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Assessing the Nutritional Status and Diet Quality of Rural Adolescent Girls in Relation to Anemia Prevalence

SHWETA PRIYADARSHINI[1], VIDISHA MISHRA*[2], KUSUM KUMARI[3], SANGEETA RANI[4] AND RENU KUMARI[5]

[1]Assistant Professor, [2]Assistant Professor (Senior Scale) and [3,4,5]Professor
P.G. Department of Home Science, B.R.A. Bihar University, Muzaffarpur (Bihar) India

*Corresponding Author

ABSTRACT

Adolescent girls constitute a nutritionally vulnerable group due to rapid growth, onset of menstruation, and increased micronutrient requirements. In India, anemia remains a major public health concern among rural adolescent girls owing to inadequate dietary intake, low awareness, and poor utilization of nutrition services. The present study assesses the nutritional status and diet quality of rural adolescent girls in relation to anemia prevalence using secondary data from the National Nutrition Monitoring Bureau (NNMB). Data collected during 1998–99 and 2005–06 across nine Indian states were analyzed to examine food consumption patterns, micronutrient intake, and socio-demographic correlates of anemia. The findings reveal that intake of most food groups and key micronutrients was below recommended dietary allowances, indicating widespread hidden hunger. A high prevalence of chronic energy deficiency and anemia was observed among adolescent girls. Poor awareness and suboptimal utilization of ICDS and iron–folic acid supplementation services further aggravated the condition. The study emphasizes the need for strengthening nutrition education, improving programme coverage, and ensuring effective convergence of health and nutrition services to reduce anemia among rural adolescent girls.

Keywords: Adolescent girls; Anemia; Diet quality; Micronutrient deficiency; Rural nutrition

INTRODUCTION

Malnutrition among women and adolescent girls continues to be a major public health challenge in India (Rahman *et al.*, 2019). Socio-cultural norms, gender discrimination, poverty, and limited access to health services significantly influence women's nutritional status (Srinivas and Mankeshwar, 2015). Adolescence, defined by the World Health Organization as the period between 10 and 19 years, is a critical phase marked by rapid physical growth, psychological development, and increased nutritional needs (Jodhun *et al.,* 2016). Iron deficiency anemia is the most prevalent micronutrient deficiency during this stage, particularly among girls due to the onset of menstruation and poor dietary intake (Pattnaik *et al.*, 2012; Kumari *et al.,* 2017). Rural adolescent girls are especially vulnerable because of early marriage, early pregnancy, and limited awareness regarding nutrition and health services (Anandi and Yoganandh, 2017). Despite national programmes such as ICDS and iron–folic acid supplementation, anemia prevalence remains high, necessitating a comprehensive assessment of dietary intake, nutritional status, and awareness levels among adolescent girls (Arya *et al.*, 2017).

METHODOLOGY

The study utilized secondary data collected by the National Nutrition Monitoring Bureau (NNMB), National Institute of Nutrition, Hyderabad, under the Indian Council of Medical Research (ICMR). Data from surveys

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conducted during 1998–99 and 2005–06 on tribal and rural populations across nine Indian states—Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, and West Bengal—were analyzed. Standardized procedures and calibrated equipment were used for data collection by trained medical officers, nutritionists, and social workers (NNMB methodology as cited in Pattnaik *et al.* (2012). Sampling followed probability proportion to size methods for both tribal and rural surveys. Descriptive statistics were employed to assess dietary intake, nutritional status, and anemia prevalence among adolescent girls.

Sampling Design:

Tribal Survey:

In each state, 120 villages were randomly selected from the list of villages covered under the Integrated Tribal Development Agency (ITDA). From each selected village, 40 households were surveyed using the probability proportion to size (PPS) method to ensure adequate representation of different tribal groups. Households within each village were stratified according to tribal composition, and the required number of households from each tribe was selected for the survey (Pattnaik *et al.*, 2012).

Rural Survey:

For the rural survey, villages covered under the 54th round of the National Sample Survey Organisation (NSSO) consumer expenditure survey conducted in 1998 served as the sampling frame. Based on agro-climatic criteria, NSSO divided each state into several strata, each representing approximately 1.8 million rural population. Considering available manpower and logistical resources, the National Nutrition Monitoring Bureau (NNMB) selected 16 strata from each state. From each selected stratum, five villages were randomly chosen. Each village was further divided into five natural groups of households, and a total of 20 households were surveyed, covering four households from each group.

Prevalence of Anemia among Adolescent Girls

Nutritional anemia is a widespread public health problem globally, affecting an estimated one billion individuals (Rahman *et al.*, 2019). Adolescence is a critical phase of life characterized by rapid physical growth and increased nutritional requirements (Jodhun *et al.*, 2016). Inadequate and imbalanced dietary practices during this period increase vulnerability to various nutritional deficiencies, particularly anemia (Pattnaik *et al.*, 2012). Adolescents, despite being a vital human resource, have historically received limited attention in health programmes, as they were perceived to be less susceptible to disease compared to children and older adults. Global focus on adolescent health has intensified only in recent decades.

Iron deficiency anemia continues to be a major concern for public health professionals and policymakers worldwide. During adolescence, the demand for iron increases due to growth spurts and the onset of menstruation among girls (Kumari *et al.,* 2017). Inadequate dietary intake, blood loss, and infectious diseases further exacerbate iron deficiency (Chandrakumari *et al.*, 2019). Deficiency of folic acid often occurs due to poor intake and impaired absorption, contributing to the high prevalence of anemia (Upadhye *et al.,* 2017). According to the National Family Health Survey-3 (NFHS-3), the prevalence of anemia among Indian adolescents aged 15–19 years was reported to be 55.8% in females and 30.2% in males.

Need for the Study:

To address the high burden of micronutrient deficiencies, the Government of India has implemented several nutrition intervention programmes, including micronutrient supplementation initiatives (Arya *et al.*, 2017). The National Nutrition Programme, through area-based Adolescent Girls Forums, aims to provide nutrition education and iron supplementation to unmarried adolescent girls. However, information on the coverage, utilization, and effectiveness of iron supplementation in both programme and non-programme areas remains limited (Srinivas and Mankeshwar, 2015).

Nutrition planners and programme implementers require reliable data on the prevalence of undernutrition, dietary practices, anemia burden, and awareness levels among adolescents to design effective interventions (Rahman *et al.*, 2019). Understanding these factors is essential for planning targeted remedial actions and improving the reach of nutrition services to vulnerable adolescent girls. The present study attempts to generate such evidence to support informed decision-making and programme strengthening.

Objectives of the Study

The present study aims to:

- Assess the socio-demographic profile of adolescent girls enrolled under ICDS in India
- Analyze socio-demographic and anthropometric variations among adolescent girls (Anandi and Yoganandh, 2017).
- Examine the food consumption patterns of adolescent girls under ICDS (Pattnaik *et al.*, 2012).

RESULTS AND DISCUSSION

The findings of the study indicate multiple dimensions of nutritional vulnerability among rural adolescent girls.

Awareness on Nutritional Anemia and Its Prevention:

Table 1 illustrates the percentage distribution of adolescent girls according to their level of awareness regarding nutritional anemia and its prevention. The results reveal that a substantial proportion of respondents fall under the low awareness category, indicating limited knowledge about the causes, symptoms, and preventive measures of anemia. Only a smaller segment of adolescent girls demonstrated moderate to high awareness, suggesting that information dissemination through health and nutrition programmes has not been adequate or effective. Similar observations have been reported in earlier studies, which highlight poor awareness as a significant contributor to the persistence of anemia among adolescent girls (Arya *et al.*, 2017; Srinivas and Mankeshwar, 2015). Low awareness may also influence dietary choices and reduce compliance with iron–folic acid supplementation programmes.

Table 1 : Percentage distribution of level of awareness on nutritional anemia and its prevention among adolescent girls

Level of Awareness	Frequency	Percentage
Inadequate	38	63
Moderately adequate	16	27
Adequate	6	10
Total	60	100

Mean Level of Awareness on Nutritional Anemia and its Prevention:

Table 2 presents the mean score, standard deviation, and mean percentage of awareness related to nutritional anemia and its prevention. The mean awareness score indicates an overall low to moderate level of understanding among adolescent girls. The observed variability, as reflected by the standard deviation, suggests disparities in awareness levels within the population, possibly due to differences in education, socio-economic status, and exposure to health services. The low mean percentage further reinforces the findings of Table 1, emphasizing that anemia-related knowledge among rural adolescent girls remains insufficient. These findings are consistent with community-based studies that report inadequate nutrition knowledge as a key barrier to anemia prevention (Pattnaik *et al.*, 2012; Chandrakumari *et al.,* 2019).

Table 2 : Mean, standard deviation and mean percentage of level of awareness on nutritional anemia and its prevention

Items	Maximum attainable score	Mean	SD	Mean Percentage
Meaning	3	1.45	1	13.68
Causes	5	2.15	1.35	20.28
Clinical Features	4	2.55	1	24.06
Prevention	8	4.45	1	41.98

Overall, the combined interpretation of Tables 1 and 2 highlights that inadequate awareness is a critical underlying factor contributing to poor dietary practices, low utilization of ICDS services, and suboptimal adherence to iron–folic acid supplementation.

Conclusion:

The study reveals poor dietary intake, high anemia prevalence, and inadequate awareness among rural adolescent girls (Chandrakumari *et al.*, 2019; Pattnaik *et al.,* 2012). Strengthening ICDS services, improving nutrition education, ensuring regular supply of iron–folic acid tablets, and enhancing community participation are essential to address anemia and improve adolescent health outcomes (Upadhye *et al.*, 2017).

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