SHORT ARTICLE

Prevalence of anaemia among school adolescent girls.

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Abstract

Background: Anaemia is a major public health problem especially among adolescent females and can result in diminished physical growth and cognitive development, performance in school and at work, and affects reproduction. Findings from NFHS-3 (2005-06) indicate that 56% of the adolescent girls in India are anaemic and, of these 17% suffer from moderate to severe anaemia. **Aim & Objective:** To find the prevalence of anaemia among adolescent girls in rural and urban schools of Haldwani. **Materials and Methods:** A cross-sectional study was carried out in rural as well as urban schools of Haldwani from October 2012 to March 2014 among 770 (443 rural and 327 urban) adolescent girls selected by multistage random sampling, using predesigned and pretested questionnaire to collect relevant data, and estimating haemoglobin concentration using Haemoglobin Colour Scale. Data was analysed by using SPSS v 20. **Results:** 48.18% of adolescent girls were found to have anaemia. Prevalence of anaemia was 43.11% and 55.04% among rural and urban school girls respectively. Mean haemoglobin concentration of study subjects was 11.35g/dl. Prevalence of mild, moderate and severe anaemia among study population was 34.53%, 10.13% and 3.52% respectively. **Conclusion:** The present study revealed that half of the school going adolescent girls were suffering from anaemia in rural and urban areas of Haldwani

Key Words

Adolescent; Anaemia; Haemoglobin Colour Scale

Introduction

Anaemia, a manifestation of under-nutrition and poor dietary intake of iron is a serious public health problem, not only among pregnant women, infants and young children but also among adolescents. In India, a home to nearly 113 million adolescent girls (1), as many as 56 percent are suffering from anaemia and of these 17 percent suffer from moderate to severe anaemia (2). Iron deficiency is thought to be the most common cause of anaemia globally, although other conditions, such as folate, vitamin B12 deficiencies, chronic inflammation, parasitic infections, and inherited disorders can all cause anaemia (3). Girls' iron requirements increase dramatically during adolescence as a result of the expansion of the lean body mass, total blood volume and the onset of menstruation (4). Anaemia can result in diminished physical growth, impaired cognitive and reproductive development among adolescent females, besides leading to increased morbidity from infectious diseases (3). The deficiency has consequences even when no anaemia is clinically apparent and term "mild anaemia" is a misnomer as iron deficiency is already advanced by the time anaemia is detected (5). Also anaemic girls have lower prepregnancy stores of iron and pregnancy is too short a period to build iron stores to meet the requirements of the growing fetus increases the risk of preterm and low birth weight babies, leading to intergenerational cycle of

malnutrition (6). It is therefore critical to address this problem which has health implications for approximately 15 percent of Indian population and is directly linked to new born, child and maternal morbidity and mortality.

Aims & Objectives

The present study was undertaken to assess the prevalence of anaemia among rural and urban school going adolescent girls

Material and Methods

The present cross-sectional study was carried out in rural as well as urban schools of Haldwani, district Nainital from October 2012 to March 2014. Government Medical College, Haldwani, Institutional Ethical Committee approved the research protocol as a part of Doctor of Medicine (MD) thesis with the sample size of 770. Multistage random sampling was used to select the requisite number of girls. In first stage, list of all schools in Haldwani having grades from class 6th to 12th grouped into rural and urban categories with enrolment numbers of girls was obtained from District Education Office (DEO), Bhimtal (Nainital). In second stage, one Government and one Non-Government schools were selected randomly each from rural and urban categories. All four selected schools agreed to participate in the study (school response rate=100%). Simple random sampling was used to select 770 adolescent girls out of total girl students from class 6^{th} to 12^{th} in required age group of 10-19 years in selected schools, with help of the school authorities in third stage. The data was collected after informed verbal consent was obtained from the respective school principals and participants. All of the selected girls agreed to participate and total 770 (443 rural and 327 urban) girls were clinically examined, interviewed using predesigned and pretested questionnaire and, subjected to haemoglobin estimation by using Haemoglobin Colour Scale (HCS) available as HEMOCHEKTM KIT containing "CE" marked validated colour shade card, test strips and blood lancets, manufactured by Allied Health Sciences Pvt. Ltd., New Delhi, which shows a sensitivity of 95% and a specificity of 99.6%. HCS comprises of a small card with six shades of red that represent Hb levels at 4, 6, 8, 10, 12 & 14 g/dl respectively. Intermediate shades can be identified, allowing haemoglobin levels to be judged to 1 g/dl. This device is simply used by placing a drop of blood obtained by finger prick on test strip and matching the colour of bloodspot against one of hues on shade card exactly after 30 seconds. According to HCS Hb level of 12 gm/dl or more is considered as not anaemic. Grading of anaemia was done according to following WHO guidelines (5):

Mild anaemia: 10 – <12 gm/dl (cut off level); **Moderate anaemia**: 7 – <10 gm/dl; **Severe anaemia** < 7 gm/dl

Recommended adjustments to measured haemoglobin concentration according to residential elevation above sea level (>1000 meters) (5) were not required as Haldwani (~424 meters) is situated at much lower altitude as compared to Nainital (~2084 meters). Data was analysed using SPSS v.20. The chi square test was used for assessing statistically significant association. A two-tailed p value less than 0.05 was considered significant

Results

Mean age of study subjects was 14.29 ± 1.81 years. Overall 48.18% of adolescent girls were found to have anaemia while 38.60% have pallor on clinical examination. Prevalence of anaemia was 43.11% and 55.04% among rural and urban school girls and this difference was statistically significant. (Table 1) Mean haemoglobin concentration of all study subjects was 11.35 g/dl. Prevalence of mild, moderate and severe anaemia among study population was 34.53%, 10.13% and 3.52% respectively. (Table 2) 49.41% and 46.62% of girls were found to be anaemic in 10-14 years (early adolescence) and 15-19 years (late adolescence) age groups respectively, difference being insignificant. No significant difference was found in premenarcheal and post menarcheal girls.

Discussion

The Government of India has reiterated the need to focus on adolescent health as a part of an integrated approach for reproductive, maternal, new born, child and adolescent health (RMNCH+A) which essentially looks to address the issue of anaemia across all age groups through National Iron + Initiative. The Weekly Iron and Folic Acid Supplementation (WIFS) scheme is addressing nutritional (iron deficiency) anaemia amongst adolescents (boys and girls) in both rural and urban areas. As articulated in 12^{th} Five Year Plan one of the coverage targets for key RMNCH+A interventions for 2017 is to reduce anaemia in adolescent girls (15-19 years) at annual rate of 6% from the baseline of 56% (NFHS 3) (6).

As a practical answer to vital need of detecting anaemia, WHO had developed Haemoglobin Colour Scale (HCS), which provides a reliable indication of the presence and severity of anaemia (7). An international validation study and recent published papers have confirmed its reliability when used in general health centres, antenatal clinics and in blood transfusion centres for donor selection (8). Most of other existing methods for measuring haemoglobin have their own advantages and disadvantages like 'cyanmethaemoglobin' method depends on accurate sample dilutions and, uses expensive and toxic consumables, while HemoCue method although simple to operate but uses costly cuvettes making them too expensive for widespread use. Both Sahli's method and HCS perform similarly in haemoglobin measurement and it has been illustrated that standards for collection, handling and disposal of blood samples are more easily guaranteed by the HCS than Sahli's Method (9). In a study to evaluate the performance of HCS against filter paper cyanmethaemoglobin method as screening method for anaemia it was concluded that HCS has acceptable precision and accuracy (10).

We attempted to use HCS and being simple and inexpensive, it enabled haemoglobin estimation in all 770 study subjects. The present study revealed the overall prevalence of anaemia as 48.18%, and among rural and urban school girls the prevalence of anaemia is 43.11% and 55.04% respectively, the difference being statistically significant. However prevalence of 43.11% among rural girls is higher than 34.5% among rural girls as reported by Rawat C.M.S *et al* (11) but is lower as compared to recently conducted study by Sachan B *et al* (12) in Lucknow which showed prevalence to be 55.6% and 57.9% in urban and rural school girls respectively. None of girls in present study was married. Further none of the girls from non-government schools have been found to consume iron supplement of any kind and, of all government school girls 87.90% of girls in rural area and 39.5% in urban area have consumed IFA tablets received in schools within one week preceding the date of visit. 49.5% & 46.6% of girls were found to be anaemic in 10-14 years and 15-19 years age categories respectively, not significantly different.

In present study majority of adolescent girls have mild anaemia and the prevalence of mild, moderate and severe anaemia was 34.53%, 10.13% and 3.52% respectively. As reported by Dutt R *et al* (13), Siddharam S.M *et al* (14) and Chaudhary S.M *et al* (15) the prevalence of anaemia among adolescent girls was 61%, 45.2% and 35.1% respectively. More recently Patnaik S *et al* (2013) (16) found the prevalence of anaemia among adolescent girls in a rural area of Odisha to be 78.8%, mean haemoglobin level to be 10.84+1.05g/dl and 75.63% & 24.37% girls suffering from mild and moderate degree of anaemia, which is quite similar to present study. There is paucity of literature on prevalence of anaemia among adolescent girls in various parts of Uttarakhand, however results of various studies mentioned above showed that prevalence found in present study was comparable to other parts of country.

Conclusion

In present study we identified that approximately half of the school going adolescent girls were suffering from anaemia. This indicated severe category of public health significance (40% or higher) as per WHO (5). Majority have mild anaemia with prevalence being significantly lower among rural school girls and not significantly different in two age categories (10-14, 15-19 years). The HCS has been found to be the effective tool for the detection of anaemia

Recommendation

Second decade of life offers a second critical opportunity for actions to intervene early enough to prepare for a healthy productive and reproductive life. Since anaemia prevention requires not just medical intervention, but also behaviour change (both in terms of dietary habits and compliance with the intake of iron supplements), an extensive communication campaign needs to be built around benefits of healthy eating habits, IFA supplementation, iron rich foods and healthy culinary practices too, which can be conversed through separate sessions via school health programme. Parents should also be oriented on WIFS and NHE (Nutrition and Health Education sessions) during parent teacher meetings so that proactive participation from parents as well as teachers can be brought about. A conscious effort has already been going on but compliance still is poor and majority from non-government schools is to be reached yet

Authors Contribution

All authors have contribute equally in the study.

References

1. Health for the World's Adolescents: A second chance in the second decade. [Online]; 2014 [cited 2015 Jan]. Available from: who.int/adolescent/second-decade
2. International Institute of Population Sciences and ORC Macro. National Family Health Survey-3. [Internet] 2010 [Last accessed on 2014, Jul 25]. Available from: http://www.iipsindia.org/ nfhs3.html
3. Government of India. Ministry of Health and Family Welfare, New Delhi. RKSK Strategy Handbook; 2014 Jan.
4. WHO. Nutrition in adolescence – Issues and Challenges for the Health Sector. Issues in adolescent health and development; 2005.
5. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011. (WHO/NMH/NHD/MNM/11.1) Available from: (http://www.who.int/vmnis/indicators/haemoglobin.pdf).
6. Government of India. A strategic approach to reproductive, maternal, newborn, child and adolescent health (RMNCH+A) in India. Ministry of Health & Family Welfare; 2013.
7. Stott GJ, Lewis SM. A simple and reliable method for estimating haemoglobin. Bull World Health Organ. 1995;73(3):369-73. PubMed PMID: 7614669; PubMed Central PMCID: PMC2486662. [PubMed]
8. Ingram CF, Lewis SM. Clinical use of WHO haemoglobin colour scale: validation and critique. J Clin Pathol. 2000 Dec;53(12):933-7. PubMed PMID: 11265179; PubMed Central PMCID: PMC1731129.[PubMed].
9. Barduagni P, Ahmed A.S, Curtale F, Mohamed R, Soliman L. Performance of Sahli's and colour scale methods in diagnosing anaemia among school children in low prevalence areas. Tropical Medicine and International Health.2003 Jul; 8(7): p. 615-618. PMID: 12828543. [PubMed]
10. Sinha N, Deshmukh PR, Garg BS. Evaluation of WHO haemoglobin colour scale & palmar pallor for screening of anaemia among children (6-35 months) in rural Wardha, India. Indian J Med Res. 2008 Sep;128(3):278-81. PubMed PMID: 19052338. [PubMed]
11. 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 Jan-Mar;45(1):24-6. PubMed PMID: 11917316. [PubMed]
12. Sachan B, Idris M.Z, Singh A. Effect of socio-demographic characteristics on the prevalence of anemia among school going adolescent girls in Lucknow district, India. South East Asia Journal of Public Health. 2012; 2(1): p. 8-12.
13. Dutt R, Patil S, Joshi S, Mhatre R, Dev R: Prevalence of anaemia among adolescent girls in rural area of Raigad district, Maharashtra. Indian J Prev. Soc. Med.2009; 40(3&4).
14. Siddharam S.M, Venketesh G.M, Thejeshwari H.L. A Study of Anaemia among Adolescent Girls in Rural Area of Hassan district, Karnataka, South India. Int J Biol Med Res. 2011; 2(4): p. 922-924.
15. Chaudhary S.M, Dhage V.R. A study of Anaemia among adolescent females in urban area of Nagpur. Indian J Comm Med. 2004; 33(4):p.243.
16. Patnaik S, Patnaik L, Kumar A, Sahu T. Prevalence of anaemia among adolescent girls in a rural area of Odisha and its epidemiological correlates. Indian Journal of Maternal and Child Health. 2013; 15(1): p.5

Tables

TABLE 1 DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO PRESENCE OF ANAEMIA

Variables		Anaemia		Total (n=770)	Chi Square value, df and P value
		Present (n=371)	Absent (n=399)		
Area	Rural	191 (43.11%)	252 (56.88%)	443 (100%)	$\chi 2$ =10.7, df=1 P <0.001
	Urban	180 (55.04%)	147 (44.95%)	327 (100%)	
Age Categories	10 to 14	212 (49.41%)	217 (50.58%)	429 (100%)	$\chi 2$ =0.59, df=1 P=0.442
	15 to 19	159 (46.62%)	182 (53.37%)	341 (100%)	

TABLE 2 MEAN HAEMOGLOBIN CONCENTRATION (G/DL) OF STUDY SUBJECTS

Age categories	Mean Haemoglobin in g/dl (SD)		Overall mean
	Rural	Urban	
10 to 14 years	11.54 (1.91)	10.81 (2.13)	11.17 (1.96)
15 to 19 years	11.82 (1.55)	11.24 (2.21)	11.53 (2.03)
Overall mean	11.68 (1.80)	11.02 (2.20)	11.35 (2.00)

Figures

FIGURE 1 DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO SEVERITY OF ANAEMIA