

Original Research Article

Knowledge, attitudes and practices of adolescent school girls regarding prevention of iron deficiency anaemia

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ABSTRACT

Background: Anaemia is very prevalent in adolescent girls, especially in developing countries like India. Treatment of anaemia based on the cause during adolescence decreases morbidity and mortality during early pregnancy. Despite weekly iron and folic acid supplementation programmes, the prevalence of anaemia among women and adolescent girls is still high. The objective of the study was to assess the proportion of anaemia and its determinants among adolescent school girls.

Methods: An observational study was conducted in adolescent school girls of Chandragiri from January to March, 2018. Demographic data, knowledge and practices of personal hygiene were collected. Nutritional status was assessed by collecting anthropometric, body composition measurements, dietary habits and haemoglobin was estimated.

Results: Of the 111 girls studied, 55.9% were found to be anaemic. Knowledge and practices of personal hygiene was lower in anaemic girls compared to non-anaemic girls. The extent of deficit of iron rich food consumption was low in both anaemic and non-anaemic girls.

Conclusions: Prevalence of mild anaemia was high and iron rich foods intake was low in our study subjects. Assessment of burden of anaemia among adolescent girls is essential to address gaps in implementation of public health programs and effective intervention programs can be designed to reduce the burden of anaemia.

Keywords: Adolescent girls, Anaemia, Iron rich foods, Knowledge, Attitude and practices

INTRODUCTION

Anaemia is a condition in which the number of red blood corpuscles (RBC) or their oxygen-carrying capacity is insufficient to meet the physiological needs of a person. Decreased RBC count could be due to inadequate production or increased destruction or loss. The production of RBC requires adequate nutrients intake of vitamins (B₆, B₉, B₁₂ and A) and minerals (Iron and Copper). Deficiency of these nutrients leads to decreased production of RBC and nutritional anaemia; while excess destruction due to blood loss, infections, etc causes

haemolytic anaemia. A study by Kassebaum et al, conducted from 1990-2010 in 187 countries reported that Global anaemia prevalence in 2010 was 32.9%, causing 68.36 million years lived with disability.¹ As per World Health organization (WHO) a higher proportion of women in 15-59 years age group were anaemic than men.² The United Nations Children's Fund (UNICEF) reported that 56% of adolescent girls (AGs) in India were anaemic.³

Adolescence is the transition of a child to become an adult, during which there are increased physiological needs of iron due to the growth spurt, expansion of the

lean body mass, total blood volume and the onset of menstruation.⁴ Anaemia affects physical and cognitive development leading to decreased scholastic performance in children; decreased work productivity in adults and increased maternal and child mortality rates.^{5,6} AGs are more vulnerable, especially in countries like India due to early marriage and pregnancies before attaining adequate growth with respect to their genetic material.⁷ Nutritional anaemia during this period will result in low birth weight babies, high perinatal mortality and foetal wastage. 43% of adolescent deaths are related to early pregnancy and strong evidence from previous studies corroborate that correction of anaemia during adolescence result in decrease in mortality and morbidity.⁷⁻⁹

The Government of India (GOI) initiated the National Nutritional Anaemia Prophylaxis Programme (NNAPP) in 1970, wherein iron and folic acid (IFA) tablets were supplied to under-five children and pregnant women. However, no significant improvement was found in anaemia in the evaluation during 1985-86.¹⁰ The GOI later launched another programme called “12 by 12 initiative” addressing the problem of anaemia in adolescents, in collaboration with WHO and UNICEF, Federation of Obstetrics and Gynaecological Society of India. The programme is aimed to achieve haemoglobin levels of 12 g% by the age of 12 years by 2012. Under Rajiv Gandhi Scheme for Adolescent Girls-SABALA programme initiated in 2011, AGs are being received weekly supplementation of IFA tablets and biannual deworming (Albendazole) tablets. Despite all these programmes, the prevalence of anaemia among women and AGs is alarming. The current study estimates the proportion of anaemia among adolescent school girls of Chandragiri village, its determinants and their knowledge, attitudes and practices (KAP) about prevention of iron deficiency anaemia (IDA). Therefore, appropriate measures can be adopted at individual and community level based on the study findings.

METHODS

A cross sectional, observational study was conducted in 111 AGs at Government Girls High School, Chandragiri, Chittoor district, Andhra Pradesh, India, from January to March, 2018. Ethical clearance was obtained from the Institutional Ethics Committee of Sri Venkateswara Medical College (SVMC), Tirupati, Andhra Pradesh, India. Written informed consent was obtained prior to study from the parents of AGs and assent from AGs. Girls who were suffering from any illnesses, moribund diseases or apparent mental illnesses; whose parents did not accept for blood test were excluded.

The girls were interviewed using a pretested semi-structured questionnaire. Information was collected about socio-demographic characteristics, utilization of mid-day meal (MDM), reception of deworming and IFA tablets, personal hygiene practices, awareness of government programmes, menstrual issues and clinical signs of nutritional deficiencies were recorded. Nutritional status

was assessed by anthropometric measurements and skinfold thickness. Height (up to the nearest 1 mm) was measured using an anthropometer rod and weight (up to nearest 100 g) by SECA weighing scale.¹¹ Mid upper arm circumference (MUAC) was measured using fibre reinforced measuring tape. Skinfold measurements were recorded using Harpenden skinfold caliper. Food intake of AGs was estimated by food frequency questionnaire. Haemoglobin estimation was carried out by cyanmethemoglobin method using dried blood spot.

Statistical analysis

Descriptive analysis was carried out using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). BG Prasad's rural scale was used to determine HH socio-economic status (with 2015 as base year). Z scores for height-for-age, body mass index (BMI)-for-age and MUAC were calculated with WHO AnthroPlus v1.0.4 software. Stunting, chronic energy deficiency (CED), undernourishment, overweight and obesity in proportions were calculated based on WHO-UNICEF growth standards nutrition estimates, 2009.¹²

RESULTS

A total of 111 AGs were recruited into the study. Majority of girls were in the age group of 10-14 years (57.6%), Hindu community (87.4%), backward social group (42.3%) and middle socio-economic status (40.5%). Further, most of girls belonged to a nuclear family and the family size being ≤ 4 . Of the studied AGs, 55.9% were found to be anaemic (Table 1).

The mean haemoglobin concentration of girls with anaemia was 10.8 g/dl compared to 12.5 g/dl in girls without anaemia. Majority of girls were utilising MDM. Food intake was compared with recommended dietary intake (RDI) by ICMR. Intake of cereals and millets was 36.1% and 33.5% higher than RDI in both groups, respectively. Between anaemic and non-anaemic girls the extent of deficit in intake of pulses and legumes was 52.8% and 51.6%; green leafy vegetables 97.8% and 98.1%; other vegetables 74.9% and 75.2%; roots and tubers 72.3% and 71.9%; fruits 62.3% and 58.9%; other flesh foods 94.4% and 94.0%; milk and milk products 74.9% and 77.8%; fats and edible oils 63.6% and 62.6%; and sugar and jaggery 57.3% and 58.9%, respectively. Proportion of abnormal vaginal bleeding was 27% in anaemic girls and 19% in non-anaemic girls (Table 2).

Majority of girls were supplemented with IFA from the mean age of 11 years. About 92% of girls were taking deworming tablets twice in a year. Personal hygiene practices were illustrated in Table 3.

Stunting was more in anaemic girls; CED and moderate undernourishment slightly high anaemic girls and non-anaemics, respectively. There was no significant difference in body composition parameters between the groups (Table 4).

Table 1: Demographics of anaemic and non-anaemic girls.

	Anaemic (n=62)	Non-anaemic (n=49)
Age group (in years)		
Early adolescence (10-14)	38 (61.3)	26 (53.1)
Late adolescence (15-19)	24 (38.7)	23 (46.9)
Religion		
Hindu	53 (85.5)	44 (89.8)
Muslim	9 (14.5)	4 (8.2)
Christian	Nil	1 (2.0)
Social class		
Backward caste	25 (40.3)	22 (44.9)
Scheduled caste	15 (24.2)	8 (16.3)
Scheduled tribe	5 (8.1)	4 (8.2)
Others	17 (27.4)	15 (30.6)
Type of family		
Nuclear	52 (83.9)	36 (73.5)
Extended nuclear	10 (16.1)	13 (24.5)
Joint	Nil	1 (2.0)
Family size (no.)		
≤ 4	34 (54.8)	28 (57.1)
> 4	28 (45.2)	21 (42.9)
Economic class		
Higher	Nil	2 (4.1)
Upper middle	9 (14.5)	9 (18.4)
Middle	30 (48.4)	15 (30.6)
Lower middle	23 (37.1)	19 (38.8)
Lower	Nil	4 (8.2)

Values are counts. Proportions in parenthesis.

Table 2: Determinants of anaemia in anaemic and non-anaemic girls.

Parameter	Anaemic (n=62)	Non-anaemic (n=49)
Haemoglobin (g/dL)[#]	10.8±0.1	12.50±0.07
Beneficiaries of MDM		
Yes	42 (67.7)	27 (55.1)
No	20 (32.3)	22 (44.9)
Intake of food stuff (mg/day)[#]		
Cereals	382.4±11.35	373±8.34
Millet	5.75±0.73	7.49±1.04
Pulses and legumes	28.34±1.45	29.01±1.44
Green leafy vegetables	2.11±0.15	1.82±0.16
Other vegetables	50.18±1.23	49.58±1.56
Roots and tubers	27.67±0.66	28.06±1.13
Nuts and oil seeds	4.05±0.44	4.18±0.51
Condiments and spices	64.97±1.69	64.7±1.79
Fruits	37.74±2.84	41.02±4.02
Fish and other sea foods	0.05±0.01	0.05±0.01
Other flesh foods	5.55±0.24	5.99±0.42
Milk and milk products	125.3±6.57	111.1±6.80
Fats and edible oils	13.65±0.55	14.02±0.70
Sugar and Jaggery	11.72±0.38	11.30±0.53
Vaginal bleeding[†]		
n	48	30
Normal	35 (72.9)	30 (81.1)
Menorrhagia	7 (14.6)	2 (5.4)
Metrorrhagia	6 (12.5)	5 (13.5)

Values are counts. Proportions in parenthesis. [#]Values are mean±Standard error. [†]Excluded subjects, not attained menarche.

Table 3: Preventive measures of anaemia among anaemic and non-anaemic girls.

Parameter	Anaemic (n=62)	Non-anaemic (n=49)
WIFS program[#]		
Age when IFA started	11.49±0.09	11.43±0.10
No. of IFA consumed	33.96±1.30	35.02±1.52
Reception of deworming tablets		
Never	1 (1.6)	3 (6.1)
Once	3 (4.8)	2 (4.1)
Twice	58 (93.5)	44 (89.8)
Usage of sanitary latrine		
Present and in use	48 (77.4)*	46 (93.9)
Absent	14 (22.6)	3 (6.1)
Washing habit after defecation		
With soap	35 (56.5)	31 (63.3)
Without soap	27 (43.5)	18 (36.7)
Washing habit before taking food		
Wash with soap	26 (41.9)	29 (59.2)
Wash with water	36 (58.1)	20 (40.8)

Values are counts. Proportions in parenthesis. *P<0.05 (Significant difference between groups); #Values are mean ± Standard error of mean in parenthesis. #WIFS: Weekly IFA Supplementation.

Table 4: Distribution of malnutrition in anaemic and non-anaemic adolescent girls.

Nutritional status	Anaemic (n=62)	Non-anaemic (n=49)
Height-for-age		
Stunted	7 (11.3)	3 (6.1)
Normal	55 (88.7)	46 (93.9)
BMI-for-age		
CED	8 (12.9)	6 (12.3)
Normal	52 (83.9)	42 (85.7)
Overweight/Obese	2 (3.2)	1 (2.0)
MUAC (cm)		
Moderately undernourished	5 (8.1)	4 (8.2)
Normal	57 (91.9)	45 (91.8)
Body composition parameters*		
Per cent body fat	57.33±0.65	56.17±0.76
Lean body mass (Kg)	17.81±0.3	18.48±0.31

Values are counts and proportions within the parenthesis. *Values are mean±standard error.

Figure 1 shows among anaemic girls majority had mild anaemia. Figure 2 reveals that the reasons behind non-consumption of IFA were bad taste, followed by absence to the school on the day of supplementation, fear of side effects that might occur due to supplementation and nausea during consumption.

Clinical manifestations of nutritional deficiency such as Phrynoderma (4.5%), dental caries (3.6%) and dental fluorosis (2.7%) were seen more in anaemic girls.

Abnormal vaginal bleeding was high in anaemic girls and the proportion was 23.5%, where 10.6% suffered from menorrhagia and 12.9% with metrorrhagia. The proportions of menorrhagia and metrorrhagia in anaemic girls were 14.6% and 12.5%, respectively and in non-anaemic girls 5.4% and 13.5%, respectively.

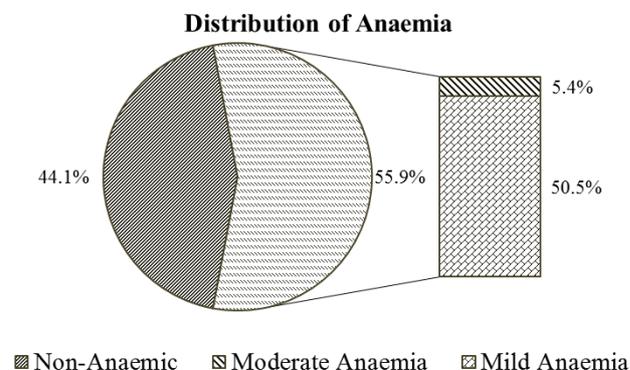


Figure 1: Distribution of anaemia in AGs.

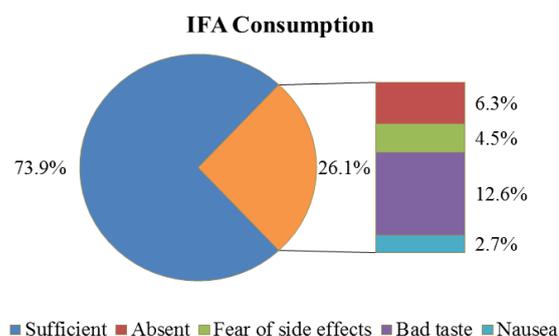


Figure 2: IFA consumption.

DISCUSSION

The proportion of anaemia in the studied populace was slightly higher (55.9%) over previous studies at Kanchipuram and Guntur wherein the proportion of anaemia was 50% and 42.4% respectively.^{13,14} Further, the current study revealed that the proportion of mild anaemia was predominant compared to findings from previous studies.^{13,14}

As expected, most of the girls with abnormal vaginal bleeding were found to be anaemic, with the predominant cause being menorrhagia and metrorrhagia. The study also revealed no significant difference in the intake of IFA supplements in both groups. The knowledge and practice of preventive personal hygiene measures such as hand washing practices were found higher among non-anaemic girls. Therefore, improvement in knowledge and practices of sanitation and personal hygiene might contribute to prevent anaemia and corroborate with findings from other studies.¹⁵ The inadequate intake of IFA can be corrected by educating them their consumption in improving health.¹⁵

Intake of millets was lower in anaemic girls and evidence from nutritional intervention studies show intake of ragi millet (ragi porridge) had increased the blood haemoglobin, and intake of biofortified pearl millet had also increased scholastic performance indicators of adolescents with decrease of simple reaction time (SRT) and attention network task (ANT).^{16,17} Iron absorption in population can be improved by public health interventions by counselling the public on nutrition which encourages diet diversity and food combinations; fortification of regular foods with iron; treating infections by hookworm etc. to prevent iron loss; and iron supplementation.¹⁸ Therefore strategies should be designed and adopted by regional and local governments to address the basic causes of anaemia; socio-cultural and economic conditions and policies, basic healthcare infrastructure, inequitable distribution of resources and inadequate local evidence on etiology leading to improvement in access or intake of nutrient rich diets, provision of curative and preventive health care services, decrease in adolescent marriages, sanitation and hygiene services.^{19,20}

Limitations

Haematological biochemical parameters except haemoglobin were not assessed and assessment of scholastic performance of the girls is also lacking in this cross-sectional study. Further, besides the observational nature of the study design, perception of adolescents towards barriers in uptake of preventive measures of sanitation and hygiene and intake of nutritious diet was not assessed, so that intervention measures to address these barriers can be designed and implemented to reduce the burden.

CONCLUSION

Anaemia remains a common public health burden, leading to increased morbidity and mortality especially in adolescent girls who are future mothers. Assessment of burden of anaemia among adolescent girls is essential for addressing gaps in implementation of public health programs. Therefore, appropriate action at this level is cost-effective in preventing maternal and neonatal morbidity and mortality widely prevalent in our country. The steps to be adopted and strengthened by government both at regional and local level are improving access to nutritious diets, adequate provision of preventive health services such as nutritional counselling and education, prevention of adolescent pregnancy, intermittent iron-folic acid supplementation, deworming, access to safe water, hand washing and sanitation interventions.

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REFERENCES

1. Kassebaum NJ, Jasrasaria R, Naghavi M, Wulf SK, Johns N, Lozano R, et al. A systematic analysis of global anaemia burden from 1990 to 2010. *Blood*. 2014;123(5):615-24.
2. WHO U. UNU. Iron deficiency anaemia: assessment, prevention and control, a guide for programme managers. Geneva: World Health Organization. 2001.
3. Beegum MR. Prevalence of malnutrition among adolescent girls: a case study in Kalliyoor panchayat, Thiruvananthapuram. Kerala Research Programme on Local Level Development, Centre for Development Studies; 2001.
4. Delisle H. World Health Organization. Nutrition in adolescence: issues and challenges for the health sector: issues in adolescent health and development, 2005.
5. Scholl TO, Hediger ML. Anaemia and iron-deficiency anaemia: compilation of data on pregnancy outcome. *The American journal of clinical nutrition*. 1994;59(2):492S-501S.
6. Macgregor MW. Maternal anaemia as a factor in prematurity and perinatal mortality. *Scottish Med J*. 1963;8(4):134-40.
7. Pathak P, Singh P, Kapil U, Raghuvanshi RS. Prevalence of iron, vitamin A, and iodine deficiencies amongst adolescent pregnant mothers. *The Indian Journal of Pediatrics*. 2003;70(4):299-301.
8. Kaur S, Deshmukh PR, Garg BS. Epidemiological correlates of nutritional anaemia in adolescent girls of rural Wardha. *Indian J Community Med*. 2006;31(4):255-8.
9. Alauddin F, Blum RW, Diallo I, Djaelani J, Ghose S, Gupta GR, King R, Kwawu J, Maddaleno M, Omar M, Rajani R. Programming for adolescent health and development. *World Health Organization-Technical Report Series*. 1999(886):1-260.
10. Indian Council of Medical Research Task Force. Evaluation of the national nutritional anaemia prophylaxis programme. New Delhi: Indian Council Med Res. 1989.
11. Jelliffe DB, World Health Organization. The assessment of the nutritional status of the community (with special reference to field surveys in developing regions of the world, 1966).
12. World Health Organization, UNICEF. WHO child growth standards and the identification of severe acute malnutrition in infants and children: joint

statement by the World Health Organization and the United Nations Children's Fund, 2009.

13. Dhulipala P, Gujjarlupudi C. Prevalence of anaemia among adolescent school going children in Guntur. *Journal of Evolution of Medical and Dental Sciences-JEMDS*. 2016;5(49):3232-5.
14. Manikandan R, Ashok KTR, Vijayakumar TM, Damodharan N, Akshaykiran M. Prevalence of anaemia among adolescent girls in rural areas of Kanchipuram district. *J Emerging Technol Innovative Res. JETIR*. 2017;4(8):38-40.
15. Siva PM, Sobha A, Manjula VD. Prevalence of Anaemia and Its Associated Risk Factors Among Adolescent Girls of Central Kerala. *J Clin Diagnos Res*. 2016;10(11):LC19.
16. Karkada S, Upadhya S, Upadhya S, Bhat G. Beneficial Effects of ragi (Finger Millet) on Hematological Parameters, Body Mass Index, and Scholastic Performance among Anemic Adolescent High-School Girls (AHSG). *Comprehensive child and adolescent nursing*. 2018: 1-0.
17. Scott SP, Murray-Kolb LE, Wenger MJ, Udipi SA, Ghugre PS, Boy E, et al. Cognitive performance in Indian school-going adolescents is positively affected by consumption of iron-biofortified pearl millet: A 6-month randomized controlled efficacy trial. *J Nutr*. 2018;148(9):1462-71.
18. World Health Organization. Guideline: daily iron supplementation in adult women and adolescent girls (2016). World Health Organization. Available at <http://apps.who.int/iris/handle/10665/204761>. Accessed on 3 January 2018.
19. Multisectoral Anaemia Partners Meeting Participant Guide 2013. Washington, DC October 18, 2013. https://www.spring-nutrition.org/sites/default/files/final_participant_guide_multisectoral_anaemia_partners_meeting.pdf. Accessed on 3 January 2018.
20. World Health Organization. Strategies to prevent anaemia: Recommendations from an Expert Group Consultation. New Delhi, India. 2016.

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