. Acta Paediatr 2004; 93: 1273-79.
16. Chaudhry IJ, Chaudhry NA, Hussain R, Munir M, Tayyab M. Neonatal septicemia. Pak Postgrad Med J 2003; 14:18-22.
17. Fazlur Rahim , Jan A, Mohammad J, Iqbal H. Pattern and outcome of admissions to neonatal unit of Khyber Teaching Hospital Peshawar.Pak J Med Sci 2007; 239(2):249-53.
18. Nahar J, Zabeen B,Akhter S,Azad K,Nahar N: Neonatal morbidity and mortality pattern in the special care baby unit of BIRDEM. Ibrahim Med Coll J 2007;1((2):1-4
19. Shehla S and Baloch SN. Perinatal mortality rate in relation to gender. J Coll Physcian Surg Pak Sept. 2004;14:545-48.
20. Kumor MK , Thakur SN, Singh BB. Study of morbidity and the mortality patterns in NICU at tertiary care teaching hospital in Rohtas district, Bihar, India. JCDR2012; 6(2): 282-85
21. Ugwu Gi GM. Pattern of morbidity and mortality in the newborn special care unit in a tertiary institution in the Niger Delta region of Nigeria: A two year prospective study. Global Advanced Research Journal of Medicine and Medical Sciences 2012; 1(6):133-38
22. Zulfiqar R and Naeemullah S. Neonatal mortality: Review from a tertiary hospital in Rawalpindi. Journal of Rawalpindi Medical College 2009;13(1):2-6
23. Islam MN. Situation of neonatal health in Bangladesh Orion 2006:Available at website <http://www.criion-group.net/orion/20> medical journal vol.6.
24. Gebremariam A. Factors predisposing to low birth weight in Jimmu Hospital South Western Ethiopia. East Afr Med J 2005;82(11):554-58
25. Shah GS, Singh R, Das BK. Outcome of newborn with birth asphyxia. J Nepal Med Assoc 2005;44(158):44-6
26. Naseer-ud-din, Khan A, Illahi N. Perinatal and maternal outcome of eclamptic patients admitted in Nishtar Hospital, Multan: J Coll Physicians Surg Pak 1995;5:193-97
27. Manzar N, Manzar B, Yaqoob A, Ahmed M, Kumar J.The study of etiological and demographic characteristics of neonatal mortality and morbidity- a consecutive case series study. BMC pediatrics 2012; 12:131-34
28. Chishti AZ, Iqbal MA, Anjum A, Maqbool S. Risk factor analysis of birth asphyxia at the children's hospital,Lahore. Pak Paediatr J 2002; 26:47-53.
29. Seyal T, Husnain F, Anwar A. Audit of neonatal morbidity and mortality at neonatal unit of Sir Gangaram hospital Lahore. Annals of KEMU 2011;17(1);9-13
30. Seyal A A, Brohi A R, Junejo A A. Pattern and outcome of admissions to neonatal unit of tertiary care hospital, Nawabshah. Med Forum Mon 2012;23(3):16-19
31. Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, deBernis L, et al. Evidence based, cost effective interventions: how many newborn babies can we save?Lancet 2005; 365:977-88.