ORIGINAL ARTICLE

ASSESSMENT OF FETAL MALNUTRITION BY CAN SCORE

Preeti Waghmare, D N Balpande, Bhavana B Lakhkar

Abstract

Fetal malnutrition is the major cause of neonatal morbidity and mortality, so early detection is essential to salvage the life of the newborns.

Aims and objectives: To assess the nutritional status of live, single, full term neonates by CAN SCORE.

Materials and methods: Prospective Study carried out from July 2008 to September 2010. Total 1400 consecutive, live, single, full term neonates delivered during this period were studied. A pre designed proforma was applied to all.

Results: According to CAN SCORE, 519 (37.1%) subjects were diagnosed as malnourished as compared to Lubchenco (23%). On the other hand Ponderal Index diagnosed 40.8% as malnourished, out of which only 297 (52%) were malnourished by CAN SCORE. Of remaining 829 babies diagnosed as well nourished by Ponderal Index, 222(26.8%) were malnourished by CAN SCORE.

Conclusion: CAN SCORE is a practical, simple method to diagnose fetal (neonatal) malnutrition

Introduction

Fetal growth is a function of growth potential of the fetus, the availability of intrauterine nutrition and placental function. The concept of fetal malnutrition (FM) was initially developed by Clifford. Scott and Usher defined it as a failure to acquire adequate quantum of fat and muscle mass during intrauterine growth.[1][2]

Fetal malnutrition and terms small for gestational age (SGA) and intrauterine growth retardation (IUGR) are not synonymous; one may occur without the other irrespective of the specific aetiology and it is independent of birth weight and gestational age.[3-6] In fetal malnutrition, the subcutaneous tissues and underlying muscles are diminished and the skin of arms, legs, elbows, knees and interscapular regions is very loose. In severe fetal malnutrition, the neonate may look "emaciated" or "marasmic" as the skin appears too large for the baby.

In an observational study in term newborns in Pune, fetal malnutrition was seen in 19.6% of babies, of whom 40.7% had intrauterine growth retardation. Of the babies with FM, 59.9% were appropriate for gestational age (AGA) and 1.9% were SGA. [7]

Ponderal index (PI) has also been used by various authors to classify intrauterine growth retarded infants. Miller and Hassanein proposed that a full term infant is growth retarded if his PI is < 2.2. [8] Mohan et al. defined SGA as those with PI falling short of 10th percentile for their gestational age so in a term infant PI < 2.25 should be an indicator of intrauterine undernutrition. [9] Ponderal index relies on the principle that length is spared at the expense of weight during period of acute malnutrition. However, it is seen that weight and length may get proportionately impaired in infants with chronic malnutrition. Therefore, infants with chronic malnutrition may be misclassified by Ponderal index. [15]

Since neonatal morbidity and mortality is more closely related to nutritional status of newborn at birth than to the birth weight for gestational age, a simple, practical, clinically applicable scoring system (Clinical Assessment of Nutritional Status (CAN SCORE) was developed by Metcoff to differentiate malnutrition from appropriately nourished babies, irrespective of birth weight or AGA/SGA. [2] The score contains the examination for nine clinical signs viz. hair, cheeks, neck, arms, chest, skin of abdominal wall (or abdomen), back, buttocks and legs. The score assess nutritional status of the fetus at birth. Features of fetal malnutrition are sought for in each baby using nine 'superficial' readily detectable signs. Maximum score of 4 is awarded to each parameter with no evidence of malnutrition and lowest of 1 is awarded to parameter with the worse evidence of malnutrition. The CAN SCORE ranges between 9 (lowest) and 36 (highest). A baby with CAN SCORE below 25 is regarded as having fetal malnutrition. CAN SCORE is a purely clinical assessment like Ballard or Dubowitz assessment of gestational age scores. It is very easy to carry out by the bedside. It identifies babies with fetal malnutrition whether small, appropriate or large for gestational age (SGA, AGA or LGA).

The present study is undertaken with primary objective to assess the fetal malnutrition by CAN SCORE in live, single, full term neonates delivered at Acharya Vinoba Bhave Rural Hospital (AVBRH), Sawangi (M) Wardha. The study also compares the utility of CAN SCORE with other commonly used measures (Lubchencos intrauterine growth curves) for defining nutritional status at birth.

Materials and Method

This was a prospective comparative study carried out from July 2008 to September 2010. Total 1400 consecutive, live, single, full term neonates delivered in AVBRH were studied. A pre designed proforma was applied to all and the results were tested by statistical analysis.

Eligibility criteria: The following eligibility (inclusion/ exclusion) criteria were used for recruitment of the study subjects. Subjects satisfying all the inclusion criteria and none of the exclusion criteria were enrolled in the study.

Inclusion Criteria:

1. Live born, singleton term infants,
2. Infants whose hospital stay exceeds 24 hrs.
3. Infants with known Gestational age (Last menstrual period/ Ballard score)
4. Parents willing to give informed consent

Exclusion Criteria:

1. Babies with obvious congenital malformation.
2. Preterm newborns.

3. If the difference between Modified Ballard Score & the gestational age by date is more than 2 weeks.

Results

According to CAN SCORE, out of 1400 cases studied, 519 (37.1%) patients were grouped as malnourished in which 265 (51.1%) patients were male and 254 (48.9%) cases were female patients. Similarly 881 cases (62.9%) were categorised as well-nourished, out of which 483 (54.8%) patients were male whereas the rest of the patients were female.

Accordingly to Lubchencho, 322 (23%) patients were grouped as malnourished (SGA) in which 154 (47.8%) patients were male and 168 (52.2%) cases were female patients. Similarly 1078 cases were categorised as well-nourished (AGA/ large for gestational age), out of which 594 (55.1%) patients.

Accordingly to Ponderal Index scoring, 571 (40.8%) patients were categorised as malnourished in which 293 (51.3%) patients were male and 278 (48.7%) cases were female patients. Similarly 829 (59.2%) cases were categorised as well-nourished, out of which 455 (54.9%) patients were male and 374 (45.1%) patients were female.

As per the Lubecheho score, of 1041 AGA babies, CAN SCORE identified 233(22.7%) babies as malnourished and 795(77.3%) as well-nourished. Of 37 LGA babies, CAN SCORE identified all 37 (100%) babies as well-nourished. Of 322 SGA babies, CAN SCORE identified 273 (84.8%) babies as malnourished and 49 (15.2 %) babies as well-nourished. Sensitivity and specificity of the Lubecheho score to detect malnourished babies as compared to CAN SCORE was 52.6 % and 94.4 % respectively.

Of the 571 malnourished babies by Ponderal Index, CAN SCORE identified 297 (52.1%) babies as malnourished and 274 (47.9 %) as well-nourished. Of 829 well nourished babies by Ponderal Index, CAN SCORE identified 222 (26.8%) babies as malnourished and 607 (73.22 %) babies as well-nourished. Thus sensitivity and specificity of Ponderal Index as compared to CAN SCORE was 57.2% and 68.9 % respectively.

Discussion

In our study, CAN SCORE identified 37.1 % babies as malnourished. The results are in the line with the published literature where CAN SCORE identified fetal malnutrition in full term newborns in the range from 17.5% to 36.1% in full term babies [10-14].

In our study, as per the Lubechencho score, of the 1041 AGA babies, CAN SCORE identified 22.4 % babies as malnourished and of 322 SGA babies; CAN SCORE identified 84.8% babies as malnourished. Though, it is seen that the CAN SCORE in our study identified more number of malnourished babies, similar results have been found in other studies where CAN SCORE identified malnutrition in 4-8.3% AGA babies and 23.3-59.9% SGA babies were malnourished. [10-13]. In a study by Kushwaha, in malnourished group 20% AGA and 80% were SGA, while in well-nourished group 80% AGA and 20% were SGA [14].

In our study, as per Ponderal Index, 40.8% newborns were malnourished from which CAN SCORE identified 52% babies as malnourished. Similarly other studies have found that Ponderal Index identified 8-27.8% as malnourished newborns of which CAN SCORE detected 62.5-69.1% as malnourished. [10,11]

Taking CAN SCORE as gold standard method for detecting fetal malnutrition, the sensitivity and specificity of weight for gestational age in our study was found to be 52.6 % and 94.4 % respectively while it has varied from 72.2-82.3% (sensitivity) and 41.8-78.4% (specificity) in other studies. [10,11,15]. Sensitivity and specificity of Ponderal Index in our study was 57.2% and 68.9% respectively while it was found to be 28.6-70.1% (sensitivity) and 70.5-96.4% (specificity) in other studies. [10,11,15].

The study re-emphasizes the observations of Metcoff et al that SGA and IUGR are not synonymous with fetal malnutrition and it is a clinical diagnosis, independent of birth weight for gestational age, and ethnic groups [2]. The advantage of CAN SCORE is that it is a simple, clinical index for identifying fetal malnutrition and may have the potential to predict neonatal morbidity associated with it without the aid of any sophisticated equipments.

References

1. Scott KE, Usher R. Fetal malnutrition: its incidence, causes, and effects. Am J Obstet Gynecol. 1966; 94: 951-963
2. Metcoff J. Clinical assessment of nutritional status at birth. Fetal malnutrition and SGA are not synonymous. Pediatr Clin North Am. 1994; 41: 875-891
3. Deodhar J, Jarad R. Study of the prevalence of and high risk factors for fetal malnutrition in term newborns. Ann Trop Paediatr. 1999; 19: 273-277
4. Crosby WM. Studies in fetal malnutrition. Am J Dis Child. 1991: 145: 871-876.
5. Hill RM, Verniaud WM, Deter RL, Tennyson LM, Rettig GM, Zion TE, et al. The effect of intrauterine malnutrition on the term infant. A 14-year progressive study. Acta Paediatr Scand. 1984; 73: 482-487
6. Bhargava SK. Prospective in child Health. Indian Pediatr. 1991; 28: 1403-1410
7. Miller HC, Hassanein K. Diagnosis of impaired fetal growth in newborn infants. Pediatrics. 1971; 48: 511-522
8. Mohan M, Prasad SR, Chellani HK, Kapani V. Intrauterine growth curves in north Indian babies: weight, length, head circumference and ponderal index. Indian Pediatr. 1990; 27: 43-51
9. Meadows NJ, Till J, Leaf A, Hughes E, Jani B, Larcher V. Screening for intrauterine growth retardation using ratio of mid-arm circumference to occipitofrontal circumference. Br Med J (Clin Res Ed). 1986; 292: 1039-1040
10. Agal P, Kamath N. Utility of clinical assessment of nutritional status score (CAN score) in detecting fetal malnutrition. Nutrition conference on students medical research (2008) 11-12 April 2008, Medical college, Thiruvavathapuram. Available at URL: http://www.commedtvm.org/natconpapers/natcon_paper_41.html. Accessed on 25th March 2011
11. Kashyap L, Dwivedi R. Detection of fetal malnutrition

by clinical assessment of nutritional status score (CAN score) at birth and its comparison with other methods of determining intrauterine growth. Pediatric Oncall. 2006; 3: Art#1. Available at URL: http://www.pediatriconcall.com/fordoctor/Medical_original_articles/can_score.asp. Accessed on 25th March 2011.
12. Adebami OJ, Owa JA. Comparison between CAN SCORE and other anthropometric indicators in fetal malnutrition. Indian J Pediatr. 2008; 75: 439-42
13. Sankhyan N, Sharma VK, Singh S. Detection of fetal malnutrition using "CAN score". Indian J Pediatr. 2009; 76: 903-906
14. Kushwaha KP, Singh YD, Bhatia VM, Gupta Y. Clinical Assessment of Nutritional Status (Cans) In Term NewBorns And Its Relation To Outcome In Neonatal Period. J Neonatology. 2004: 18: 55-59
15. Mehta S, Tandon A, Dua T, Kumari S, Singh SK. Clinical assessment of nutritional status at birth. Indian Pediatr. 1998; 35: 423-428

From: Department of Pediatrics, Jawahar lal Medical College, Sawangi, Wardha, India.

Address for Correspondence: Dr Preeti Waghmare, Room no T 16 , New PG Hostel, AVBRH Campus, DMIMS (DU), Sawangi (M), Wardha, Maharashtra, INDIA. Email: preetiwaghmare96@yahoo.co.in

E-published: 1st January 2012. **Art**#1

DOI No. 10.7199/ped.oncall.2012.1