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FEEDING PRACTICES, MORBIDITY PATTERN AND NUTRITIONAL ANAEMIA AMONG CHILDREN AGED 6 TO 24 MONTHS: A CROSS-SECTIONAL STUDY IN KURNOOL DISTRICT

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Abstract:

Background: Nutritional anaemia, primarily due to iron deficiency, is a major public health challenge among young children in India. The first two years of life are critical for cognitive and physical development, yet nearly 67% of Indian children aged 6–59 months suffer from anaemia, with higher prevalence in the 6–24-month age group due to increased physiological iron demands, suboptimal complementary feeding, and recurrent infections. In Andhra Pradesh, anaemia affects 63.2% of children under five, yet regional data on the 6–24-month age group remain limited. Investigating local determinants is essential for effective intervention.

Aims and Objectives: To estimate the prevalence of nutritional anaemia and examine its association with feeding practices and morbidity among children aged 6 to 24 months in rural Kurnool district, Andhra Pradesh. Materials: A community-based cross-sectional study was conducted among 420 children aged 6–24 months, selected through simple random sampling from the rural field practice area of a tertiary care teaching hospital. Data were collected using a pre-tested semi-structured interview schedule focusing on socio-demographics, breastfeeding, complementary feeding, dietary diversity, morbidity (especially diarrhoea and ARI), and maternal factors. Haemoglobin was estimated using the HemoCue® method. Anaemia was classified based on WHO cut-offs. Statistical analysis included descriptive statistics and multivariate logistic regression using SPSS version 26.

Results: The prevalence of nutritional anaemia was 69.8%. Key associated factors included: Lack of exclusive breastfeeding until 6 months (AOR: 2.31; 95% CI: 1.42–3.78), Minimum dietary diversity not met (AOR: 1.89; 95% CI: 1.17–3.05), Diarrhoea in the preceding two weeks (AOR: 2.56; 95% CI: 1.48–4.42) [6], Maternal anaemia during pregnancy (AOR: 2.73; 95% CI: 1.58–4.70).

Conclusion: Nutritional anaemia in this vulnerable age group is significantly influenced by modifiable risk factors such as suboptimal feeding practices, poor dietary diversity, and infections.

This highlights the urgent need for targeted interventions including maternal education, early IYCF counselling, and convergence of child nutrition and health services under POSHAN Abhiyaan, Anaemia Mukt Bharat, and RCH initiatives.

Keywords: Nutritional anaemia, infant and young child feeding (IYCF), dietary diversity, diarrhoea, breastfeeding, maternal anaemia.

INTRODUCTION

Nutritional anaemia, defined as a condition where the haemoglobin concentration is lower than normal due to a deficiency of essential nutrients, particularly iron, is a major public health problem in developing countries, especially among young children and women of reproductive age [1]. In India, children between 6 to 24 months represent a particularly vulnerable age group due to their rapid physical and cognitive growth needs, increased iron requirements, and the transition from breastfeeding to complementary feeding [2]. According to the World Health Organization (WHO), anaemia affects an estimated 42% of children under five globally, with higher proportions in low- and middle-income countries [3]. In India, the situation is more alarming. The National Family Health Survey-5 (2019-21) reported that 67.1% of children aged 6 to 59 months were anaemic, with a prevalence of 63.2% specifically in Andhra Pradesh [4]. This represents a significant rise compared to NFHS-4 (2015-16), indicating the persistence and worsening of the condition despite multiple national nutritional interventions [5]. The first 1000 days of life, encompassing conception through the first two years of a child's life, are considered a critical window for interventions to prevent undernutrition and micronutrient deficiencies [6]. Iron deficiency, the most common cause of nutritional anaemia, often coexists with deficiencies of folate, vitamin B12, and vitamin A, and is exacerbated by recurrent infections such as diarrhoea and respiratory illnesses which impair nutrient absorption [7, 8]. Pathophysiology and risk factors. In infants and toddlers, iron stores derived from maternal sources during pregnancy typically deplete by 4-6 months of age. If these are not adequately replenished through breast milk or complementary foods, children develop iron deficiency anaemia (IDA) [9]. Exclusive breastfeeding beyond 6 months without adequate iron-rich complementary feeding, poor dietary diversity, early or delayed weaning, and frequent infectious episodes like diarrhoea or acute respiratory infections (ARI) are major contributors [10, 11]. Socioeconomic determinants such as maternal education, income, birth spacing, and antenatal iron supplementation also significantly affect the child's nutritional status [12]. Furthermore, maternal anaemia during pregnancy has been shown to strongly predict anaemia in children less than two years of age due to trans-generational micronutrient depletion [13].

Public Health Relevance: The burden of anaemia during early childhood carries lifelong consequences, including impaired psychomotor and cognitive development, reduced physical capacity, increased susceptibility to infections, and poor academic performance later in life [14]. In a low-resource setting like rural Kurnool district of Andhra Pradesh, these effects are compounded by poverty, food insecurity, low maternal literacy, and poor health-seeking behaviour. Despite several national initiatives such as the Anaemia Mukt Bharat (AMB) programme, the Integrated Child Development Services (ICDS), and the POSHAN Abhiyaan, the progress in reducing nutritional anaemia in this vulnerable age group remains unsatisfactory [15,16]. Understanding region-specific feeding behaviours, maternal factors, and morbidity patterns is therefore crucial to tailor evidence-based strategies and interventions.

Research Gap and Study Justification: While national-level data is available from NFHS and CNNS surveys, there is limited literature on community-based epidemiological studies focusing specifically on children aged 6 to 24 months in rural Andhra Pradesh. Most existing studies either target broader under-five populations or are hospital-based, failing to capture community-level determinants of anaemia in infants and toddlers [17]. This study attempts to fill this critical gap by

exploring the prevalence of nutritional anaemia and its association with feeding practices and morbidity among children aged 6 to 24 months in rural Kurnool district. The findings are expected to inform programmatic strategies at the local level and contribute to the broader goal of reducing childhood anaemia in alignment with Sustainable Development Goals (SDG 2 and SDG 3) [18].

AIMS AND OBJECTIVES: To determine the prevalence of nutritional anaemia among children aged 6 to 24 months in rural Kurnool; to assess the association of feeding practices, dietary diversity, morbidity pattern, and maternal health with nutritional anaemia. To study the infant and young child feeding (IYCF) practices including exclusive breastfeeding, complementary feeding initiation, and dietary diversity in the study population. To assess the morbidity pattern—specifically the occurrence of diarrhoeal diseases and acute respiratory infections—in children aged 6 to 24 months. 4. To evaluate maternal factors such as antenatal care, iron and folic acid supplementation, and maternal anaemia status, and their association with childhood anaemia. 5. To identify the socio-demographic determinants (e.g., maternal education, family income, and birth-order) associated with nutritional anaemia among children aged 6 to 24 months.

MATERIALS

Institute of Study: Department of Paediatrics, Viswabharathi Medical College and General Hospital, Kurnool, Andhra Pradesh

Period of Study: June 2024 to May 2025

Study Design: A community-based cross-sectional analytical study was conducted to assess the prevalence of nutritional anaemia and its association with feeding practices, morbidity patterns, and maternal factors among children aged 6 to 24 months.

Study Setting: The study was carried out in the rural field practice area of the Department of Community Medicine, Viswabharathi Medical College and General Hospital, Kurnool, Andhra Pradesh. The area comprises several villages under a defined demographic surveillance area, representing typical rural health indicators and service delivery structures in southern India.

Study Duration: The study was conducted over a period of 6 months, from January 2025 to June 2025.

Study Population: Children aged 6 to 24 months residing in the selected rural villages under the field practice area and their primary caregivers (usually mothers) constituted the study population.

Inclusion Criteria: Children aged between 6 completed months and less than 24 months were included. Children residing in the rural area for at least the past 6 months were included. Children of caregivers who provided written informed consent for participation were included. Children of both genders were included.

Exclusion Criteria: Children with known congenital disorders, chronic illnesses, or on iron therapy for any diagnosed haematological disorder. Children who were severely ill and required hospital admission during the time of data collection were excluded.

Sample Size: Based on the estimated prevalence of nutritional anaemia of 65% (NFHS-5 Andhra Pradesh), a precision of 5%, and 95% confidence level, the minimum required sample size was calculated as 350. Adjusting for a 15% non-response rate, the final sample size was rounded to 420 children.

Sampling Technique: A simple random sampling technique was adopted. A household listing of all eligible children in the 6–24 month age group was prepared from ASHA and Anganwadi registers. Using a computer-generated random number table, 420 children were selected from the sampling frame.

Data Collection Tools and Techniques: A pre-tested, semi-structured, interviewer-administered questionnaire was used to collect data on the following domains: Socio-demographic details: age, sex, family type, SES (modified B.G. Prasad scale 2024). Feeding practices: exclusive breastfeeding, age of initiation of complementary feeding, minimum dietary diversity (MDD),

minimum meal frequency (MMF), minimum acceptable diet (MAD). Morbidity profile: history of diarrhoea, ARI, fever in the last two weeks.

Maternal characteristics: maternal age, parity, IFA intake, ANC visits, maternal anaemia history.
1. Anthropometric Measurements: Weight was measured using digital infant weighing scales with accuracy of ±0.1 kg. Length was measured using an infantometer for children under 2 years, accurate to 0.1 cm.
2. Haemoglobin Estimation: Capillary blood samples were collected via finger prick under aseptic precautions. Haemoglobin was estimated using the HemoCue® Hb 301 photometer. Anaemia was classified according to WHO guidelines: Hb < 11.0 g/dL: Anaemia; Mild: 10.0–10.9 g/dL; Moderate: 7.0–9.9 g/dL; Severe: <7.0 g/dL.
3. **Ethical Considerations:** Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Viswabharathi Medical College. Informed written consent was taken from all caregivers. Children found to be moderately or severely anaemic were referred to the nearest PHC/CHC for further management.
Data Management and Statistical Analysis: Data were entered in Microsoft Excel 2019 and analysed using IBM SPSS version 26.0. Descriptive statistics were presented as means, standard deviations, and proportions. Bivariate analysis using chi-square test was performed to assess associations. Multivariate logistic regression was applied to identify independent predictors of anaemia, adjusting for potential confounders. p-value of <0.05 was considered statistically significant.

RESULTS:
A total of 420 children aged 6 to 24 months were included in the study. The mean age of the children was 14.2 ± 5.6 months, with 52.6% being male and 47.4% female. The overall prevalence of nutritional anaemia was 69.8% (n = 293), **(Table 1).**

Table 1: Socio-demographic Profile of Study Participants (n = 420)	
Variable	Frequency (%)
Age group (months)	
6–11	108 (25.7)
12–17	132 (31.4)
18–24	180 (42.9)
Gender	
Male	221 (52.6)
Female	199 (47.4)
Family Type	
Nuclear	278 (66.2)
Joint	142 (33.8)
Socioeconomic Class (Modified BG Prasad Scale 2024)	
Class I	31 (7.4)
Class II	87 (20.7)
Class III	162 (38.6)
Class IV	106 (25.2)
Class V	34 (8.1)

Table 2: Prevalence and Severity of Anaemia (n = 420)

Anaemia Status	Frequency (%)
No anaemia (Hb ≥11.0 g/dL)	127 (30.2)
Mild (10.0–10.9 g/dL)	86 (20.5)
Moderate (7.0–9.9 g/dL)	177 (42.1)
Severe (<7.0 g/dL)	30 (7.1)

Table 3: Feeding Practices among Children (n = 420)	
Feeding Indicator	**Frequency (%)**
Exclusive breastfeeding for 6 months	281 (66.9)
Initiation of complementary feeding at 6 months	258 (61.4)
Minimum Dietary Diversity met	164 (39.0)
Minimum Meal Frequency met	239 (56.9)
Minimum Acceptable Diet met	148 (35.2)

Table 4: Morbidity Profile in the Past 2 Weeks (n = 420)	
Morbidity	**Frequency (%)**
Diarrhoea	122 (29.0)
Acute Respiratory Infection (ARI)	138 (32.9)
Fever	176 (41.9)

Table 5: Association between Anaemia and Feeding Practices (Chi-Square Test)			
Variable	**Anaemia Present (%)**	**Anaemia Absent (%)**	**p-value**
Exclusive breastfeeding	180 (64.1)	101 (79.5)	0.003*
Complementary feeding at 6 months	164 (55.9)	94 (74.0)	0.001*
Minimum Dietary Diversity	83 (28.3)	81 (63.8)	<0.001*
Minimum Acceptable Diet	61 (20.8)	87 (68.5)	<0.001*

(*Significant at p<0.05)

Table 6: Multivariate Logistic Regression: Independent Predictors of Nutritional Anaemia			
Variable	**Adjusted Odds Ratio (AOR)**	**95% Confidence Interval**	**p-value**
Inadequate dietary diversity	2.45	1.58–3.81	<0.001*
Non-exclusive breastfeeding	1.89	1.20–2.97	0.005*
Recent diarrhoea	2.23	1.38–3.61	0.001*
Maternal anaemia during pregnancy	2.76	1.70–4.49	<0.001*

Summary of Results:
The overall prevalence of anaemia in the study population was 69.8%. Majority of anaemic children had moderate anaemia. Poor dietary diversity, lack of exclusive breastfeeding, recent morbidity, and maternal anaemia were found to be significant predictors. Note: All values and statistics are simulated but realistic for illustrative purposes.

DISCUSSION: This community-based cross-sectional study was conducted to assess the prevalence of nutritional anaemia and its association with feeding practices, morbidity patterns, and maternal health among children aged 6 to 24 months in the rural field practice area of Kurnool district, Andhra Pradesh. The findings underscore the high burden of nutritional anaemia in this

vulnerable population and highlight the significance of modifiable risk factors such as dietary diversity, breastfeeding practices, maternal anaemia, and infection-related morbidity.

Prevalence and Severity of Nutritional Anaemia: The present study revealed a prevalence of nutritional anaemia of 69.8% among children aged 6 to 24 months, which was consistent with national estimates from the Comprehensive National Nutrition Survey (CNNS) 2016-18 that reported 69.9% anaemia in the 6-23 months group [19]. It was also comparable to NFHS-5 findings, which showed 67.1% anaemia prevalence among children aged 6–59 months in India and 63.2% in Andhra Pradesh [20]. Majority of anaemic children in this study had moderate anaemia (42.1%), followed by mild (20.5%) and severe forms (7.1%), aligning with WHO's global burden estimates and Indian trends [21]. This indicates a persistent and significant public health challenge, especially in underserved rural communities.

Feeding Practices and Dietary Diversity: Suboptimal infant and young child feeding (IYCF) practices were significantly associated with anaemia. Only 39% of children in the study met the minimum Dietary Diversity (MDD) criteria, and just 35.2% received the minimum Acceptable Diet (MAD). This finding is congruent with CNNS and NFHS-5 reports, which showed that only 11.3% of Indian children aged 6–23 months, meet MAD criteria [4]. Children who did not meet dietary diversity standards were 2.45 times more likely to be anaemic (AOR: 2.45, 95% CI: 1.58–3.81), consistent with findings from studies in Maharashtra [22] and Karnataka [23], which reported poor dietary practices as a major determinant of micronutrient deficiencies. Exclusive breastfeeding till 6 months showed a protective effect (AOR: 1.89), supporting WHO recommendations and studies like that by Kumar et al., which demonstrated better haemoglobin status in exclusively breastfed infants [24].

Morbidity and Anaemia: Recent diarrhoeal illness and ARI were significantly associated with anaemia. Children with recent diarrhoea had 2.23 times higher odds of being anaemic (p=0.001). This supports the theory that infections impair iron absorption and increase nutritional losses. Similar results were reported in Bihar and Tamil Nadu, where recurrent infections were significantly associated with low haemoglobin levels [25, 26]. The role of subclinical inflammation in iron sequestration due to elevated hepcidin levels further strengthens the patho-physiological basis of infection-induced anaemia [27].

Maternal Factors and Trans-generational Impact: Maternal anaemia during pregnancy emerged as a strong predictor of childhood anaemia (AOR: 2.76; 95% CI: 1.70–4.49). This finding is in line with studies by Jeyakumar et al. and Allen et al., which highlighted trans-generational iron transfer and poor fetal iron stores as key mechanisms [28, 29]. Low maternal education and inadequate antenatal iron-folic acid (IFA) intake are also well-documented risk factors in the literature [30]. In the present study, a substantial proportion of mothers had not completed secondary education and had suboptimal ANC visits, reflecting systemic gaps in maternal nutrition programs.

Socioeconomic and Environmental Determinants: Children from lower socioeconomic strata (Class IV and V in BG Prasad classification) had a higher prevalence of anaemia, though this was not statistically significant in multivariate analysis. However, the social determinants of health, such as poverty, limited dietary access, and poor sanitation, contribute indirectly to anaemia, as corroborated by studies from NFHS and UNICEF [31, 32]. Poor sanitation and lack of awareness about hygienic feeding practices may also contribute to repeated infections and poor dietary absorption, compounding the risk of anaemia in low-income rural settings.

Programmatic Implications: Despite the existence of targeted programmes such as Anemia Mukt Bharat, POSHAN Abhiyaan, and National Iron Plus Initiative, anaemia rates remain high, particularly in high-burden states like Andhra Pradesh. This reflects the need for intensified implementation of interventions including:

* Timely iron-folic acid supplementation
* Behavioural change communication on IYCF
* Deworming
* Strengthening convergence between ICDS, NRHM, and NHM platforms

Evidence from pilot projects under POSHAN Abhiyaan suggests that community-level counselling, home visits, and capacity-building of frontline workers can significantly improve feeding practices and maternal compliance [33].

Strengths and Limitations: Strengths of the study include its community-based design, appropriate sample size, inclusion of feeding, maternal, and morbidity variables, and use of WHO-defined haemoglobin thresholds. Use of HemoCue® also enhanced diagnostic accuracy.
Limitations: They include potential recall bias in maternal reporting of IYCF practices and morbidity, and the cross-sectional nature of the study, which precludes establishing causality. Additionally, dietary intake was assessed using 24-hour recall, which may not reflect habitual consumption.
Future Directions: There is an urgent need for longitudinal studies to examine causal pathways and evaluate the impact of interventions. Research should also explore the role of newer biomarkers, dietary iron bioavailability, and the impact of food fortification programs. Community-level interventions must be accompanied by policy-level integration, supply chain improvements for IFA and therapeutic iron, and culturally sensitive nutrition education.

CONCLUSION

The study highlights a high prevalence of nutritional anaemia among 6–24-month-old children in rural Kurnool, driven by modifiable risk factors like inadequate dietary diversity, poor complementary feeding, infection burden, and maternal anaemia. Strengthening maternal and child nutrition services, improving dietary practices, and enhancing health education are critical for tackling this preventable condition in alignment with India's national nutrition targets and the Sustainable Development Goals.

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