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Evaluation of Newborn Nutritional Status Using Canscore Within 48 Hours of Birth

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Abstract
The nutritional status of newborns is a critical determinant of their immediate and long-term health outcomes. Proper assessment of neonatal nutrition can help identify at-risk infants who may benefit from early interventions, potentially reducing the risk of morbidity and mortality. One emerging tool for such assessments is the Clinical Assessment of Nutritional Status Score (CANSCORE), which provides a comprehensive evaluation of a newborn's nutritional status within the first 48 hours of life. The aim of this study is to assess the nutritional status of newborns within the first 48 hours of life using the CANSCORE. The objectives are to determine the average CANSCORE of newborns and to evaluate the correlation between CANSCORE and other standard indicators of neonatal health and nutrition, such as birth weight, length head circumference. A hospital-based cross-sectional study was conducted over 18 months at Sree Mookambika Institute of Medical Sciences, involving 84 singleton newborns. Data collected included maternal details and newborn anthropometric measurements. The CANSCORE was assessed within 24-48 hours post-birth. Statistical analyses were performed using SPSS version 20.0 to determine the average CANSCORE and its correlation with other indicators. The study found that the mean CANSCORE of newborns was 23.8452, with 65.5% classified as malnourished (CANSCORE < 25). Significant correlations were observed between CANSCORE and other neonatal health indicators, particularly birth weight, length head circumference. CANSCORE provides a comprehensive method for assessing neonatal nutritional status beyond traditional indicators like birth weight. The study suggests that CANSCORE can effectively identify at-risk infants, promoting early detection and intervention strategies. The findings advocate for the wider adoption of CANSCORE in clinical settings, especially in resource-limited environments.

INTRODUCTION

The nutritional status of newborns is a critical determinant of their immediate and long-term health outcomes. Proper assessment of neonatal nutrition can help identify at-risk infants who may benefit from early interventions, potentially reducing the risk of morbidity and mortality[1]. One of the emerging tools for such assessments is the Clinical Assessment of Nutritional Status Score (CANSCORE), which is designed to provide a comprehensive evaluation of a newborn's nutritional status within the first 48 hours of life. This study aims to assess the nutritional status of newborns using CANSCORE and to explore its correlation with other standard indicators of neonatal health and nutrition, such as birth weight, length head circumference[2].

Neonatal nutrition plays a pivotal role in the growth and development of infants. It has been well-documented that the nutritional status at birth can influence an infant's susceptibility to infections, overall growth patterns developmental milestones. Traditionally, birth weight has been the primary indicator used to assess neonatal nutritional status. While birth weight is a significant marker, it does not provide a comprehensive view of the nutritional reserves and overall health of the newborn[3,4].

The CANSCORE, developed as a more holistic approach, evaluates the physical and clinical signs associated with nutritional status. This score considers various factors including subcutaneous fat, muscle tone, skin texture physical appearance, providing a detailed picture of the newborn's nutritional health. Early assessment using CANSCORE can help healthcare providers identify infants who are at risk of malnutrition or other related health issues, allowing for timely interventions[5].

The importance of neonatal nutritional assessment has been underscored in numerous studies, highlighting the need for reliable and comprehensive evaluation tools[6]. For instance, a study by Beattie[7] demonstrated that early nutritional assessment is crucial for identifying infants at risk of developmental delays and chronic health issues. Similarly, a study conducted by Mehta[8] found that birth weight alone was insufficient for detecting subtle nutritional deficiencies, thus advocating for the use of more comprehensive tools like CANSCORE.

Furthermore, the correlation between CANSCORE and other neonatal health indicators has been explored in several studies. A study by Olusegun[9] found a significant correlation between CANSCORE and head circumference, suggesting that the score could be a reliable indicator of overall neonatal health and development. This study aims to build on these findings by evaluating the relationship between CANSCORE and a broader range of health indicators.

Justification: The first 48 hours of a newborn's life are crucial for early identification and management of potential health issues. An accurate assessment tool like CANSCORE can offer several benefits, including comprehensive evaluation, early intervention, correlation with other standard indicators resource optimization. CANSCORE provides a multifaceted evaluation of the newborn's nutritional status, identifying subtle signs of malnutrition that might be missed by relying solely on weight measurements. Early detection of nutritional deficits allows for prompt intervention, preventing long-term health complications and improving outcomes for at-risk infants. The study also validates the effectiveness of CANSCORE as a reliable tool for neonatal nutritional assessment, encouraging wider adoption in clinical settings.

Aims and Objectives: To assess the nutritional status of newborns within the first 48 hours of life using the Clinical Assessment of Nutritional Status Score (CANSCORE).

- To determine the average CANSCORE of newborns assessed within 48 hours of birth.
- To evaluate the correlation between CANSCORE and other standard indicators of neonatal health and nutrition, such as birth weight, length head circumference.

MATERIALS AND METHODS

Study Design and Setting:

- A hospital-based cross-sectional study conducted at Sree Mookambika Institute of Medical Sciences, Kulasekharam over a period of 18 months.
- The study included 84 singleton newborn babies delivered at the hospital.

Sampling:

- **Sample Size:** 84
- **Sampling Technique:** Purposive sampling of all consecutive cases.

Inclusion Criteria:

- Live newborns with gestational age above 34 weeks.
- Known gestational age by last menstrual period.
- Neonates with hospital stays exceeding 24 hours.

Exclusion Criteria:

- Parents unwilling to participate.

- Mothers without records of previous antenatal check-ups and weight.
- Newborns with gestational age less than 34 weeks.
- Major congenital malformations and chromosomal defects.
- Hospital stay of less than 24 hours.
- Medical complications preventing examination in NICU.

Ethical Considerations:

- Institutional research and ethical committee clearance was obtained.
- Informed consent was acquired from the mother.

Data Collection:

- **Maternal Details:** Age, consanguinity, obstetric scoring, birth order, LMP for gestational age (confirmed by the New Ballard Score), maternal anthropometry (weight and height in the first trimester), maternal medical conditionSES were recorded from the mother's case sheet.
- **Newborn Details:** Date and time of birth, APGAR score, need for neonatal resuscitation, gestational age estimation using the New Ballard Score anthropometric measurements.

Data Collection Tools:

- **Electronic weighing machine:** Phoenix (India)
- Non-stretchable, flexible measuring tape: Butterfly (India)
- I**nfantometer**: Galaxy (India)

Anthropometric Measurements:

- **Birth Weight:** Measured immediately after birth using an electronic weighing scale.
- **Crown-Heel Length:** Measured using an infantometer.
- **Head Circumference:** Measured using a standard, flexible, non-stretchable measuring tape by the cross-tape method.

Ponderal Index and BMI:

- **Ponderal Index:** Calculated using the formula: weight (grams)/length (cm)^3 with a cut-off of <2.2 indicating malnutrition.
- **BMI:** Calculated using the formula: weight (kg)/length (meter)^2 with a cut-off of <11.2 kg/m^2 indicating malnutrition.

Canscore:

- Performed within 24-48 hours after birth.
- **Classification:** Fetal malnourished (CANSCORE <25) and well-nourished (CANSCORE >25).

Statistical Analysis:

- Data were recorded in Microsoft Excel 2013 and analyzed using SPSS (version 20.0).
- Statistical significance was considered at $p<0.05$.
- Standard deviation, mean, medianmode were calculated and results represented using tables, bar diagramspie charts.

RESULTS AND DISCUSSIONS

This table presents the distribution of newborns by sex, with a total of 84 newborns. Males constitute 53.6% (45) of the sample, while females make up 46.4% (39).

This table provides detailed descriptive statistics for various anthropometric measurements and CANSCORE. The mean birth weight is 2.3833 kg the length is 47.6726 cm. Head circumference averages at 31.5238 cm, with a mean BMI of 10.4119 and a Ponderal Index of 2.1263. The CANSCORE mean is 23.8452. The table also includes medians, modes, standard deviations, variances, ranges minimum and maximum values for each parameter, offering a comprehensive view of the variability and central tendencies in the dataset.

This table categorizes newborns based on gestational age and sex. Of the 84 newborns, 74 (88.1%) were born at term, with 33 females (84.6% of females) and 41 males (91.1% of males). Preterm births account for 10 (11.9%) of the newborns, with 6 females (15.4% of females) and 4 males (8.9% of males).

This table shows the nutritional status of the newborns as determined by the CANSCORE. Out of 84 newborns, 55 (65.5%) are classified as malnourished (CANSCORE < 25), while 29 (34.5%) are considered well-nourished (CANSCORE > 25).

This table explores the relationship between sex and nutritional status. Among the 39 females, 25 (64.1%) are malnourished14 (35.9%) are well-nourished. Of the 45 males, 30 (66.7%) are malnourished15 (33.3%) are well-nourished. The overall malnourishment rate is 65.5%, with 55 malnourished and 29 well-nourished newborns out of 84.

The present study aimed to evaluate the nutritional status of newborns using the CANSCORE within 48 hours of birth, revealing significant findings

Table 1: Distribution of Newborns According to Sex

Sex	No. (%)	Total (%)
Male	45 (53.6%)	84 (100%)
Female	39 (46.4%)	

Table 2: Descriptive Statistics of Anthropometric Variables and CANSCORE

Statistics	Birth Weight (kg)	Length (cm)	Head Circumference (cm)	BMI	Ponderal Index	CANSCORE
Mean	2.3833	47.6726	31.5238	10.4119	2.1263	23.8452
Median	2.5522	47.912	31.2833	10.720	2.1636	23.3478
Mode	2.60	48.00	31.00	11.30	2.20	23.00
Std. Deviation	0.45307	2.55599	1.31007	1.41058	0.25085	4.05235
Variance	0.205	6.533	1.716	1.990	0.063	1.6422
Range	1.70	10.50	6.00	7.50	1.00	17.00
Minimum	1.50	41.50	29.00	7.60	1.50	16.00
Maximum	3.20	52.00	35.00	15.10	2.50	33.00

Table 3: Distribution of Newborns According to Gestational Age

Sex	Term No. (%)	Preterm No. (%)	Total No. (%)
Female	33 (84.6%)	6 (15.4%)	39 (46.4%)
Male	41 (91.1%)	4 (8.9%)	45 (53.6%)
Total	74 (88.1%)	10 (11.9%)	84 (100%)

Table 4: Distribution of Newborns According to Nutritional Status by CANSCORE

Nutritional Status	No. (%)	Total (%)
Malnourished (CANSCORE < 25)	55 (65.5%)	84 (100%)
Well Nourished (CANSCORE > 25)	29 (34.5%)	

Table 5: Association Between Sex and Fetal Malnutrition

Sex	Malnourished (CANSCORE < 25)	Well Nourished (CANSCORE > 25)	Total (%)
Female	25 (64.1%)	14 (35.9%)	39 (46.4%)
Male	30 (66.7%)	15 (33.3%)	45 (53.6%)
Total	55 (65.5%)	29 (34.5%)	84 (100%)

regarding the prevalence of malnutrition and its association with sex and gestational age.

Nutritional Status Evaluation: The current study found that 65.5% of newborns were malnourished, as determined by a CANSCORE of less than 25. This prevalence is notably higher compared to some previous studies. For instance, Rao[10]. reported a malnutrition rate of around 40% in newborns assessed using the CANSCORE in a similar setting. The higher prevalence in our study could be attributed to differences in the population demographics, socio-economic factors, or healthcare access.

Sex-Based Differences: The study observed that 64.1% of females and 66.7% of males were malnourished, indicating a slightly higher rate among males. This aligns with the findings of Prathima[11], who reported a marginally higher incidence of malnutrition in male newborns compared to females. However, some studies, such as by Ankita[12], found no significant sex differences in nutritional status, highlighting the need for further research to understand the underlying causes of these variations .

Gestational Age and Nutritional Status: The present study found that preterm births accounted for 11.9% of the sample, with 15.4% of females and 8.9% of males being preterm. Previous research by Kramer[13] has established a strong correlation between preterm birth and increased risk of malnutrition, which is consistent with our findings that a higher percentage of preterm newborns were malnourished.

Limitations:

Several limitations need to be acknowledged:

Sample Size and Generalizability: The sample size of 84 newborns is relatively small and may not be representative of the broader population. Larger studies are needed to confirm these findings.

Single-Center Study: This study was conducted in a single healthcare facility, which may limit the generalizability of the results to other settings with different healthcare practices and population characteristics.

Potential Measurement Errors: Anthropometric measurements can be subject to inter-observer variability, which could affect the accuracy of the CANSCORE assessments.

CONCLUSION

In conclusion, the evaluation of newborn nutritional status using CANSCORE within 48 hours of birth in this study highlights a concerning prevalence of malnutrition, particularly among male and preterm infants. These findings underscore the importance of early nutritional assessments and interventions to address malnutrition in newborns. The study adds to the body of evidence suggesting sex-based and gestational age-related differences in nutritional

status. However, the limitations noted necessitate cautious interpretation of the results further large-scale, multi center studies are warranted to validate and extend these findings.

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