PUB: 96/2013

Journal of Neonatology

Vol.27, No.1, January - March 2013

ORIGINAL ARTICLE

Study of Perinatal Outcome of a Tertiary Care Hospital

Chirag D. Shah*, Swati Upadhyay, Narendra N.S**, K. M. Mehariya*****

*Assistant Professor, **Resident, ***Professor & Head of Department, Department of Paediatrics, BJ Medical College, Civil Hospital, Ahmedabad

Abstract

A retrospective observational study was done to assess the perinatal outcome of our tertiary care hospital from April 2009 to Dec 2011. The data was collected in prescribed proforma and analyzed. Out of various modes of delivery, cesarean section was performed in 28.6% of all deliveries. Out of the total live births, 8.8% were preterm and 39.4% were low birth weight. The neonatal mortality rate was 41.53/1000 live births. Birth asphyxia, Sepsis, Hyaline Membrane Disease and Meconium Aspiration Syndrome were the major morbidities, birth Asphyxia being the most common primary cause of mortality in 27.5%. Blood culture analysis revealed Coagulase Negative Staphylococcus aureus to be the most common organism isolated.

Key Words: Perinatal outcome, Neonate, Tertiary care

Introduction

Collection of standardized neonatal-perinatal data is a pillar of newborn care quality at the individual centre level as well as at the national level. The National Neonatology Forum (NNF) first launched National Neonatal-Perinatal Database (NNPD) initiative in 1995 using locally developed software. This was repeated in 2000 by 16 centres in the country. In 2002-03, a network of 18 institutions, supported by the Indian Council of Medical Research (ICMR), succeeded in: (a) providing valuable information on stillbirths and neonatal morbidity and mortality including profile, burden and determinants; (b) standardizing definitions and data collection and analysis protocols; (c) developing capacity for newborn health research; and (d) developing research network mechanisms. This was the first time when detailed information on individual babies from all centers was gathered prospectively over two full calendar years. It encompassed an electronic data entry for over two lakhs births for over 300 variables. Ten of the sites are linked to district level hospitals as well, and community extensions can be visualized in future. The WHO Collaborating Centre (WHO-CC) for Training and Research in Newborn Care at All India Institute of Medical Sciences, New Delhi was the Nodal Centre for this Network. Establishment of a SEA Neonatal-Perinatal Database Network was proposed in year 2005 and for the first time with support from WHO-SEARO in 2007-08, South-Asia NNP network was launched in six countries comprising a center of excellence each-Bangladesh, Nepal, Srilanka, Thailand, Indonesia, India (AIIMS, NEW DELHI).

There is a compelling need to obtain, compile, analyze and disseminate reliable data on neonatal-perinatal health collected from various centers of our country for improvising neonatal care. A fundamental prerequisite for planning, implementing and monitoring health care programmes is to ensure an accurate assessment of the morbidity and mortality derived from a reliable database. However, there is a paucity of data on several key aspects of neonatal-perinatal health in our country. We do not have accurate estimate of major morbidity such as asphyxia, sepsis; or of the major causes of maternal, neonatal and perinatal morality. Besides, the available data is not collected on a uniform protocol, making it difficult to get the overall picture and to make comparisons. More and more databases need to be developed under able local leadership in consultation with State NNF. This will be of considerable help to planners, researchers and healthcare providers, who are committed to improve neonatal health care services in the country.

With this goal, observational study was done at our tertiary care hospital of a state connected with a medical college. A large number of referral cases with high risk pregnancy are being admitted in the hospital. Babies born through such deliveries are been routinely brought to the NICU for observation & further treatment when required. The aim was to study perinatal outcome in terms of morbidity, mortality & survival of such newborns. The purpose was to contribute this data for preparation of database &utilization for research & planning of MCH services.

Materials & Methods

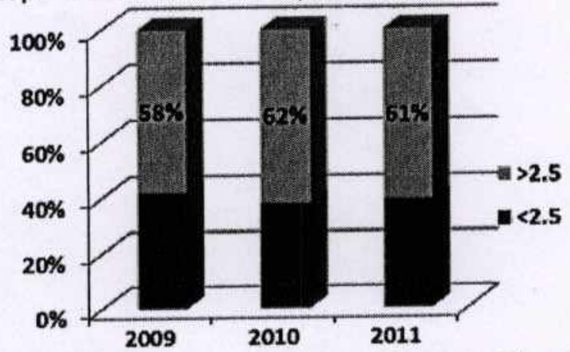
This was a retrospective observation of a perinatal data from April 2009 to December 2011. The data was collected in prescribed proforma. Data was obtained from the Obstetrics department & intramural nursery of NICU. The entire data was analyzed and important observations were summarized. The results were compared with SEAR-NPD 2007-08 (South East Asian Region Neonatal Perinatal Database) and National Neonatal Perinatal Database 2002-03 due to lack of comparable studies in contemporary period.

Observations

Delivery Modes & Outcome:

Total 18,511 deliveries occurred, of which 5,302 were caesarean delivery. This accounts to CS rate of 28.6%. Total live births were 17,719 of which 1,573 were preterm which constitutes8.8% of live births. Total 6,994 were low birth weight contributing up to 39.4% of live births. (Table 1a, 1b & Graph 1).

Graph 1. % of LBW babies in present study



Across the institutes of excellence in 4 countries, the incidence of preterm births and LBW is comparatively higher in our country; the incidence of LBW being quite high at our center (39.4%).

Survival data:

A total of 6,977 babies were brought in to NICU of which 6,241 survived with overall survival rate of 89.45%. The Neonatal Mortality Rate was 41.53 per 1000 live births. Survival among VLBW and ELBW was 53.2% & 15.33% respectively with overall survival of LBW approaches to 91.2%. (Table 2 & Graph 2).

The NMR of our center was 2.7 times that of AIIMS; PMR was almost 4 times that of AIIMS (SEAR-NPD 2007-08). The survival in LBW group was also lower in our center as compared to other centers included in SEAR-NPD.

Perinatal asphyxia -936, Early onset sepsis(EOS)-332 Vs Late onset sepsis(LOS)-160, Hyaline Membrane Disease (HMD) -248, MSL with aspiration syndrome -187 & extreme prematurity (EX PRE) -146 were the major morbidities. The survival in perinatal asphyxia was 78.31%, in EOS was 78%, in LOS 78.75%, in Meconium Aspiration Syndrome (MAS) 71.12%, in HMD 36.69% & in extreme preterm was 15%.

Table 1a. Modes of delivery in present study and comparison with SEAR-NPD

Mode of Delivery	Present Study				SEAR-NPD 2007-08*			
	2009	2010	2011	Total	India (AIIMS)	Nepal	Bangladesh	Sri Lanka
Normal (%)	3492 (65.6)	4681 (68)	4163 (65)	12336 (66.6%)	1053 (54.1)	2935 (73.5%)	108 (29.3)	2340 (64.3)
Caesarean (%)	1511 (28.4)	1839 (27)	1952 (30.4)	5302 (28.6)	763 (39.2)	1022 (25.6%)	261 (70.7)	1130 (31.1)
Breech	114	134	114	362	-	4	-	4
Forceps	10	14	15	39	111	7	-	56
Vacuum	94	12	40	146	21	24	-	107
Twins	85	116	120	321	52	73	7	66
Triplets	1	3	1	5	5	2	6	2
Higher Order	-	-	-	-	-	-	6	3
Total	5307	6799	6405	18511	1948	3992	369	3637

*SEAR-NPD: South East Asian Region-Neonatal Perinatal Database; data for Bangladesh insufficient as stated in the report.

Table 1b. Outcome of delivery

Present Study					SEAR-NPD 2007-08			
Outcome of Delivery	2009	2010	2011	Total	India	Nepal	Bangladesh	Sri Lanka
Total Births	5394	6921	6527	18842	1979	4038	396	3653
Still Births	337	456	330	1123	31	46	27	16
Live Births	5057	6465	6197	17719	1948	3992	369	3637
Full Term	4588	5887	5671	16146	1475	3592	251	3250
Post Term	-	-	-	-	2	18	-	11
Pre Term (%)	469 (9.2)	578 (8.9)	526 (8.5)	1573 (8.8)	471 (24.1)	382 (9.8)	118 (32)	376 (10.4)
Low Birth Weight (%)	2124 **(42)**	2454 **(38)**	2416 **(39)**	6994 **(39.4)**	591 (30.3)	493 (12.3)	140 (37.9)	717 (19.7)

Graph2. % Survival of VLBW in present study

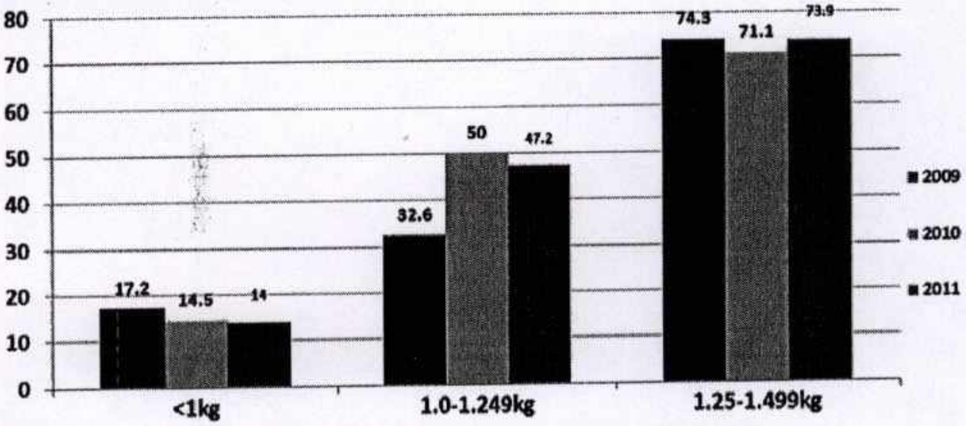


Table 2: NICU Statistics in present study & comparison with SEAR-NPD 2007-08

	Present Study				(SEAR-NPD: 2007-08)			
	2009	2010	2011	Total	India	Nepal	Bangladesh	Sri lanka
Total Live Births	5057	6465	6197	17719	1948	3992	369	3637
Total NICU Admissions	1786	2648	2543	6977	-	-	-	-
Neonatal deaths	237	265	234	736	29	25	1	23
NICU survival	1549	2383	2309	6241	-	-	-	-
% survival in NICU	86.7	89.9	90.7	89.45	-	-	-	-
Overall survival (%)								
ELBW (< 1 kg)	17.2	14.5	14	15.3	77	80	66	29.4
VLBW (< 1.5 kg)	50	51.5	73.9	73.2	84.7	63.8	95	72.4
LBW (<2.499kg)	90.2	91.6	92	91.2	96.1	95.8	99.2	97.2
Overall	95.3	95.9	96.2	95.8	92.9	98.3	99.7	99
NMR	**46.8**	**40.98**	**37.8**	**41.53**	**14.9**	**6.3**	**2.7**	**6.3**
Corrected NMR	37.4	34.78	32.1	34.7	-	-	-	-
PMR	108.1	111.4	86.4	101.9	26.3	16.3	68.2	10.1
Corrected PMR	98.5	99.04	75.4	90.9	-	-	-	-

Morbidity Data (Table 3)

Table3. Morbidities

	2009			2010			2011			total
	Total	Survival	%survival	Total	Survival	%survival	Total	Survival	%survival	%survival
Major Morbidities										
EX PRE	41	7	17.07	55	8	14.5	50	7	14	15
HMD	82	22	26.8	86	32	37.2	80	37	46.2	36.6
Asphyxia	263	191	72.6	368	301	81.7	305	241	79.0	78.3
MSL	355			415			530			
MAS	71	56	78.8	46	31	67.3	70	46	65.7	71.1
PPHN	13	7	53.8	12	5	41.6	9	6	66.6	54
EOS	109	95	87.1	146	114	78	77	50	64.9	78
LOS	35	24	68.5	58	46	79.3	67	56	83	78.5
NEC	5	2	40	10	7	70	13	10	76	62
PYO ME	10	8	80	13	11	84.6	15	14	93.3	85.9
CONG MAL	136	119	87.5	92	74	80.4	110	98	89	85.6
Minor Morbidities										
ICH	1	1	100	1	0	0	0	-	-	50
Pneumothorax	1	1	100	4	2	50%	1	1	100	83.3
Birth Injury	2	2	100	10	10	100	13	13	100	100
Hyperbil (RH)	25	25	100	45	45	100	45	45	100	100
Hyperbil (ABO)	111	111	100	293	293	100	245	245	100	100
Hyperbil (Others)	66	66	100	193	193	100	96	96	100	100

Blood Culture data:

Table 4. Blood Culture Analysis

	2009	2010	2011	total
Total Sent	492	604	606	1702
Sterile	308	388	457	1153
Positive	184	216	149	
E.coli	57	42	30	129
Pseudomonas	8	37	0	45
Klebsiella	44	44	28	116
Cons	46	54	58	158
Streptococcus	0	4	0	4
Candida	0	1	4	5
Acinetobacter	5	1	5	11
B.subtilis (Contamination)	23	33	20	76
S.aureus	1	0	1	2
Enterococci	0	0	3	3

CONS: Coagulase Negative Staphylococcal aureus

Total 1,702 blood culture sample tested of which 1,153 were sterile. The most common organisms isolated were CONS (158), E.coli (129), Klebsiella (116), B.subtilis (76) & Pseudomonas (45).

Mortality Data

Perinatal asphyxia (27.5%), HMD (21.3%), Extreme prematurity (16.8%), Sepsis (14.5%), MAS (7.3%) & lethal congenital malformation (6.3%) were the major cause of death. (Table 5). Year wise mortality is shown in graph 9-12.

According to SEAR-NPD also, major causes of mortality were prematurity, birth asphyxia, infection and lethal malformations.

Discussion

Neonatal & Infant mortality rate are the major health indicator of maternal & child health services of a state & nation. Globally also, health facility of a country is evaluated on the basis of health parameters of MCH services. Recently various national health programmes like Janani Surksha Yojna, Chiranjivi Yojna & Bal Sakha Yojna has been implemented to

TABLE 5. Cause of Death in present study and SEAR-NPD:

	PRESENT STUDY							SEAR-NPD 2007-08*			
Cause of Death	2009 (237)		2010 (265)		2011 (234)		Total	India	Nepal	Bangla desh	Sri Lanka
	No.	%	No.	%	No.	%	%	%	%	%	%
Extreme Preterm	34	14.3	47	17.7	43	18.5	16.8	26.7	37	-	66.7
Hyaline Membrane Disease	60	25.3	54	20.3	43	18.5	21.3				
Birth Asphyxia	72	30.3	67	25.2	64	27.4	27.5	3.3	22.2	-	-
Meconium Aspiration	15	6.3	15	5.6	24	10.2	7.3				
Pphn	6	2.5	7	2.6	3	1.2	2.1				
Septicemia	25	10.5	44	16.6	38	16.3	14.5	20	25.9	100	4.2
Pyogenic Meningitis	2	0.8	2	0.7	1	0.4	0.6				
Necrotizing Enterocolitis	3	1.2	3	1.1	3	1.2	1.2				
Lethal Anomaly	17	7.1	18	6.7	12	5.1	6.3	23.3	11.1	-	16.7
Sudden Infant Death Syndrome	3	1.2	5	1.8	3	1.2	1.4				
Intracranial Hemorrhage	0		1	0.3	0		0.1				
Pneumothorax	0		2	0.7	0		0.2				
Others	-	-	-	-	-	-	-	26.7	3.7	-	12.5

*: In SEAR-NPD, only major causes of mortality have been shown and rest all the causes have been included in others; Also insufficient data available for Bangladesh, as mentioned in the report.

improve neonatal care. Under National Rural Health Mission (NRHM) government has made sincere efforts to reduce rural mortality on a large scale by introducing Facility Based Newborn CARE (FBNC) & Emergency Newborn Care (EmNBC) at government facility like FRU, CHC & District hospitals

Out of total 18,511 deliveries, 5,302 were caesarean which accounts for 28.6% of total. National database for 2002 & 2003 has also observed CS rate of 28.6% (41,720 CS delivery out of 1,45,623). High CS rate could be due to large number of cases with high risk pregnancy & labour complications being routinely referred from periphery for further management & instrumental delivery as ours is the apex hospital of the state.

Out of total 18,842 births 17,719 were live births. Out of total live births 1573 were preterm which contributes to 8.8% of live births. Similarly low birth weight constitutes 39.4% of live births. National database 2002-2003 documented preterm births as 14.5% & LBW as 31.3% of live births respectively. Maternal anaemia, maternal malnutrition, chronic infections & pregnancy related complications are the important causes of LBW. High proportion of LBW contributes to significant neonatal admissions. This also contributes to prolong NICU stay & deployment of huge resource for care as they are vulnerable to significant morbidities & mortality.

NMR was 41.53 per 1000 live births with overall survival was 89.45%. Current NMR of Gujrat is 37 (<7days-29) & that of India is 36(<7 days-29) per 1000 live births. Similarly Infant Mortality Rate of Gujarat is 44 (41male Vs 47 female) & 47 that of India. (46 male Vs 49 female) Neonatal death contributed 71.7% & 65.5% to IMR of the state & country respectively.

The NMR of our center was 2.7 times that of AIIMS; PMR was almost 4 times that of AIIMS (SEAR-NPD 2007-08). The survival in LBW group was also lower in our center as compared to other centers included in SEAR-NPD.

Survival according to weight is almost more than 98% in babies with weight >2.5 Kg. Amongst the LBW, VLBW & ELBW had survival of 53.2% & 15.33% respectively with overall survival of 91.2%. Various neonatal morbidities like RDS, perinatal asphyxia, sepsis, hypothermia & metabolic derangement are more frequent & severe preterm & LBW especially with weight<1.5 Kg which accounts for relatively higher death rate amongst them.

Perinatal asphyxia in 5.2% (936), EOS in 1.8%(332), LOS in 0.9%(160), HMD in 1.3% (248), MAS in 1.05% (187) & Extreme prematurity in 0.8% (146) were the common neonatal morbidities of the total live births. The survival according to morbidity was 78.31% in asphyxia, 78% in EOS, 78.75% in LOS, 71.12% in MAS, 36.69% in HMD & 15% in extreme preterm.

Total 1702 blood culture sample were tested of which 1153 become sterile. The most common organisms isolated were CONS (158), E.coli (129), Klebsiella (116), B.Subtilis (76) & Pseudomonas (45). Higher proportion of CONS could be due to poor skin preparation before sample collection. Similarly isolation of B. subtilis indicates laboratory contamination in present database.

Primary cause of death was asphyxia in 27.5%, HMD in 21.3%, Extreme prematurity in 16.8%, Sepsis in 14.5%, MAS in 7.3% & lethal congenital malformations in 6.3%. National database 2002-2003 has reported asphyxia in 28.8%, extreme prematurity in 26.3%, sepsis in 18.6% & lethal congenital malformation in 9.2% as an primary cause of death. SEAR-NPD 2007-08 has also reported prematurity, perinatal asphyxia, sepsis and lethal malformation as major causes of mortality.

We hope that in the coming years, this initiative of preparing databases at all the centres that care for newborns in the country would continue and thus help in reaching the goal of "intact survival" by improvising neonatal care.

What this study adds to existing knowledge?

New insights into the profile of neonatal-perinatal trends have been generated which would be highly useful in planning new policies and methods for improving neonatal outcome.

The study can also aid in preparing reliable national database which is fundamental pre-requisite for planning, implementing and monitoring health care programs.

The study also enabled us to compare our neonatal morbidity and mortality trends with other centers and thus helped us in identifying the major areas which need to be strengthened.

Acknowledgement

We are profoundly indebted to the superintendent of our hospital, HOD, NICU In-charge and HOD of Gynecology Department. Last but not the least, we would thank the paramedical staff, all the patients and their parents for their unconditional assistance throughout the study period.

References

1. National Neonatal - Perinatal Database 2002-03, NNPD Network. Supported by Indian Council of Medical Research, New Delhi, Nodal Centre, AIIMS, New Delhi. http://www.newbornwhocc.org/pdf/nnpd_report_2002-03.PDF
2. South East Asia Regional - Neonatal Perinatal Database (SEAR-NPD: 2007-08).

http://www.newbornwhocc.org/ pdf/SEAR_NPD-Final_report.PDF

3. SRS Bulletin. Govt. of India (2008), sample Registration System, Statistical Report 2007, Report No. 2 of 2008, Ministry of Home Affairs, New Delhi. http://censusindia.gov.in/ Vital_Statistics/SRS_Bulletins/SRS_Bulletins_links/SRS_Bulletin_-_October_2007-1.pdf
4. SRS bulletin. Govt. of India (2011), Sample Registration System, Statistical Report 2011, Ministry of Home Affairs, New Delhi. http://censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS_Bulletin_December_2011.pdf