Section: Community Medicine

Original Research Article

PREVALENCE OF NUTRITIONAL ANAEMIA AMONG LATE ADOLESCENT GIRLS IN RURAL AREA OF BELAGAVI

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ABSTRACT

Background: Adolescence, a key transition from childhood to adulthood, is critical for health issues like anaemia, which affects around 1.62 billion people globally. In India, the National Family Health Survey - 5 reported a 59.1% prevalence among adolescent girls, with 49.4% in Karnataka. Despite government efforts, anaemia remains widespread in rural areas**. Aim and Objective:** The aim of the study was to assess the prevalence of nutritional anaemia in late adolescent girls in rural areas of Belagavi, evaluate their knowledge about nutrition, and examine the current dietary practices in their households. **Materials and Methods:** This cross-sectional study, conducted from January to December 2021 in Vantamuri, involved 365 adolescent girls aged 16 to 19. Participants were selected using systematic random sampling from a master list prepared by ASHA. Data were collected through a pre-designed questionnaire covering sociodemographics, knowledge, attitude, and practices. Haemoglobin levels were measured using the cyanmethaemoglobin method. Data analysis included descriptive statistics, bar and pie charts, and various tests (t-test, ANOVA, Chi-square, Fisher's Exact Test) for assessing associations and significance. **Results:** The distribution of participants showed that the majority were in the 16 to 17 age group (71.78%), and most (91.23%) were Hindus. Additionally, 90% of the participants were below the poverty line. The prevalence of anaemia in the study was 42.19%. Among those with anaemia, 51.3% had mild anaemia, 37.6% had moderate anaemia, and 11.1% had severe anaemia, according to WHO guidelines. About one-third of the participants had some awareness of anaemia, and 20% recognized it as a health problem. The availability and consumption of iron and folic acid in schools were associated with a decreased prevalence of anaemia. Although dietary habits generally did not significantly impact anaemia, excluding milk products and eggs showed a beneficial effect. The study also found a statistically significant decrease in weight and BMI among participants with anaemia. **Conclusion:** The study identified a high prevalence of anaemia among 16 to 17-year-olds, with most participants below the poverty line. Severity varied, and awareness of anaemia was low. Increased availability of iron and folic acid in schools and excluding milk and eggs from the diet were associated with reduced anaemia. Additionally, anaemia was linked to decreases in weight and BMI.

Keywords: Anaemia, Nutrition, Prevalence, Dietary Habits, Adolescent girls.

INTRODUCTION

Adolescence, as defined by the World Health Organization (WHO), spans from ages 10 to 19 and is a crucial developmental period characterized by rapid physical, cognitive, and psychosocial growth.[1] This stage requires appropriate education, life skills development, health services, and supportive

environments to ensure healthy maturation. In India, there are 253 million adolescents, making up more than one-fifth of the population, underscoring the importance of addressing their unique health needs.[2] Anaemia, particularly iron-deficiency anaemia, is a significant public health concern among adolescents, especially girls. WHO defines anaemia in this group as a haemoglobin level below 12.0 g/L.2 This condition can lead to a range of health problems, including fatigue, weakened immune response, cognitive impairments, and complications during pregnancy. In India, the prevalence of anaemia among adolescent girls is alarmingly high, with reports indicating rates of 55% as per the National Family Health Survey (NFHS-4 and NFHS-5).[3,4]

In Karnataka, the prevalence of anaemia among adolescent girls aged 15 to 19 years rose from 45.3% in 2015 to 49.4% in 2020.[5] This issue is driven by factors such as poor dietary intake, inadequate healthcare access, socioeconomic disparities, and cultural practices. Despite various government initiatives like the National Nutritional Anaemia Prophylaxis Programme, the National Iron Plus Initiative, and the Anaemia Mukth Bharat campaign, the prevalence of anaemia remains high, indicating gaps in implementation and outreach.[6]

This study aims to evaluate the prevalence of anaemia and the level of awareness among late adolescent girls, with a focus on understanding the barriers to effective prevention and treatment. By identifying these gaps, the study seeks to inform more targeted and effective interventions to combat anaemia in this vulnerable population

Objective

1. To assess the prevalence of nutritional anaemia in late adolescent girls in rural area of Belagavi.
2. To assess the knowledge about nutrition in late adolescent girls.
3. To assess the current dietary practices in households of adolescent girls.

MATERIAL AND METHODS

A community-based cross-sectional study was conducted to assess anaemia prevalence among adolescent girls aged 16 to 19 years in the Belgaum district, Karnataka. The research was carried out in two sub-centres, Vantamuri and Bhutramnahatti, under the Primary Health Centre (PHC) Vantamuri, located in the rural field practice area of the Department of Community Medicine, Jawaharlal Nehru Medical College, KAHER Belagavi. The study was conducted over one year, from January 1, 2021, to December 31, 2021.

Sample Size and Calculation: The sample size was calculated based on an anaemia prevalence rate of 52.24% among late adolescents in rural Tamil Nadu,[7] using the formula: $n = 4pq/d^2$

Where:

- p is the prevalence (52.24%),
- $q = 1 – p = 47.6\%$
- d = absolute precision (10% has been considered here with a 99% CI) = 5.22

Substituting the variables in the formula: Sample size, $n = 4 * 52.24 * 47.6 / (5.22)^2 = 363.4 \approx 365$

Systematic random sampling was utilized to select participants from a master list prepared by Accredited Social Health Activists (ASHAs) as part of the National Deworming Program conducted in September 2020. Assent was collected from adolescent girls aged 16 to 17, along with consent from their parents for the study. Only consent was collected for the girls aged 18 to 19. Inclusion criteria were late adolescent girls willing to participate and permanent residents of sub-centres Vantamuri and Bhutramnahatti,. The exclusion criteria included adolescent girls aged 10 to 15 years and participants with bleeding disorders, congenital heart disease, kidney disorders, or those on medications or steroids. Ethical clearance was obtained from the Institutional Ethics Committee for Human Subjects Research of Jawaharlal Nehru Medical College, KAHER, under letter number MDC/DOME/77, dated 12/02/2021.A pretested semi-structured questionnaire was used to collect information on socio-demographic data, knowledge of anaemia, food habits, and cultural practices. The questionnaire covered variables such as age, educational status, occupation of parents, religion, type of family, and socio-economic status, using the modified BG Prasad scale.

Assessment of Anaemia: Haemoglobin levels were measured using the cyanmethaemoglobin method. Blood samples were collected, and haemoglobin concentrations were determined. Anaemia was classified as severe, moderate, or mild based on haemoglobin levels: severe (<8 mg/dl), moderate (8-10 mg/dl), and mild (10-11.9 mg/dl).

Data on Food Culture: Information on dietary practices, including the types of cereals, pulses, vegetables, meat, milk products, fruits, nuts, and salt intake, was collected. Questions also covered food preparation and consumption habits.

Family Practices: The questionnaire included questions on family practices related to the consumption of Iron Folic Acid supplements and adherence to deworming schedules.

General Physical Examination& Anthropometry: A general physical examination and anthropometric measurements included height (measured in centimeters) and weight (measured in kilograms). The Body Mass Index (BMI) was calculated and categorized as underweight, normal, overweight, or obese based on WHO standards.

Statistical Methods: Descriptive statistics, including means, standard deviations, frequencies, and proportions, were used to summarize the data. Associations between variables-sociodemographic data, menstrual history, knowledge on nutrtion, anthropometry and diet with anaemia were analyzed using independent sample t-tests, ANOVA, Chi-

square tests, Fisher's Exact Test, and Monte Carlo Simulation. Data analysis was performed using SPSS software, Trial version 26.

RESULTS

I. Sociodemographic Profile

The study involved 365 participants, Table 1 reveals that most are aged 16-17 years (71.78%) and have completed 9 years of schooling (75.89%), with nearly all currently enrolled in school (99.73%). Participants predominantly come from nuclear families (64.66%), with 33.70% from joint families and 1.64% from broken families. Economic data shows that 89.04% hold a Below Poverty Line (BPL) card, with the majority in socioeconomic class 4 (35.81%) or class 5 (26.45%). Parental education levels are generally low, with most mother's illiterate (34.07%) or having up to an 8th standard education (36.82%), and fathers similarly less educated, with 25.21% illiterate and limited higher education (Degree: 4.66%, PG: 0.55%). Occupation-wise, most mothers are farmers (48.22%) or homemakers (18.90%), and fathers are also primarily farmers (47.40%), with notable numbers in self-employment (15.62%) and labour (11.78%). Regarding housing and environment, the study reveals that most participants reside in Pucca houses (47.67%) and predominantly own their homes (91.78%). A significant majority have functional sanitary latrines (89.86%), though some rely on open defecation (5.21%) or shared/community latrines. For drinking water, sanitary wells (44.11%) and tube wells (26.58%) are the primary sources, with a small percentage using unsanitary wells (3.01%). Almost all homes are electrified (98.9%), LPG is the most used cooking fuel (66.58%), and most participants have separate kitchens (92.05%). In the study of 365 participants, 94.52% have attained menarche, with an average first period age of 13.22 years. Most participants (82.89%) have regular periods, and 69.2% experience a menstrual interval of 21-45 days. The average menstrual flow lasts 3-8 days for 77.97%, while 15.65% report clots or heavy bleeding. On average, participants use 4 sanitary pads per cycle, ranging from 1 to 15.

II. Knowledge, Attitude and Practices on nutrition among participants

In our study, Table 2 shows that 36.16% of participants are aware of anaemia, with 21.1% recognizing it as a health issue. Knowledge about the causes is held by 31.2%, while 32.3% understand its symptoms, effects, and prevention methods. Treatment knowledge is reported by 33.2% of participants. It also reveals that 38.36% are aware of iron folic tablets being provided through schools or Anganwadi centres. Among the participants, 44.38% consume these tablets, and 47.95% use deworming tablets.

III. Dietary Consumption Practices among Study Participants

Most participants eat grains and green leafy vegetables daily. Pulses are consumed by 79.73%, and vegetables daily by 78.08%. Half never consume milk products, and 31.23% eat eggs daily. Meat is consumed weekly by 27.12%, and poultry by 21.64%. Fish is eaten weekly by 23.56%, and fruits at least once a week by 65%. Nuts are eaten daily by 30.41%.

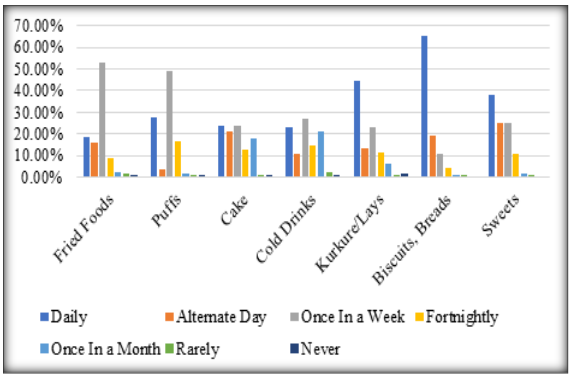

Figure 1: Food Consumption Patterns among Study Participants

In our study, 80% of participants consume junk foods, such as fried items, puffs, cakes, and LAYS, at least once a week. Notably, 44.38% eat Kurkure/LAYS (fried potato chips) daily. Additionally, 90% of participants eat biscuits and bread at least once a week, with 65.25% consuming them daily. Moreover, 27.12% of participants drink cool beverages once a week. (Figure 1), 59.73% of participants use iodized salt daily, 31.5% use both iodized and non-iodized salt, and 8.49% do not use iodized salt. Handwashing practices show 98.9% wash hands with soap and water after defecation, and 99.73% before cooking. Most participants (58.36%) can perform normal activities for more than 60 minutes. Academic performance is rated as above average by 69.32%, average by 16.9%, excellent by 12.8%, and below average by 0.82%.

IV. Prevelance of Anaemia among study participants

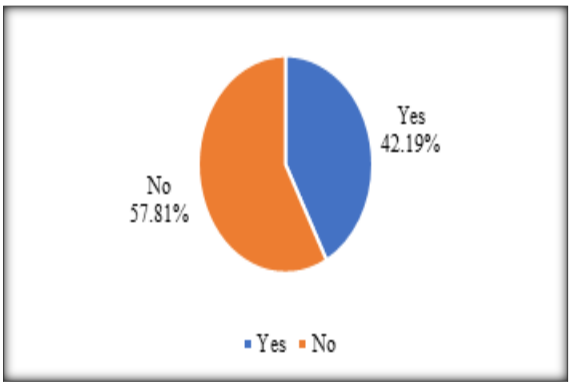

Figure 2: Prevelance of Anaemia among study participants

Among the study participants, 42.19% of the participants are anaemic, while 57.81% are not (Figure 2), in that 51.30% have mild anaemia, 37.66% have moderate anaemia, and 11.04% have severe anaemia. [Figure 3]

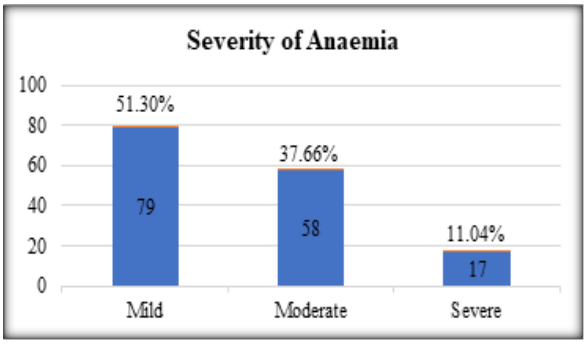

Figure 3: Distribution of participants based on the severity of anaemia

The study finds significant associations with anaemia. Participants with Below Poverty Line (BPL) cards and limited knowledge about anaemia are more likely to be anaemic, with statistical significance indicated by p-values of 0.046 and 0.03, respectively. Iron folic acid and deworming tablet consumption are linked to lower anaemia rates, with a p-value of 0.033 for iron folic acid. Participants with anaemia have a lower average BMI (19.84) compared to those without (20.35), though this is not statistically significant. Lower BMI and weight are observed in moderate and severe anaemia compared to mild anaemia. Milk product consumption is significantly associated with higher anaemia rates ($p = 0.002$), while regular egg consumption reduces anaemia risk. Frequent poultry and nut consumption is positively related to anaemia, with p-values of 0.003.

In summary, most participants were aged 16-17, with a high prevalence of anaemia at 42.2%. Among those affected, 51.3% had mild anaemia, 37.6% moderate, and 11.1% severe. The study found a significant association between anaemia and below poverty line (BPL) status but no significant correlation with factors like age, education, religion, or family type. Iron and folic acid intake from school supplements positively affected anaemia. The data indicated a higher prevalence of anaemia among participants with low BMI. While knowledge about anaemia was relatively low, there was some awareness of preventive measures. The consumption of iron and folic acid supplements was linked to reduced anaemia prevalence. However, overall dietary habits, including the consumption of junk food, did not show a significant direct impact on anaemia levels, except for the exclusion of milk products and eggs, which appeared beneficial.

Table 1: Sociodemographic details among study participants

Variable	Category	Frequency	Percentage
Age	16-17	262	71.78%
	17-18	74	20.27%
	18-19	29	7.95%
Number of Years Completed Schooling	9	277	75.89%
	10	80	21.92%
	1st PUC	7	1.92%
	2nd PUC	1	0.27%
Present Schooling Status	Studying	364	99.73%
	Drop out	1	0.27%
Religion	Hindu	333	91.23%
	Muslim	23	6.30%
	Christian	1	0.27%
	Jain	4	1.10%
	Others	4	1.10%
Type of Family	Nuclear	236	64.66%
	Joint	123	33.70%
	Broken	6	1.64%
BPL Card	Yes	325	89.04%
	No	40	10.96%
Socio-Economic Class	Class 1	24	6.06%
	Class 2	38	10.47%
	Class 3	77	21.21%
	Class 4	130	35.81%
	Class 5	96	26.45%

Table 2: Distribution of Participants Based on Knowledge, Attitude and Practice on Anaemia

Knowledge Aspect	Know (%)	Don't Know (%)
Have you heard about anaemia	36.16	63.84
Is anaemia a health problem	21.1	78.9
Causes of anaemia	31.2	68.8
Symptoms of anaemia	32.3	67.7
Effects of anaemia	32.3	67.7
How to prevent anaemia	32.3	67.7
How anaemia can be treated	33.2	66.8
Attitude/Practice Aspect	**Yes (%)**	**No (%)**
Are iron folic tablets given in school/Anganwadi/ASHA	38.36	61.64
Are deworming tablets given in school/Anganwadi/ASHA	37.26	62.74
Do you consume iron folic tablets	44.38	55.62
Do you consume deworming tablets	47.95	52.05

DISCUSSION

Adolescence is marked by rapid growth and transitions, and nutritional anaemia is a prevalent micronutrient deficiency, especially among adolescent females. This study, conducted from January to December 2021 among 365 late adolescent girls in Vantamuri, a rural area of Karnataka, aimed to explore anaemia prevalence and related factors. In this study, 71.78% of participants were aged 16 to 17 years, and 28.2% were aged 17 to 19 years. Most (75.8%) had completed 9th grade, and 21.92% had completed 10th grade. The majority were Hindu (91.23%), with 6.3% Muslim, and 90% were below the poverty line. Two-thirds were from nuclear families, and 33% from joint families. Most were in socioeconomic class four (35.81%) or five (26.45%), with 6.06% in the lowest class. These findings are consistent with studies from Northern India showing high anaemia prevalence in lower socioeconomic groups.[8,9,10]

Approximately 34.07% of participants consume tea or coffee within an hour of eating. About 80% eat junk food at least once a week and consume iron-rich foods, such as green leafy vegetables, fruits, and legumes, at least once a week. This contrasts with a study by Bukelo et al., where only 25% of rural adolescents consumed fruits and vegetables more than twice a week, which is lower than the frequency observed in our study.[11]

Our study's findings are comparable to Premalatha et al.'s study in Chennai, which reported an anaemia prevalence of 78.75% among adolescent girls. Similarly, Toteja et al. found an overall prevalence of 90.1% across 16 districts in India. However, our study observed a lower prevalence rate (42.19%) compared to these studies.[12,13] Iron and folic acid supplementation is a crucial nutritional intervention for adolescent girls, supporting their growth and development. Our study highlights a significant association between the availability of iron-folic acid (IFA) supplements in schools and their consumption among the study population. This finding resembles with a study from Maharashtra, which reported increased haemoglobin levels in unmarried adolescent girls who received IFA supplementation for three months.[14] In our study, dietary components, except for milk products and eggs, did not show a significant association with anaemia. However, it was observed that participants who consumed poultry products and nuts had lower haemoglobin levels. This suggests the need to examine the frequency and quantity of these foods, as well as other potential causes of anaemia. Similar findings were noted in a National Adolescent Nutrition Survey in Nepal, where a higher prevalence of anaemia was observed among adolescents with limited food variety.[15] Verma et al. also reported a higher anaemia prevalence among vegetarians (65.9%) compared to non-vegetarians (38%).[16] This highlights the need for ongoing anaemia prevention measures for adolescent girls in India, including nutrition education in schools

Limitations: The study faced limitations in differentiating between nutritional and non-nutritional anaemia due to budget constraints, preventing additional tests like serum ferritin, vitamin B12, folic acid levels, serum electrophoresis, and stool examinations. The use of a self-administered questionnaire introduced potential subjective bias. Additionally, as a cross-sectional study, it could not establish a temporal relationship between dietary habits and anaemia.

CONCLUSION

Anaemia is a significant public health issue among adolescent girls in rural areas, particularly affecting those over sixteen and from lower socioeconomic backgrounds. School-based interventions are crucial for preventing and controlling anaemia in this group, emphasizing the need for a regular supply of iron and folic acid tablets, along with health education. It is essential to improve knowledge about consuming iron and folic acid-rich foods. Given the multifactorial causes of anaemia, regular check-ups, evaluation, treatment, and prevention are

vital for improving adolescent girls' health. This study can serve as a reference for future research, and larger, multicentric studies should be planned.

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REFERENCES

1. https://www.who.int/publications/i/item/9241208864, Last accessed URL on19/04/2022 at 5pm
2. https://www.who.int/health-topics/adolescent-health#tab=tab_1, Last accessed URL on 19/04/2022 at 5pm
3. http://www.nrhm.gov.in/nrhm-components/rmnch-a/adolescent-health-rkskbackground.html, Last accessed URL on 15/09/2022 at 8pm
4. http://rchiips.org/nfhs/pdf/NFHS4/India.pdf, Last accessed URL on 31/10/2022 at 8. 30pm
5. http://rchiips.org/nfhs/NFHS-5_FCTS/KA/Belgaum.pdf, Last accessed URL on 19/04/2022 at 5pm
6. https://pib.gov.in/PressReleasePage.aspx?PRID=1575151, Last accessed URL on 19/04/2022 at 5pm
7. Chandrakumari AS, Sinha P, Singaravelu S, Jaikumar S. Prevalence of Anaemia Among Adolescent Girls in a Rural Area of Tamil Nadu, India. J FamMed Prim Care. 2019 Apr;8(4):1414–7.
8. Chaudhary SM, Dhage VR. A study of anaemia among adolescent females in the urban area of nagpur. Indian J Community Med Off Publ Indian Assoc Prev Soc Med. 2008 Oct;33(4):243–5.
9. Rawat CM, Garg SK, Singh JV, Bhatnagar M, Chopra H, Bajpai SK.Prevalence of anaemia among adolescent girls in rural area of District Meerut,U.P. Indian J Public Health. 2001 Mar;45(1):24–6.
10. Basu S, Basu S, Hazarika R, Parmar V. Prevalence of anaemia among schoolgoing adolescents of Chandigarh. Indian pediatrics. 2005 Jun 17;42(6):593.
11. Jones AC, Kirkpatrick SI, Hammond D. Beverage consumption and energy intake among Canadians: analyses of 2004 and 2015 national dietary intakedata. Nutrition Journal. 2019 Oct 18;18(1):60
12. Premalatha T, Valarmathi S, Srijayanth P, Sundar JS, Kalpana S. Prevalence of anaemia and its associated factors among adolescent school girls in Chennai,Tamil Nadu, India. Epidemiology: Open Access. 2012 Aug 27;2(2):1-4.
13. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP, et al.Prevalence of Anaemia among Pregnant Women and Adolescent Girls in 16 Districts of India. Food Nutr Bull. 2006 Dec 1;27(4):311–5.
14. Bhanushali MM, Shirode AR, Joshi YM, Kadam VJ. An intervention on iron deficiency anaemia and change in dietary behavior among adolescent girls.International journal of pharmacy and pharmaceutical sciences. 2011;3(1):40-2.
15. Chalise B, Aryal KK, Mehta RK, Dhimal M, Sapkota F, Mehata S, Karki KB, Madjdian D, Patton G, Sawyer S. Prevalence and correlates of anaemia among adolescents in Nepal: Findings from a nationally representative cross-sectionalsurvey. PloS one. 2018 Dec 14;13(12):e0208878.
16. Verma M, Chhatwal J, Kaur G. Prevalence of anaemia among urban school children of Punjab. Indian Pediatrics 1998 Dec; 35 (12): 1181-6.