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Clinical Assessment of Nutritional Status at Birth by CANSCORE and Morbidity and Mortality Pattern in Them In A Tertiary Care Hospital

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Abstract: ***Context:*** *Fetal malnutrition indicates a clinical state that may be present at all most any birth weight. Small for Gestation (SGA), Intrauterine Growth Retardation (IUGR) and fetal malnutrition (FM) are not synonyms. Each condition can occur independently without the other .A simple clinical method can be used to detect FM.*
Aim: *To assess the nutritional status by CANSCORE at birth. To observe the morbidity and mortality pattern, in them.*
Study design: *Simple random ampling, prospective study.*
Setting*: This study was carried out in tertiary care centre, Siddhartha medical college hospital , department of paediatrics,Vijayawada, Andhra Pradesh, India over the period of 6 months.*
Subjects and Method: *500 consecutive live born neonates with gestation age >35 weeks. Clinical assessment of nutritional status was done within 48hrs of birth as described by METCOFF. The score is obtaining by the sum total of 9 signs. Score <25, were consider to have fetal malnutrition. Statistical analysis used- the entire data was entered in master chart. Graphpad Instat software is used for calculating chi-square & p-value.*
Result: *Out of the 500 neonates, 148 neonates had Fetal Malnutrition as detected by CANSCORE. Out of 92 SGA babies 76 (82.6%) babies had FM and 16 (17.3%) babies were well nourished by CANSCORE. Among 401 AGA babies, 72 had FM.132(26.4%) out of total 500 neonates had one or more neonatal morbidity, 93(65.4%) malnourished babies and 39(11.07%) well-nourished babies developed neonatal morbidity.*
Conclusion: *17.95% OF AGA babies had evidence of FM by CANSCORE on the other hand 17.39% of SGA babies were well nourished. This observation suggest that SGA and FM are not synonymous. Neonatal morbidity was significantly higher in babies with FM [65.4%] as Compared to well-nourishedbabies.*
Key Words: *Small for gestation (SGA), intrauterine growth retardation (IUGR), fetal malnutrition (FM), CAN Score.*

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I. Introduction

The incidence of LBW babies in india is about 30% in contrast to 5-7% in developed countries.Out of these only 10% are preterm babies,the rest being term small for gestational age babies.SGA is weight for gestational age based on population norms and some predetermined weight cutoff(<-2sd).IUGR refers to a multiplicity of adverse effects limiting the fetal growth potential. IUGR may or may not having SGA,likewise baby with IUGR and SGA may or may not having FM.So FM,SGA AND IUGR are not synonymous,one may occur without the other.FM indicates a clinical state that may be present at almost any birth weight[1].Perinatal problems and longterm sequelae are known to occur in babies with FM whether AGA or SGA.Assessment of nutritional status of the fetus has been a major concern ,because of the potentially serious sequelae of malnutrition on multiple organ systems. . There is a need for prompt identification of babies with fetal malnutrition for prevention and treatment of short term and long term sequelae. The concept of fetal malnutrition was initially developed by Clifford[2] .Scott defined FM like "*Clinical state of infants characterised by obvious intrauterine loss or failure to aquire normal amounts of subcutaneous fat and muscle[3] . "*[1]Jack Metcoff modified the definition of fetal malnutrition as the "**clinical state that may be present at almost any birth weight is clinically characterised by obvious intrauterine loss of or failure to aquire normal amount of subcutaneous fat and muscles,weight and length.**head circumference may or may not be affected". Metcoff described a simple clinical method to diagnose fetal malnutrition based on superficial and easy clinical parameters.he described it as **"clinical assessment of nutritional status(CANS)" and scoring system as**

CANSCORE. It can be utilised for identifying fetal malnutrition and may be used to predict neonatal morbidity and mortality associated with it, without the aid of any sophisticated equipments.

II. Aim

- To assess the nutritional status by CANSCORE at birth.
- To observe the morbidity and mortality pattern, in them.
- **Study design:** Simple random sampling, prospective study.

III. Materials and methods

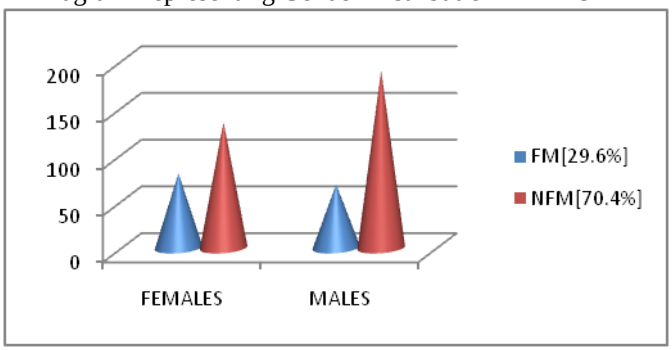
The study was conducted in tertiary care centre,siddhartha medical college,vijayawada,andhra pradesh,india.Total 500 newborns were included in the study.
The *selection criteria* used for neonates were as follows:
1.live born,singleton fetus with gestational age >35 wks.
2.neonates with known gestational age by date of last menstrual period or using obstetric ultrasonography examinations or by using new ballard score. *Neonates born to diabetic mothers* were *excluded* from the study.The observations were taken by single observer without relying on the observations taken by the other hospital staff.Data collection was done every day and entered in a master chart on the same day.

Statistical analysis:the entire data was entered in the master chart and was subjected to statistical analysis,graphpad instat software was used for calculating chisquare &p-value.
Babies were divided into 2 broad groups as
1.fetally malnourished(FM) and
2.no fetal malnutrition(NFM) by using CANSCORE.
Null hypothesis:no significant difference in proportion of two groups was tested.P-Probability of accepting null hypothesis.There is significant association between weight for gestation and malnutrition.% of malnutrition is significantly more in small for gestational age P<0.0001(significant) and it goes on decreasing with gestational age.in LGA it is as 0%.

IV. Results

Among 500 newborns included in study,285(57%) were males and rest 215 (43%) were females.Out of the 500 neonates,148(29.6%) neonates had fetal malnutrition as detected by CANSCORE. 80 Females were fetally malnourished accounts for 16% & 68 males were fetally malnourished accounts for 13.6%.Females Were slightly more affected than males & this difference was not statistically significant.We found that out of 92 SGA babies 76(82.6%) were fetally malnourished and 16(17.39%) babies were well nourished by CANSCORE.

Figure 1 Diagram Representing Gender Distribution In FM & NFM Babies



- Among 401 AGA babies 70(17.86%) had fetal malnutrition and rest 331 AGA babies were well nourished.There was no fetal malnutrition in 7 LGA babies .132(26.4%) out of total 500 neonates had one or more neonatal morbidity ,93(62.08%) malnourished babies and 39(11.07%) well nourished babies developed neonatal morbidity .18(3.6%) babies suffered birth asphyxia ,of these 13(72.2%)were malnourished and rest being well nourished .Of 16(3.2%) babies who had hypoglycemia ,11 were malnourished.Hypocalcemia developed in 15(3.0%) neonates,12(80%) of which were FM. Polycythemia was observed in 13(2.6%) babies,of which 10 babies were FM.Neonatal hyperbilirubinemia was the most frequent clinical problem,found in 56(11.2%) babies.of these 37 babies had evidence of FM.NEC developed in 5(1.0%) babies,all of these were FM.5 out of total 9(1.8%)neonates who suffered from MAS were malnourished.The incidence of all individual neonatal morbidities and overall neonatal morbidity was significantly high in FM babies.Out of 148 fetally malnourished babies detected by CANSCORE

93(62.83%) babies developed one or more neonatal morbidity.While out 352 nourished babies 39(11.07%) had neonatal morbidity.Among 148 fetally malnourished newborns mortality was 2.12% i.e;3 newborns.There was no mortality in 352 well nourished babies.Out of the 20 newborns with congenital anomalies ,7 had fetal malnutrition and 13 were nourished.In FM,2 babies had cyanotic and 1 had acyanotic CHD,1 had tracheoesophageal fistula,1 had hypospadias,1 had PUJ obstruction and 1 had duodenal atresia .In well nourished babies 3 had acyanotic and 1 had cyanotic CHD,2 had CTEV,1 had polydactyly and 1 had hypospadias.Other babies in this group had PUJ obstruction,single umbilical artery and preauricular tag with each 1 in number.2 well nourished newborns had DAOM hypoplasia.

Table 1 Table showing distribution of malnutrition according to weight for gestational age

Weight for GA	FM	NFM	Total
SGA	76	16	92
AGA	70	331	401
LGA	0	7	7
total	146	354	500

Table 2 ANALYSIS SHOWING NEONATAL MORBIDITY IN FETALLY MALNOURISHED & NO FETAL MALNUTRITION BABIES

NEONATAL MORBIDITY	FM BABIES	NFM BABIES	TOTAL
Birth Asphyxia	13	5	18 [3.6%]
Hypoglycemia	11	5	16 [3.2%]
Hypocalcemia	12	3	15 [3.0%]
Polycythemia	10	3	13 [2.6%]
Hyperbilirubinemia	37	19	56 [11.2%]
NEC	5	0	5 [1.0%]
MAS	5	4	9 [1.8%]
total	93	39	132[26.4%]

Figure 2 BAR DIAGRAM SHOWING NEONATAL MORBIDITY IN FETALLY MALNOURISHED & NO FETAL MALNUTRITION BABIES

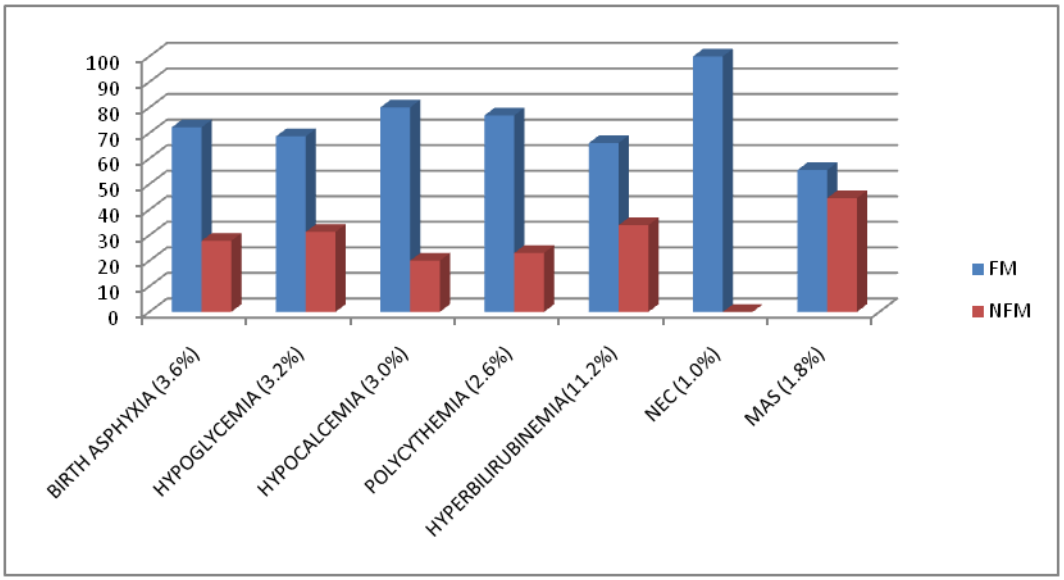


Table 3 TABLE SHOWING PATTERN OF CONGENITAL ANOMALIES IN FEATLLY MALNOURISHED AND NO FETAL MALNOURISHMENT BABIES

CONGENITAL ANOMALIES	FM BABIES	NFM BABIES
Cyanotic CHD	2	1
Acyanotic CHD	1	3
Tracheoesophageal fistula	1	0
Hypospadias	1	1
PUJ Obstruction	1	1
Duodenal Atresia	1	0
CTEV	0	2
Polydactyly	0	1
Single umbilicalartery	0	1
Preauricular tag	0	1
DAOM Hypoplasia	0	2
total	**7**	**13**

V. Discussion and conclusion

Most of the classification systems for SGA babies are based on observed birth weight below the 3rd or 10th percentile for gestational age estimated by use of various growth curves.However none of the above classification system identifies fetal malnutrition,a term coined by scott and usher,which indicates a clinical state that may be present at almost any birth weight.The clinical manifestation of fetal malnutrition depends on part on the time it began during gestation. FM is characterised by obvious intrauterine loss of or failure to acquire normal amount of subcutaneous fat and muscle.weight,length and head circumference may or may not be affected.Long term neurological sequelae may occur in babies with FM whether SGA/AGA.hence it is need of time to identify neonates with FM[11,12]. In our study ,148 out of total 500 neonates were diagnosed as fetally malnourished,using CANSCORE.This study diagnosed 148 babies as malnourished using CANSCORE <25 as diagnostic criteria for fetal malnutrition.The terms SGA,IUGR,FM are not synonymous.one may occur without the other.The present study observed that 16 of SGA infants had no FM by CANSCORE method,where as 70 of AGA babies had fetal malnutrition using CANSCORE which was statistically significant.There has been a great deal of work done to identify and understand the clinical problems in growth retarted babies.Unfortunately these studies have not always distinguished between symmetrically and asymmetrically growth retarted neonates.Hence proper and useful interpretation of these findings have been limited and much of the dogma concerning small for dates babies may be true only for a certain segment of the population.eg;malnourished or asymmetrically growth retarted babies.It is important to note that growth retarted neonates are likely to present in the delivery rooms with severe and often life threatening problems including asphyxia,hypoglycemia,polycythemia and hypothermia. In present study, 132 (26.4%%) out of total 500 neonates developed one or more neonatal morbidity and of these 93(62.08%%) were malnourished and only 39(11.07%) were well nourished. The increased incidence of neonatal morbidity in malnourished babies was statistically significant. 18(3.6%) babies suffered birth asphyxia. Of these 13 were malnourished, whereas only 5 well nourished babies suffered birth asphyxia. Significant intrapartum fetal heart rate decelerations were observed in SGA infants, they showed fetal acidosis. These findings explain why some SGA infants are asphyxiated even after an apparently atraumatic delivery. In these cases, fetal reserves appear to be chronically compromised. The resultant neonatal depression may be associated with additional complications like hypothermia, pulmonary hemorrhage, post asphyxial seizures and disseminated intravascular coagulation.In present study, 16 (3.2%) babies developed hypoglycemia, out of whom 11 babies had evidence of fetal malnutrition. On the contrary, only 5 well nourished babies, developed hypoglycemia. Causes of hypoglycemia in these babies are multifactorial. Growth retarded babies are at risk for developing hypoglycemia because of their poor glycogen stores, decreased glucose production, increased metabolic demands, relatively large brain which utilizes 75% of body glucose. It is also contributed by decreased gluconeogenic response to hypoglycemia[4] . Out of 15 (3.0%) neonates who suffered hypocalcemia in present study 12 were malnourished. A suggested mechanism for hypocalcemia in these growth retarded neonates is transient

hypoparathyroidism[5,6] . Only 13 (2.6%) out of 500 neonates had polycythemia out of that 10 babies were fetally malnourished. Polycythemia, hyperviscocity are probably because of active erythropoietin production in response to fetal hypoxia. Neonatal Hyperbilirubinemia was the commonest neonatal morbidity affecting 56 (11.2%) neonates out of 500 babies in present study.37 of these newborns had evidence of fetal malnutrition. The increased incidence of hyperbilirubinemia could be explained on the basis of increased hematocrit in malnourished infants and subsequent increased production. Increased incidence of infection in such neonates may also contribute to neonatal hyperbilirubinemia. Increased incidence of infection in growth retarded infants is probably because of decreased immune response and increased intervention in management of neonatal complications like hypoglycemia, birth asphyxia[7,8]. In present study 5 (1.0%) out of 500 babies developed necrotizing enterocolitis, all of which were malnourished . Necrotizing enterocolitis is due to hypoxic injury to gut mucosa. Infection also plays an important role. Most of the published data on NEC in LBW babies majority of them being preterm. There is paucity of published data on NEC in purely growth retarded and small for dates babies. 9 (1.8%) out of 500 neonates developed MAS and 5 of them were malnourished. Meconium aspiration syndrome in growth retarded infant is due to in utero passage of meconium due to hypoxia and subsequent gasping of fetus or newborn causing aspiration of amniotic fluid contaminated by meconium.Usher[9] mentioned that respiratory distress after birth in neonate with fetal malnutrition is due to meconium aspiration . In the present study, out of the 20 newborns with congenital anomalies, 7 had Fetal Malnutrition and 13 were well nourished.There was no significant difference in congenital anomalies in fetally malnourished babies as compared to well nourished babies. 17.86% of appropriate for gestational age (AGA) babies had evidence of fetal malnutrition by CANSCORE.On the other hand 17.39% of SGA babies were well nourished by CANSCORE. This observation proves that SGA and fetal malnutrition are not synonymous When weight is used as a sole criteria, FM babies and vice –versa[10]. Neonatal morbidity was significantly higher in babies with fetal malnutrition (62.83%) as compared to well-nourished babies (11.07%).

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