

# Iron deficiency anemia (IDA), their prevalence, and awareness among Girls of reproductive age of Distt Mandi Himachal Pradesh, India

**Rakesh Kumar**

Department of Biochemistry, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India

Department of Biotechnology and Microbiology, Abhilashi Institute of Life Sciences,  
Nerchowk, Mandi, Himachal Pradesh, India

E-mail address: rakeshbiochem01@g mail.com

## ABSTRACT

Anemia constitutes a public health problem, in both developed and developing countries with major burden on economic and social development. Present study was designed to examine the prevalence of anemia among girl students of Abhilashi College, Distt Mandi Himachal Pradesh. Hemoglobin (Hb) level of 87 girls students was determined. Prevalence of anemia was detected to have been quite high at 55%. Self-awareness of the condition among those anemic was dismally low at 10%. Health education constitutes an important approach to increase awareness about anemia in terms of exposures, risk factors, essential nutrition ingredients and the importance of iron supplementations. Thus, the present study has tried to focus on those issues which are responsible for determining the level of anemia among women aged 20 to 40 years and has also tried to provide scientific explanations of iron deficiency anemia.

**Keywords:** Anemia; Iron deficiency Anemia; Pregnant women; Himachal Pradesh; India

## 1. INTRODUCTION

Anemia is a condition in which the number of red blood cells and consequently their oxygen-carrying capacity is insufficient to meet all the body's physiologic needs which are vary with a person's age, gender, altitude, smoking and different stages of pregnancy. Iron deficiency is thought to be the most common cause of anemia globally, but some other nutritional deficiencies (including folate, vitamin B12 and vitamin A), acute and chronic inflammation, parasitic infections, and inherited or acquired disorders can cause anemia (1).

Anemia is estimated to contribute to more than 115,000 maternal deaths and 591,000 perinatal deaths globally per year (2). Anemia is very high (ranging between 80 ->90%) in preschool children, adolescent girls pregnant and lactating women (3, 4).

There are about 1.2 billion adolescents in the world, which is equal to 1/5th of the world's population and their numbers are increasing. Out of these, 5 million adolescents are living in developing countries. Out of 1 billion total Indian population, 21% are adolescents (5). The world's adolescent population is facing a series of serious nutritional challenges which are not only affecting their growth and development but also their livelihood as adults. Yet, adolescents remain a largely neglected, difficult-to-measure and hard-to-reach population, in which the needs of adolescent girls in particular, are often ignored (6). The

commonest causes of anemia in developing countries, particularly among the most vulnerable groups (pregnant women and preschool age children), are nutritional disorders and infections (7).

**Our aim of study is to estimate trends in the complete distributions of hemoglobin concentration and Anemia prevalence by severity for pregnant women, Girls of reproductive age, female employee of the college.**

## 2. METHODS

### Study design:

This study was designed as a cross sectional, descriptive study providing a snapshot of the prevalence of anemia in the study population.

### Study population:

**Target Group:** (Pregnant women & Girls of reproductive age, female employees)

Present study includes 87 Girls student of Abhilashi College, Ner Chowk, Distt Mandi, Himachal Pradesh. The age of the subjects in the present study ranged from 20-40 years, while the mean age of the patients is 22.2 year. Out of which 68 subjects were below 25 years of age (Group I), 07 subjects (9%) were 25-35 years of age (Group II), Group III included subjects more then 35 year of age.

### Data collection:

Personal particulars, Anemia Awareness Data, Diet Counselling and risk factors for anemia were asked for, vide a questionnaire. The values of the hemoglobin level were analyzed with the help of hemoglobinometer. Anemia was diagnosed at Hemoglobin level lower than 12 gm / dl for girls (8-10).

The following variables were tabulated from the questionnaire on a categoric dichotomous scale:

- a) Anemic awareness by detailed interviews with all the participant and participants to get insight into their modern food habits.
- b) Prevalence of anemia was calculated separately, different age group {(20-25 year (group 1), 25-35 year (group 2), more then 35 year (group 3)}.
- c) Prevalence of anemia among the vegetarian and the non-vegetarian participants was calculated separately as a proportion for the two groups.
- d) Prevalence of anemia among the married and un-married participants was calculated separately as a proportion for the two groups.
- e) Self-awareness, among those anemic, of having anemia was calculated as a proportion for the anemic participants.

### Estimation of Hemoglobin level:

Hemoglobin concentration alone cannot be used to diagnose iron deficiency. However, hemoglobin concentration should be measured, even though not all anemia is caused by iron deficiency. The prevalence of anemia is an important health indicator and when it is used with other measurements of iron status the hemoglobin concentration can provide information about the severity of iron deficiency (1).

Hemoglobin (Hb) estimation is one simple and economic laboratory parameter to assess Anemia and is thus used quite frequently in population studies (11). Currently Sahli's hemoglobinometer method for Hemoglobin estimation is the one recommended by the Government of India for use by the health workers in the field and in laboratory facilities (12).

It is a simple and inexpensive device for providing a reliable indicator of the presence and severity of Anemia (13). Hemoglobin was measured by Sahli's method using the Sahli's hemometer (14).

### Method:

The hemometer tube was filled to the level of lowest graduation (0.02 gramme) with standard hydrochloric acid diluted 1:10. 20 $\mu$ l of blood was then added to the hemometer tube and mixed. This was allowed to stand at room temperature for 3 minutes. This was then diluted with distilled water until color matched with that in the comparator. Results were observed and percentage of hemoglobin was noted.

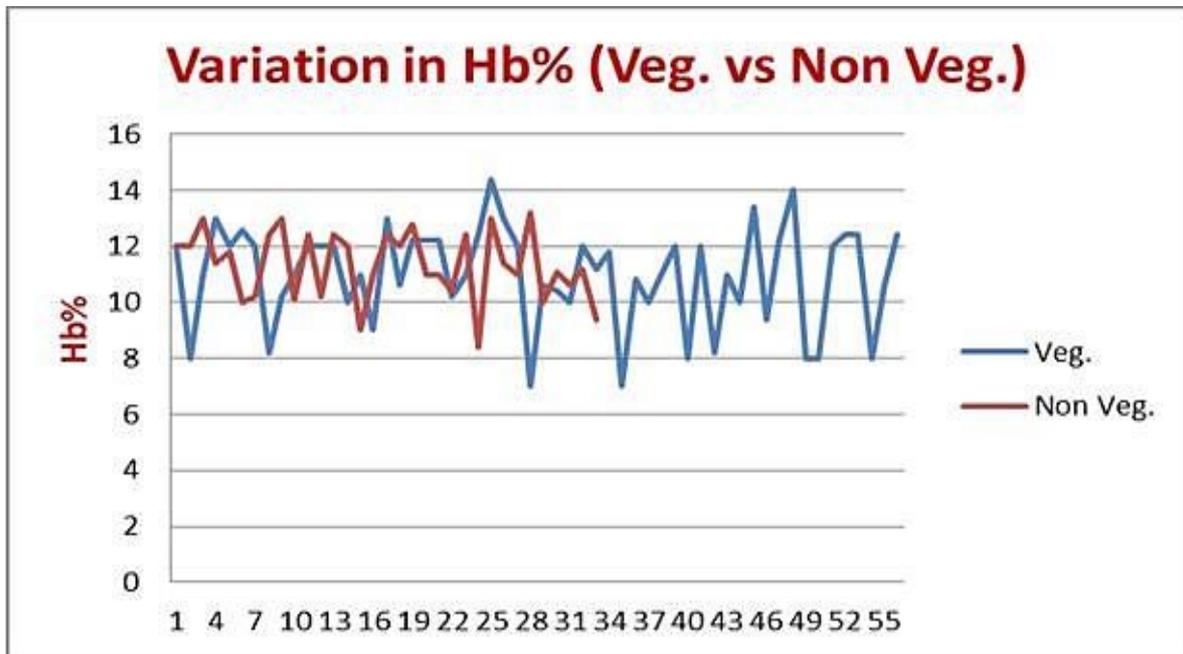
## 3. RESULT

**Table 1.** Percentage of anemia in different group.

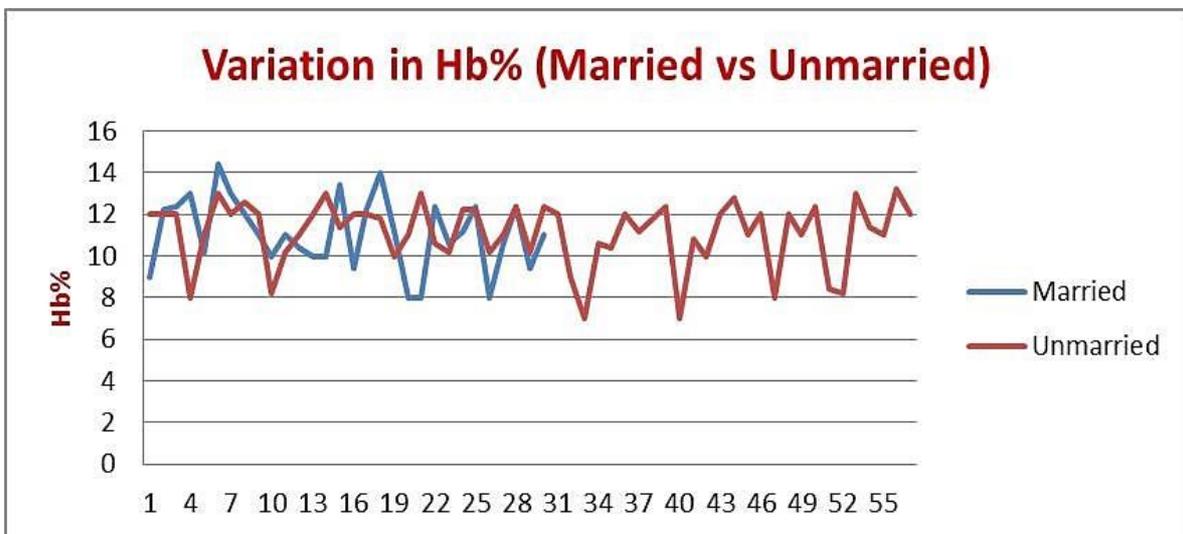
	Anemic % (n)	Non Anemic % (n)	Total (n)
All participants	55.17(48)	44.82 (39)	87
Age group (20-25)	53.62(37)	46.37(32)	69
Age group (25-35)	42.85(3)	57.14(4)	7
Age group (Above 35)	72.72(8)	27.27(3)	11
Married	60(18)	40(12)	30
Unmarried	52.63(30)	47.36(27)	57
Vegetarian	53.70(29)	46.29(25)	54
Non vegetarian	57.57(19)	42.42(14)	33

**Table 2.** Grading of Anemia on the basis of Hb %.

Grading of anemia (Hb%)	Number of person with percentage
Severe ( $\leq 8$ )	n = 7 (8.04 %)
Moderate ( 8 - 10)	n = 7 (8.04 %)
Mild (10 - 12)	n = 34 (39 %)
Normal ( $\geq 12$ )	n = 39 (44.82 %)



**Graph 1.** Variation of Hb % Veg vs Non veg.



**Graph 2.** Variation in Hb% (Married vs Unmarried).

Overall, 55% (n = 87) students were detected to be anemic. 53.6 % of age 20-25 years and 42.85 % students are of age 25-35 years, 66.6 % of age more than 35 years were detected to be anemic. We also observed there was hardly any difference in the prevalence amongst vegetarians or non-vegetarians which were 53 % and 57 % respectively and hemoglobin level  $10.982 \pm 1.75$  in vegetarian as compared to  $11.33 \pm 1.21$  in non vegetarian subjects.

We also observed there was slight difference in the prevalence amongst Married or Un-married- which were 60 % and 52 % respectively and hemoglobin level  $11.09 \pm 1.69$  in Married as compared to  $11.126 \pm 1.53$  in Un Married subjects.

#### 4. DISCUSSION

In a present study prevalence of mild, moderate, and severe anemia is 39.0%, 8.04%, and 8.04%, respectively, mild anemia being the most common type. Moderate and severe anemia was observed in very few adolescents. An earlier study reports the frequency of mild, moderate and severe anemia to be 36.6%, 22.4% and 4.8%, respectively, in Gujarat (15). A similar study in district Kinnaur and Shahpur block of district Kangra, Himachal Pradesh, has also revealed mild anemia, at 53.9% as the most prevalent type, which is comparable to 48.4% in a country wide survey (16).

While severe anemia has been reported to occur with a frequency of 1% at the national level (17), 0.7% in whole Himachal (18), and 8.04% in the subjects in our study. Menstrual cycle irregularity is one of the major cause of iron deficiency anemia in this study, 47% of subjects with menstrual disturbances have been seen to suffer from any one type of anemia. Hemoglobin levels reported to be higher (9.0 g/dl) in female subjects having normal menstrual cycle as compared to those with menstrual disturbances (8.83 g/dl) (19,20), have reported an increased susceptibility of menarcheal girls with inadequate diet, to anemia.

The evaluation of the respondents' awareness level was done using a self-developed multiple choices questionnaire. The questionnaire comprised of total 45 questions, 8 questions based on Socio-demographic data, 26 on Anemia Awareness and 11 on food habits. Among the source of information on anemia reported by respondents were electronic media (35%), Press media (22%), teacher or school (12%), family (15%) and hospital or clinic (8%). A similar type of study on adolescents in 8 secondary schools in Malaysia, source of information on anemia reported by respondents were electronic media (51%), health provider (31%), peer (27%), mass media (20%), teacher or school (18%), family (15%) and hospital or clinic (11%) (21).

Poor nutrition, early childbearing & reproductive health complications compound the difficulties of physical development in young girls in India. Most girls are not adequately aware of their increased nutritional needs for growth (especially increasing their food intake to meet calorie demands of pubertal growth); resulting in girls being underweight & of short stature. Their current nutritional status will decide the well being of the present as well as the future generations (22).

The general meal pattern showed that majority of subjects consumed 3 major meals, breakfast, lunch and dinner. Anemia in the subjects in the present study could be attributed to poor food habits. Only 52.2% of the our subjects were seen to consume 3 meals a day, and out of which 26.1% subjects were not taking taking their breakfast. Similar study done by (23,24,25) also revealed inadequate intake of these food groups in adolescents.

Consumption of tea is observed to be high among all the age group of girls in our study. Majority of them consumed tea in the evening and 40% of girls took tea with breakfast and none of the girls subjects took tea with lunch. Higher intake of tea and its consumption along with the meals hinder iron absorption in the body (26) and could be the reason for low hemoglobin levels in the subjects.

This thus, necessitates the need to organize awareness programs offering counseling to parents of female children in rural areas. Moreover, educating girls in schools and colleges, about the importance of regular and healthy meals and the seriousness of good health, could help in lowering the prevalence of anemia in less developed cities.

This study indicated that most of the subjects (88.5%) agreed with the statement "IDA is preventable through intakes of iron-rich food/diet". Besides, over 80% subjects correctly recognized that anemia symptoms as tiredness, dizziness and pale complexion.

## 5. CONCLUSIONS

There is need to include iron rich food in the diet of adolescents. Grams, maize, Mustard leaf, powder milk and red meat has high iron component so at least once in a week girls should eat iron rich food to get recommended iron per day to gain normal body mass index. Mustard leaf is affordable for adolescents so easily they can purchase and include twice or thrice in a week. Students are taking food twice a day, they can increase food intake thrice a day so from this at least adolescents will be able to get 18 mg/day iron. Iron pot use for cooking, will also increase iron in the diet.

Social marketing is one of the ways to create awareness of anemia and demand for supply of the health services from the government side. Counseling can be done to empower adolescents to make understand the importance of precaution measures to avoid anemia in adulthood. Training program should be organized to make people aware about fortification of food as well as importance of iron for adolescents.

Monitoring and evolution of government program like ICDS (Integrated Child Development Services) Supplementary Nutritional Program should be strengthened. Most of the programs are running on paper not on ground level. Monitoring of these programs should be done properly and effectively time to time (27).

An effective strategy is needed to make the health education sessions for pregnant women and young children. It is important to raise the level of awareness by all possible ways with the help of Media, TV, and health campaigns by Government as well as Non Government Organization at community basis, so it can reach to door step of each family specially women in reproductive age (28).

Awareness with the help of National Social Services (NSS) unit, these type of awareness programme can be conducted in all educational institutions. It is of great importance to encourage and motivate all women, especially multiparous women and the less educated women, for early registration for their health check up and antenatal visits to clinics to attend health education sessions (28).

To start health education sessions with more focus on specific issues and information on anemia, general information, such as the adverse effects of drinking tea with meals in reducing the absorption of iron and about the side effects of misuse or overuse of iron pills especially those women who don't follow a doctor's prescription and health instructions.

To plan for these types of awareness program, information about basic health parameter about iron deficiency anemia in women and children is needed, and how they have changed over time. The Government needs to provide mass awareness and mass screening of Iron deficiency anemia, and Counseling for Iron deficiency anemia among specially school going girls and women of reproductive age (29).

Various surveys and studies across the country have shown anemia as an endemic public health problem. Country has initiated the distribution of IFA tablets among adolescents and pregnant women in order to reduce the anemia. In addition, various food supplementation programs for children, adolescents, and pregnant women have been in operation over the last three decades (30). But, despite the significant efforts by the country the significant reduction in anemia is yet to be observed. A marked difference in IFA consumption due to considerable disparities in socioeconomic factors and health care delivery system was observed (31).

The present study shows a positive correlation between hemoglobin levels, food intakes and nutrient intakes. Hemoglobin levels of low income groups are lower than middle and upper income groups. Females with normal menstrual cycle have higher hemoglobin levels than females with menstrual disturbances. There is an urgent need for improving overall nutritional status of adolescents through nutrition education, community awareness and supplementation programmes. The need for regular blood tests to check hemoglobin levels is emphasized. Nutrition component needs to be included in the school and college curriculum.

#### Acknowledgments

The authors are grateful to the participants in this study for their collaborations.

#### References

- [1] Assessing the iron status of populations: report of a joint World Health Organization/ Centers for Disease Control and Prevention technical consultation on the assessment of iron status at the population level, 2nd ed., Geneva, World Health Organization, 2007. Available at [http://www.who.int/nutrition/publications/micronutrients/Anemia iron deficiency/9789241596107.pdf](http://www.who.int/nutrition/publications/micronutrients/Anemia%20iron%20deficiency/9789241596107.pdf)
- [2] Ezzati M, Lopez AD, Rodgers AA, Murray CJL. Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors. Geneva, Switzerland: World Health Organization, 2004
- [3] National Nutrition Monitoring Bureau (NNMB). 1975-2006. NNMB Reports. National Institute of Nutrition, Hyderabad
- [4] National Nutrition Monitoring Bureau (NNMB). 2002. NNMB Micronutrient Survey. National Institute of Nutrition, Hyderabad
- [5] Mathur JSS. Preventive and Social Medicine, A comprehensive text book. 1st ed. New Delhi: CBS Publishers and Distributors; 2007; 382-89.
- [6] Chatterjee R, *Paediatrics Today* 3 (2008) 110-14.
- [7] Guidelines for Control of Iron Deficiency Anemia, Adolescent Division, Ministry of Health and Family Welfare Government of India, 2013

- 
- [8] Antia FP, Abraham P. Editors (1997). Clinical dietetics and nutrition. 4th ed. Oxford, Oxford university press, 328.
- [9] Park K. Park's textbook of preventive and social medicine (2007). 19th ed. Jabalpur: M/s Banarsidas Bhanot, 493.
- [10] WHO (1968). Techn. Rep. Ser. No. 405.
- [11] United Nations Children's Fund, United Nations University, World Health Organization. Iron deficiency Anemia. Assessment, prevention and control: a guide for programme managers. Geneva, World Health Organization, 2001 (WHO/NHD/01.3.).
- [12] Anand H, Mir R, Saxena R., *Indian Journal of Pathology & Microbiology* 52 (2009) 360-362.
- [13] Ingram CF, Lewis SM., *Journal of Clinical Pathology* 53 (2000) 933-937
- [14] Wintrobe, M. M. „Clinical Hematology' 7th Edition. Philadelphia: Lea and Febiger 1975; pp. 114-115.
- [15] Mehta MN. Effectiveness of daily and weekly iron and folic acid supplementation in anaemic adolescent girls. Bombay: Bombay Urban ICDS Project; 1998; 21-5.
- [16] International Institute for Population Sciences (IIPS) and Macro International, National Family Health Survey (NFHS-3), 2005-06, vol. I, IIPS, Mumbai, India, 2007.
- [17] NFHS (2002). India 1998-99 - National Family Health Survey-2 NFHS-2 - Anemia among women and children. Mumbai: International Institute for Population Sciences; 2000.
- [18] K.N. Agarwal, et al., *Indian J Med Res* 124 (2006) 173-184.
- [19] Kaur I. P., Kaur S., *Journal of Exercise Science and Physiotherapy* 7(1) (2011) 11-18.
- [20] Passi SJ, Malhotra A. Nutrition, Health and Developmental needs of adolescent girls. Press Information Bureau, Government of India, 2002.  
[http://www.pib.nic.in/feature/feyr2002/ffeb2002/f210\\_220021.html](http://www.pib.nic.in/feature/feyr2002/ffeb2002/f210_220021.html). Retrived on 15th March 2013
- [21] Hafzan Yusoff, Wan Nudri Wan Daud, Zulkifli Ahmad, *Iranian J Publ Health* 42(5) (2013) 467-471.
- [22] Adolescent Girls in India Choose a Better Future: An Impact Assessment The Centre for Development and Population Activities (CEDPA) September 2001
- [23] Akkamahadevi, K.H., Kasturiba, B. and Rao M., *Journal of Agriculture Sciences* 31(4) (1998).
- [24] Kumari S., Singh S., *Ind. J. Nutr. Dietet.* 40 (2003) 147-152.
- [25] Prabhakaran S., *Ind. J. Nutr. Dietet.* 40: (2003) 274-279.
- [26] Zijp IM1, Korver O, Tijburg LB., *Crit Rev Food Sci Nutr.* 40(5) (2000) 371-98.
- [27] Ramesh Verma, Minakshi Kharb, Shiv Parsad Yadav, Vikas Chaudhary, Ruchi, Ajay, *International Journal of Social Science & Interdisciplinary Research* 2 (9) (2013) .

- [28] Kumar R., *An International Journal* 6(1) (2014) 24-29.
- [29] Kumar R., Sagar C.S., *Public health Rev: Int J Public health Res* 1(1) (2014) 32-38.
- [30] Government of India, "Annual Report," Ministry of Health and Family Welfare, 2010, pp. 7-12.
- [31] S.-R. Pasricha, B.-A. Biggs, N. Prashanth, et al., "Factors influencing receipt of iron supplementation by young children and their mothers in rural India: local and national cross-sectional studies," *BMC Public Health*, 2011, Vol. 11, article 617.

( Received 23 October 2014; accepted 31 October 2014 )