Original Research Article

TO STUDY ANTENATAL RISK FACTORS REQUIRING NEONATAL INTENSIVE CARE (N.I.C.U.) ADMISSION

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Abstract

Background: According to WHO 4 million newborn deaths occur worldwide every year. Among these approximately 98% deaths occur in developing countries and are caused by infections, asphyxia, complications of prematurity and low birth weight generally reported incidence of birth asphyxia lies between 2.9 and 9.0/1000 deliveries. Neonatal mortality accounts for nearly 2/3 of infant mortality rate and 1/3 of under-five mortalities worldwide. Infant mortality rate of any country reflects its socioeconomic status as well as healthcare efficiency, effectiveness and its outcome. Hence there is need to improve neonatal care services globally. With this background it is important to identify group of pregnant women who need NICU services after delivery. Preventable causes for neonatal morbidity should also be labeled and addressed during antenatal period. **Material & Methods:** This retrospective hospital record based analytical study was done among 1862 NICU neonates admitted in dept of Obstetrics & Gynaecology, Peoples Medical College, Bhopal. All women without NICU admission were excluded. Still birth infants beyond 28 days after delivery were also excluded. Delivered women with neonates requiring NICU admission were included in study and further reason for NICU admission and duration of NICU stay for the neonate was estimated from the records. **Results:** Maternal diseases complicating pregnancy/medical condition in mother during pregnancy 41% was a major concern for neonates for NICU admission, second was past B.O.H. 31%. and last was maternal contributing factor in labor was 28%. Maximum preterm 85% but 75% AGA were shifted to NICU for various reasons. Minimum admissions were of post term 4% and LGA 9%. Finally maternal risk factor resulting in NICU admission of neonate was maternal anemia (67%) with asphyxia in neonate (65%). **Conclusion:** Our study concludes that Anemia was a major health issue for NICU in antenatal cases. In neonate problems were like late onset sepsis, LBW, R.D.S. and perinatal asphyxia were commonly found. Diseases like anemia, UTI, and hypertension observed in this study are preventable. Should be taken care of from adolescent age group itself. Birth asphyxia can also be prevented by specific antenatal and intra natal care.

Keywords: NICU, Antenatal risk factors, Maternal diseases

Introduction: According to World Health Organization (WHO) 4 million newborn deaths occur worldwide every year.[1] Among these approximately 98% deaths occur in developing countries and are caused by infections, asphyxia, complications of prematurity and low birth weights generally reported incidence of birth asphyxia lies between 2.9 and 9.0/1000 deliveries.[2] Neonatal mortality accounts for nearly two-

thirds of infant mortality rate and one-third of under-five mortalities worldwide.[3] Children under age 5 accounted for 5.4 million of these deaths, with 2.5 million deaths occurring in the first month of life - approximately 7000 every day. The risk of dying was highest in the first month of life at an average rate of 18 deaths per 1000 live births globally in 2017 and 24 per 1000 live births in India. Infant mortality rate was 32 per 1000 live births compared to Global average of 29 per 1000 live births.[4] New born care is of vital importance for survival. It is also important from future development point of view.[5] There is high risk group of pregnancies where there is increased neonatal morbidity and mortality. As such new born needs special care, these infants at risk should be identified prior to birth itself so that precautions like in utero shifting need can be judged for intensive care.[6] Neonatal period of a child is most vulnerable period. It is the obstetrician's task to identify new born infant at risk of morbidity and mortality. Infant mortality rate of any country reflects its socioeconomic status as well as healthcare efficiency, effectiveness and its outcome.[7] Hence there is need to improve neonatal care services globally.[8] With this background it is important to identify group of pregnant women who need NICU services after delivery. Preventable causes for neonatal morbidity should also be labeled and addressed during antenatal period.[9] The knowledge of pattern of N.I.C.U. admissions will help in making future management protocols for specific conditions. It will further enhance utilization of skilled hands and up gradation of resources.

Objectives:
1. To identify obstetric conditions where the newborn is at risk of N.I.C.U. admission.
2. To analyze preventable obstetric causes for increased N.I.C.U. admission.
3. To identify the infants who need additional neonatal care.
4. To establish gold standard protocol about important obstetric information to be conveyed to neonatologist.

Materials & Methods:
STUDY DESIGN: Retrospective Hospital record based analytical study.
SAMPLE SIZE: under study N =1862 women with neonate admitted to N.I.C.U.
INCLUSION CRITERIA:
1. Record of All baby admitted to N.I.C.U.
2. All high risk pregnancies >28 weeks record.
3. All patients admitted in labor room in latent phase.
4. All high risk patient who are on expectant treatment e.g. I.U.G.R., placenta previa, renal disease.
5. All live births up to 28 days where referral to N.I.C.U. is required.
EXCLUSION CRITERIA: All neonates who were not shifted to N.I.C.U. and
1. Baby admitted in N.I.C.U. for observation only and shifted to nursery.
2. Data of NICU admission case not found.
3. Still birth record.
4. Infants >28 days.
5. Home deliveries referrals.
METHODOLOGY: In the present study data of 1,862 mothers whose neonates required N.I.C.U. admission was collected from both case records after obtaining ethical clearance from institute's ethical committee. Data of N.I.C.U. admission of neonates whose mother had antenatal risk factors was obtained from hospital record.
All women without N.I.C.U. admission were excluded. Still birth infants beyond 28 days after delivery were also excluded. Analysis of the case record for different clinical conditions and the reason for admission of neonates due to antenatal risk factors was evaluated in detail according to proforma. Maternal risk factors for

N.I.C.U. admission were scrutinized. Health problems in antenatal, intra natal period of women socio-demographic variables were identified. Each case record was analyzed from clinical point of view where neonate health after birth was not fair enough as predicted by 5 minute A.P.G.A.R. score as @ 0-3 used as a parameter for birth asphyxia. Clinical diagnosis was made by neonatologist on admission to N.I.C.U. From the neonatal case record relevant variables like gestational age at birth and S.G.A., A.G.A., L.G.A. neonates were diagnosed. Next preterm and post term group was obtained. Gestational age was largely based on fetal biometry and past menstrual history. For SGA cut off used was <10th percentile for that period of gestation L.G.A. cut off used was 90thpercentile was used. A.G.A. range was between two cut offs.

Data analysis was done to assess independent association of newborn with pathological conditions at birth for need of N.I.C.U. admission. Data was compiled using M.S. Excel sheet 2007 and analyzed using IBM SPSS software Version 20. Categorical data was expressed as frequency and percentage, where as numerical data was expressed as mean and standard deviation.

Observation and Results: In the present study 9,964 live births were analyzed. 1, 862 (19%) neonates required N.I.C.U. admission for various reasons. On analysis of maternal risk factors as demographic variables major 80% of women had mean age <30yrs. Mean age of mother in the present sample was 26.19 yrs with standard deviation of 4.43. On analysis of birth order 57 % of women population was primigravida, 34% were second gravida, 10% were third gravida. Least group 5% was of 3-6th gravidity. Mean gestational age for pregnancy was 36.75weeks with standard deviation of 3.04. On estimation of gestational age of neonate at birth A.G.A. group was 75% least group was L.G.A. 9%. Route of delivery was maximum 57% by L.S.C.S. rest were vaginal delivery. On subdivision of full term new born maximum 51% constituted A.G.A. domain, 31% S.G.A. and least 8% were L.G.A. neonates. On analysis of preterm neonates highest group was A.G.A. 74%. Among post term neonates highest group was S.G.A. 62 %.

Fig:- 1 NICU admission in co- relation with gestational age
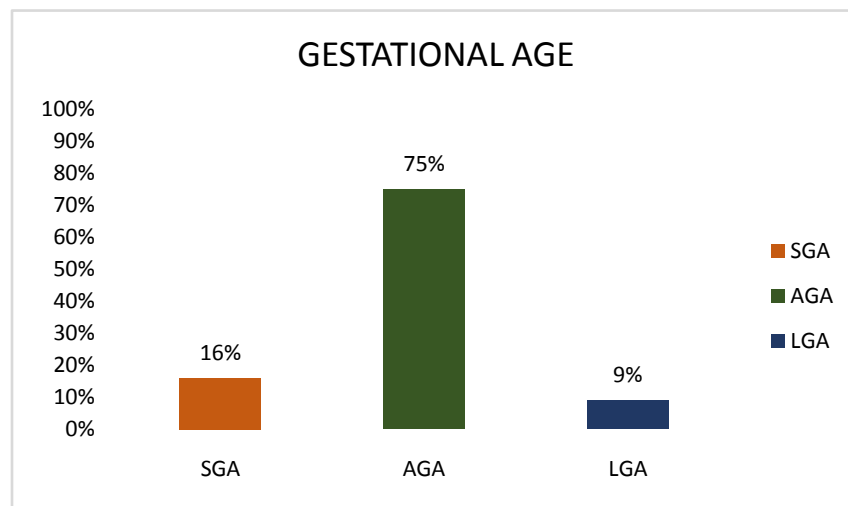

Table-1:- Correlation of Mothers Variables With Neonatal Variables

AGE OF MOTHER	WEIGHT RANGE	%	GRAVIDA	%	TERM OF PREGNANCY	GESTATIONAL AGE AT BIRTH	MODE OF DELIVERY

(YRS.)		(GMS)				PRE TERM 85%	FULL TERM 11%%	POST TERM 4%	SGA 16%	AGA 75%	LGA 9%	NVD 47% %	LSCS 53% %
18-TO-30	80%	<2000	76%	PRIMI	57%	901	138	22	298	1396	167	66%	67%
>31-<35	9%	>2000-<3499	19%	SECOND	34%	405	218	10				34%	33%
>36	11%	>3500	5%	THIRD	10%	103	67	16					
				FOURTH	3%	78	19	9					
				FIFTH	2%	55	10	5	M	47%	875		
				SIXTH	1%	45	4	1	F	58%	987		
		ALL				1587	208						

Table-2 Neonatal Risk Factors for NICU Admission

	VARIABLE	SGA/LBW	AGA	LGA	PRE TERM	FULL TEM	POSTTERM	%
1	Asphyxia	3%	14%	2%	17%	6%	1%	34%
2	Jaundice	1%	12%	2%	11%	1%	1%	14%
3	Anemia	1%	11%	1%	5	3%	1%	9%
4	Sepsis <72 hrs	2%	2%	1%	4%	2%	1%	4%
	>72 hrs	2%	3%	1%	11%	4%	1%	5%
5	Seizures < 24 hrs	1%	3%	1%	11%	4%	1%	2%
	>24 hrs	2%	2%	1%	6%	1%	1%	4%
6	Feed intolerance and vomiting	2%	1%	1%	3%	1%	1%	9%
7	Congenital defects	1%	1%	1%	1%	1%	1%	3%
8	Poly-cythemia	1%	1%	1%	4%	3%	1%	6%
9	Metabolic disorders	2%	3%	1%	7%	2%	1%	7%
10	HIE	1%	1%	1%	1%	1%	1%	3%
	TOTAL	16%	75%	9%	92%	11%	4%	100

TABLE-3 Maternal Risk Factors for NICU Admission

S.N	PAST BAD OBSTETRICS HISTORY	31%	MATERNAL DISEASES COMPLICATING PREGNANCY MEDICAL CONDITION IN MOTHER	41%	MATERNAL CONTRIBUTING FACTORS IN LABOR	28%
1.	previous nicu admission	5%	use of drugs -thyroid, epilepsy etc	6%	use of drugs	2%

2.	diabetes to mother	6%			lower genital tract infection	3%
3.	metabolic disorders in mother	4%	Anemia	34%	septicemia in mother	5%
4.	gestational d.m.	4%	Hypothyroidism	6%	prom and oligo	15%
5.	previous still birth & previous intra uterine death	4%	Uti	5%	Polyhydromnias	7%
6.	previous delivery with hyperkalemia and hypokalemia / previous delivery with hypercalcemia /hypermagnesimia	4%	Abo incompatibility	2%	Twins	3%
7.	mother with abo incompatibility	2%	Jaundice	3%	Breech	4%
			HYPERTENSIVE DISORDERS and oligo	25%	abnormal presentation	2%
					prolong l /obstructed labor+	6%

Table -4 :- Maternal Risk Factor Identified for NICU Admission

MATERNAL	NEONATAL	SGA %	AGA %	LGA %	PRE TERM %	FULL TERM %	POST TERM %	%
Anemia	LBW	1%	11%	1%	5%	3%	1%	22%
	RDS	10%	22%	9%	11%	20%	6%	60%
	TTNB	2%	4%	1%	11%	4%	1%	30%
	MSL	3%	6%	1%	3%	8%	1%	29%
	NEONATAL HYPERBILIRUBINEMIA	3%	6%	1%	3%	8%	1%	29%
	PERINATAL ASPHYXIA	3%	6%	1%	5%	6%	1%	45%
	CONGENITAL PENUMONIA	3%	6%	1%	6%	5%	1%	43%
	CAPUT	0%	0%	1%	0%	1%	0%	1%
	STAPH SEPSIS	3%	6%	1%	2%	9%	1%	18%
	ABO INCMCOMPATIBILITY	1%	2%	1%	2%	1%	1%	29%
	HYPOTHYROIDISM	1%	1%	1%	1%	1%	1%	4%
	CONGENITAL MALFORMATION	0%	0%	0%	0%	0%	0%	7%
	LATE ONSET SEPSIS	2%	2%	1%	8%	3%	1%	34%
	POLYCYTHEMIA	1%	2%	1%	2%	1%	1%	28%
	VOMITING	1%	1%	1%	1%	1%	1%	29%
	IDM	1%	2%	1%	3%	1%	1%	36%
	FEED INTOLERANCE	2%	1%	1%	2%	2%	1%	45%
	NEONATAL SEPSIS	3%	6%	1%	3%	9%	1%	28

								%
	HIE	1%	1%	1%	1%	1%	0%	30%
	NEC	1%	1%	1%	1%	1%	1%	34%
	METABOLIC DISORDER	1%	1%	1%	2%	1%	1%	45%
	HYPOCALCEMIA/ HYPOMAGNESEMIA	3%	4%	2%	6%	3%	1%	56%
PROM	MSL	2%	2%	1%	1%	1%	1%	45%
	RDS	1%	4%	1%	3%	1%	1%	68%
	SEPSIS AND SEPTIC SHOCK	6%	8%	2%	20%	9%	2%	81%
	IUGR	1%	1%	1%	2%	1%	1%	24%
	MENINGITIS	1%	1%	1%	3%	1%	1%	28%
IDM	SEPSIS	2%	2%	1%	8%		1%	56%
	Rds	1%	1%	1%	2%	1%	1%	54%
	LBW	1%	1%	1%	2%	1%	1%	65%
OLIGO HYDRAMNIOS	MSL	1%	1%	1%	2%	1%	1%	45%
POST TERM PREGNANCY	ASPHYXIA	1%	1%	1%	1%	1%	1%	67%
PIH	PHYSIOLOGICAL JAUNDICE	1%	1%	1%	1%	1%	1%	34%
	TTNB	1%	1%	1%	1%	1%	1%	45%
CONGENITAL MALFORMATIONS	CONTRACTED PELVIS+OTHER DEFORMITIES	1%	2%	1%	1%	1%	1%	21%
UTI	LBW	2%	4%	1%	4%	1%	1%	45%
	RDS	2%	4%	1%	4%	1%	1%	56%
	METABOLIC DS	1%	1%	1%	1%	1%	1%	57%
	NEONATAL SEIZURES	2%	1%	1%	1%	1%	1%	45%
G. D.M.	RDS	1%	1%	1%	2%	1%	1%	56%
	POLYCYTHEMIA	1%	1%	1%	1%	1%	1%	45%
>35 YRS	CONGENITAL ANOMALIES	1	1	0	1	1	0	4%

Discussion: On retrospective analysis of maternal risk factors in pregnancy and labor, 1862 neonates were admitted to N.I.C.U. Mean age of women in the study was 26.19 yrs with standard deviation of 4.43.[10] Maximum 57 were primigravida. Over all 57% neonates were delivered by L.S.C.S. Mean gestational age was 36.75weeks. 75% were A.G.A. newborn. Maximum 69 % were with weight >2000-<3500gm. Admission rate was highest 85% for preterm neonates and 76% for birth weight was <2000gms. Study by **Uttam et al** 51% neonatal admission preterm neonatal birth weight was < 1.5 kg.[11] 11% Full term neonates and 4%post term neonates were shifted to N.I.C.U. Almost same observation was done by **Uttam et al [11]** study in 2014 reported NICU admission rate as identified 51% full term , 44% preterm and 5% post term. When association of maternal risk factors with NICU admission was analyzed it was observed that, asphyxia was a major reason for NICU admission in

mothers suffering from anemia in pregnancy 64%. High incidence of anemia 28% was also quoted by **Devid et al** 1996.[12] In present study next order disease was hypertension 18%. All most same observation was made by devid et al 17 % mothers had hypertensive disorders of pregnancy .UTI and APH of uncertain origin was associated with highest order of antenatal risk factor for need of NICU care was anemia 64%, next hypertensive disorder 19 %. Intranatal PROM & oligoamnios was major concern 15%.[13] Thus factors which are independently associated with I.U.G.R. were maternal preeclampsia, diabetes, urinary tract infection are the strong predictors of N.I.C.U. admission. As regards to neonatal diseases asphyxia 34%, jaundice 14%, anemia, sepsis and rest 9% were with N.I.C.U. admission. Intra partum asphyxia was in 23% cases. However by **devid et al** (1996) prevalence of intrapartum asphyxia was documented as 13% among all neonates at birth. Prevalence of U.T.I. was almost same 5% in present study while **Devid et al** reported 6% .[14]

Conclusion: On the bases of our study findings, we conclude that 18% women had hypertensive disorders and these mothers are prone for neonatal jaundice (14%). Also use of oxytocin as drug in labor is responsible for jaundice. 5% women had U.T.I. and lower genital tract infections 6% their neonates get sepsis 9% and seizures 6%. Diseases like anemia 65 %, U.T.I. 6%, Hypertension 6% observed in this study are preventable. Should be taken care of from adolescent age group itself. Birth asphyxia can also be prevented by specific antenatal and intra natal care. Major maternal diseases were −anemia (65%), P.R.O.M. (9%), P.I.H. (6%), U.T.I. (6), >35 yrs age (3%), congenital malformation (3%). P.R.O.M. & Oligoamnios neonates are more prone for sepsis and seizures.

Limitation of study: Since it is record based retrospective study, current scenario needs more multicentric prospective analytical study.

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