"Neurosonographic Screening of Preterm Babies Admittedin Nicu of Krishna Institute of Medical Sciences University, Karad"

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ABSTRACT: **Background:**
Neurosonography(NSG) was introduced into neonatology in the late 1970s and has become an essential diagnostic tool in the modern neonatology.NSG is a safe, inexpensive, non ionizing radiation, no sedation, non-invasive, bedside technology has made it different from MRI and CT scan. As the suture lines and fontanel are open in infants and neonates, this can be used as acoustic windows to look into the brain.

METHOD: All preterm less then 32weeks included in the study will undergo neurosonography using standard ultrasonography machine SEIMENS ACUSON JUNIPER.

RESULTS: In this study, i conducted NSG examination of the study subjects. We observed that 41% subjects presented with germinal matrix hemorrhage, among them overall 15% had grade I GMH, 14% had grade II GMH, 8% had grade III GMH and 4% had grade IV GMH.

Among 9% study subjectsintraventricular haemorrhage was noted, while among 10% subjects Periventricular leucomalacia was observed.

CONCLUSIONS: There was significant association between NSG and gestational age <32 weeks and birth weight <1.5kg.

KEYWORDS: preterm,neurosonography,germinal matrix hemorrhage

I. INTRODUCTION

Neurosonography(NSG) was introduced into neonatology in the late 1970s and has become an essential diagnostic tool in the modern neonatology.NSG is a safe, inexpensive, non ionizing radiation, no sedation, non-invasive, bedside technology has made it different from MRI and CT scan. As the suture lines and fontanel are open in infants and neonates, this can be used as acoustic windows to look into the brain.

The aim of the study was to estimate the magnitude of abnormal intracranial findings among the preterm neonates admitted in NICU of Krishna Institute of Medical Sciences University, Karad by using NSG and to evaluate the possible use in determining prognosis and to promote early diagnosis.

II. MATERIALS AND METHODS

TYPE OF STUDY: Prospective observational study

PLACE OF STUDY: Department of Pediatrics, KIMS Karad

DURATION OF STUDY: 18 months

METHOD OF COLLECTION OF DATA:
➢ All preterm infants below 32 weeks will be subjected for study.
➢ All patients included in the study will undergo neurosonography using standard ultrasonography machine SEIMENS ACUSON JUNIPER. .
➢ Ethical clearance was obtained for the study from the Ethical committee, KIMS
➢ Informed written consent was obtained from the parent or the guardian of the child before enrolling the child in the study.
➢ Clinical examination with particular emphasis on
•Birth weight and gender of the newborn.
•Assessment of gestational age of neonate using the criteria of the new Ballard score system.
➢ Neurosonography was performed within 7 days of birth followed by a follow up scan at the end of one month.
➢ Sonography technique :Neurosonographic examinations were performed through anterior fontanelle in both the coronal and sagittal plane

INCLUSION CRITERIA
➢ All preterm born prior to 32 weeks of gestation.
➢ All preterm who weigh less than 1500gm at birth .

EXCLUSION CRITERIA
➤ All cases suspected to have congenital malformations, severe infections and failed resuscitation.

III. RESULTS
Age distribution

In the present study we assessed the study subject's according to their gestational age distribution. We observed that majority of the subjects belonged to the gestational age of 30 weeks (34%), followed by 31 weeks of gestation among 27% subjects, 32 weeks among 17%, 29 weeks among 15% study subjects. The mean gestational age among the study subjects was observed to be 30.32 ± 1.13 weeks.

Table:1 Distribution of study subjects according to their gestational age

Gestational Age	Number of subjects	Percentage
28 weeks	7	7
29 weeks	15	15
30 weeks	34	34
31 weeks	27	27
32 weeks	17	17
Total	100	100
Mean gestational age	30.32 ± 1.13 weeks	

BIRTH WEIGHT

In the present study, we assessed the birth weight of the study subjects. We observed that the majority of the study subjects had the weight between the range of 125. to 1500 gm (49%), followed by 37% subjects had birth weight between 1000 to 1250 gm. 14% study subjects had birth weight between 750 to 1000 gm. The mean birth weight observed among current study subjects was 1202.2 ± 169.19 gm.

Table:2 Distribution of study subjects according to their birth weight

Birth weight	Number of subjects	Percentage
750-1000 gm	14	14
1000 - 1250 gm	37	37
1250 - 1500 gm	49	49
Total	100	100
Mean birth weight	1202.2 ± 169.19 gm	

Maternal risk factors

In this study i assessed various maternal risk factors. i observed that 39% mothers had PIH, whereas 27% mothers had multiple pregnancies, 21% mothers had PROM, 13% mothers had APH and birth trauma each.

Table 3: Distribution of study subjects according to presence of maternal risk factors

RISK FACTORS	Number of subjects	Percentage

PIH	29	29
APH	13	13
PROM	21	21
MULTIPLE BIRTHS	27	27
BIRTH TRAUMA	13	13

CLINICAL PRESENTATION

In the present study i assessed the clinical presentation of the study subjects. i observed that Seizures were noted among 41% subjects, Lethargy among 38% subjects, absent suckling among 31%, Flaccidity among 10%, Irritable / excessive cry among 29%, Sudden onset pallor among 12%, Hypotonia among 32% subjects, and Bulging anterior fontanelle was seen among 5% study subjects.

Table:4 Distribution of study subjects according to their clinical presentations

Clinical Presentation	Number of subjects	Percentage
Seizures	41	41
Lethargy	38	38
Absent suckling	31	31
Flaccidity	10	10
Irritable / excessive cry	29	29
Sudden onset pallor	12	12
Hypotonia	32	32
Bulging anterior fontanelle	5	5

NSG findings

In this study, i conducted NSG examination of the study subjects. We observed that 41% subjects presented with germinal matrix hemorrhage, among them overall 15% had grade I GMH, 14% had grade II GMH, 8% had grade III GMH and 4% had grade IV GMH.

Among 9% study subjectsintraventricular haemorrhage was noted, while among 10% subjects Periventricular leucomalacia was observed. Ventriculomegaly was seen among 2% subjects, cerebral edema observed among 2% subjects, Cysts were observed among 3%, Corpus Callosum Agenesis among 2% and Dandy-Walker syndrome was seen among 1% study subjects.

Table:5 Distribution of study subjects according to their NSG findings

NSG Finding		Number of subjects	Percentage
Normal		30	30
GMH	Grade I	15	15
	Grade II	14	14
	Grade III	8	8

Grade IV	4	4
IVH (intraventricular haemorrhage)	9	9
PVL (Periventricular leucomalacia)	10	10
Ventriculomegaly	2	2
Cerebral edema	2	2
Cysts	3	3
Corpus Callosum Agenesis	2	2
Dandy-Walker syndrome	1	1

OUTCOMES

In this study I assessed the outcomes among the study subjects after 1 month. I observed that 75% study subjects were cured and discharged, 4% subjects were discharged against medical advice. 6% mortality was observed in the current study. 1 case of newly diagnosed cystic PVL was diagnosed.

Table:6 Distribution of study subjects according to their outcomes (at the end of 1 month)

Outcome	Number of subjects	Percentage
Resolved	75	75
Persisted	14	14
Death	6	6
DAMA	4	4
New diagnosed	1	1
Total	100	100

COMPARISON BETWEEN NSG FINDINGS AND OUTCOMES

In the present study, we compared NSG findings with outcomes on follow up examination after 1 month. We observed that lesions were persisted among GMH grade III (3 cases), IV (1 case), IVH (2 cases), PVL (3 cases), ventriculomegaly (1 case), cerebral edema (1 case), corpus callosum agenesis (2 cases), DWS (1 case). Mortality was observed among GMH III (1 death), GMH IV (2 deaths), IVH (1 death), PVL (1 death), and cyst (1 death). Among majority of the subjects lesions were resolved.

TABLE:7 FINDINGS OF NEUROSONOGRAPHY

NSG Finding		Number of subjects	Follow up scan result				
			New	Resolved	Persisted	Death	DAMA
Normal		29	0	29	0	0	0
GMH	Grade I	15	0	15	0	0	0
	Grade II	14	0	14	0	0	0
	Grade III	8	0	4	3	1	0
	Grade IV	4	0	0	1	2	1
IVH (intraventricular haemorrhage)		9	0	4	2	1	2
PVL (Periventricular leucomalacia)		10	0	5	3	1	1
Ventriculomegaly		2	0	1	1	0	0
Cerebral edema		2	0	1	1	0	0
Cysts		3	0	2	0	1	0
Corpus Callosum Agenesis		2	0	0	2	0	0
Dandy-Walker syndrome		1	0	0	1	0	0
Cystic PVL		1	1	0	0	0	0
Total		100	1	75	14	6	4

IV. DISCUSSION

Gender wise distribution

In this study we assessed the study subjects according to their gender. We observed that majority of the study subjects were males (54%), followed by 46% female subjects. The male: female ratio observed in the present study was 1:0.85. The present study findings are compared with other studies as in given table.

TABLE:8

Gender	Males	Females
Present study	54	46
Niranjan Nagaraj et al[12]	62.9	37.1
Prithviraj et al[13]	56%	44%

USG findings

In this study, we conducted USG examination of the study subjects. We observed that 41% subjects presented with germinal matrix hemorrhage, among them overall 15% had grade I GMH, 14% had grade II GMH, 8% had grade III GMH and 4% had grade IV GMH.

Among 9% study subjectsintraventricular haemorrhage was noted, while among 10% subjects Periventricular leucomalacia was observed. Ventriculomegaly was seen among 2% subjects,

cerebral edema observed among 2% subjects, Cysts were observed among 3%, Corpus Callosum Agenesis among 2% and Dandy-Walker syndrome was seen among 1% study subjects. The present study findings are compared with other studies as in given table.

TABLE:9

Studies	Studies			Niranjan Nagaraj et al.[12]	Diwakar R et al[15]	Satish Prasad B.S[14]	Sameera Allu, T[16]		
		Present study							
GMH		**Grade I**	15%	11.2%	--	ICH: 2	**Grade I**	8.06%	
		Grade II	14%				**Grade II**	4.8%	
		Grade III	8%				**Grade II**	6.45%	
		Grade IV	4%				**Grade IV**	1.61%	
IVH	9%			1.6%	20%		--		
PVL	10%			1.6%	6.66%	11.5%	8%		
Ventriculomegaly	2%			1.6%	Hydrocephalous : 33.33%	--	12.9%		
Cerebral edema	2%			--	20%	7.7%	--		
Cysts	3%			--	6.66%	7.7%	Present		
Corpus Callosum Agenesis	2%			--	--	—	Present		
Dandy-Walker syndrome	1%			--	--	—	--		

OUTCOMES

In this study we assessed the outcomes among the study subjects after 1 month. We observed that 75% study subjects were cured and discharged, 4% subjects were discharged against medical advice. 6% mortality was observed in the current study. 1 case of newly diagnosed cystic PVL was diagnosed.

TABLE:10

Outcome	Present study	Niranjan Nagaraj et al.[12]
Resolved	75%	77.9%
Persisted	14%	--
Death	6%	12.9%
DAMA	4%	8.06%
New diagnosed	1%	--

V. CONCLUSIONS

There was significant association between NSG and gestational age <32 weeks and birth weight <1.5kg. Most common abnormality was intraventricular hemorrhage. Early neurosonography could help in prognostic immediate outcome and early intervention.

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