



## Socio- demographic Profile and Compliance to Weekly Iron Folic Acid Supplementation among Adolescent Girls in Central Delhi

Anuradha Chauhan\*, Jitendra Kumar Meena\*, Mongjam Megha Chandra Singh\*,  
Jugal Kishore\*, Gopal Krishna Ingle\*

### Abstract

Adolescence is a vulnerable period in the human life cycle for the development of nutritional anemia, particularly among girls. A cross-sectional survey was conducted in an Urban Health Center, in New Delhi with the objectives to find out the prevalence and associated socio-demographic factors of iron deficiency anemia along with the study of compliance to weekly iron folic acid supplementation (WIFS). A total of 60 adolescent females (10–19 years old) were included in this study. The study was undertaken from Nov 2013 – Dec 2013 (2 months) using a pre-tested questionnaire containing items to assess the socio-demographic profile, their medical history and past history. After taking their assent, hemoglobin (Hb) was estimated using HemoCue method. The prevalence of anemia was found to be 71.1%. A significant association of presence of anemia was found with lower socio-economic status and non-intake of WIFS. Mean height and weight of subjects with anemia was significantly less in anemic girls than participants without anemia. Significant association of anemia was found with non-consumption of Iron Folic Acid (IFA) tablets ( $\chi^2$  value – 5.3, p value 0.02). A high prevalence of anemia among adolescent females was found, which was higher in the lower socio-economic strata and those not consuming WIFS. Thus there is a need to strengthen the programme for the prevention of anemia among adolescent girls through nutrition education and anemia prophylaxis.

**Keywords:** Adolescent, anemia, prophylaxis, iron, supplementation.

### Introduction

Adolescence has been defined by the World Health Organization (WHO) as the period of life spanning the ages between 10 to 19 years.<sup>1</sup> This is the prime period of life when maximum amount of physical, mental and psychological, and behavioral changes ensue in the human body and this makes them vulnerable to iron deficiency.<sup>2, 3</sup> Girls are more likely to be vulnerable in this period of human life cycle for the development of nutritional anemia, which has been constantly neglected by public health programs. According to Planning Commission report, Government of India (GoI), the prevalence of anemia in women in India is 56.1%.<sup>2</sup> In a family with limited resources, the female child is more likely to be neglected.<sup>4</sup> She is deprived of good food and education, and is utilized as an extra working hand to carry out the household chores. The added burden of menstrual blood loss, normal or abnormal, precipitates the crises too often.

Iron deficiency anemia (IDA) is classified as Mild-Hemoglobin of 11.0-11.9 gm/dl, Moderate-Hemoglobin 8.0-10.9 gm/dl and Severe-Hemoglobin of <8.0 gm/dl in a non pregnant women. IDA leads to cognitive impairment delayed psychomotor development, impaired performance on language skills, motor skills and co- ordination that is equivalent to a 5-10 point deficit in IQ.<sup>5</sup> In the developing world, the prevalence of iron deficiency is high, and this is mainly due to a low intake of bio-available iron.<sup>6</sup> Diets that have a high content of phytate and other modifiers of mineral absorption are associated with an increased risk of iron deficiency anemia.<sup>7</sup> Moreover, the inappropriate dietary habits and low intake of healthy food among adolescents aggravate the condition.

Further, anemia in adolescent girls is also associated with factors reflecting poor socioeconomic status

\*Department of Community Medicine, Maulana Azad Medical College, New Delhi, India

**Correspondence to:** Dr. Anuradha Chauhan, Department of Community Medicine, Maulana Azad Medical College, New Delhi, India. **E- mail:** chauhandranuradha@gmail.com

and recent diarrheal and febrile illnesses.<sup>8</sup> A study conducted by Chaudhary SM shows that there is a significant association of anemia with socio-economic status.<sup>4</sup> Results have showed a significant difference in prevalence of anemia in adolescent girls in relation to caste, socio- economic status, father's occupation and mother's education. Reverse association was seen between socio- economic status and the prevalence of anemia in adolescent girls. Lower the socio- economic status, higher the prevalence of anemia i.e. maximum (47.6%) in class V and minimum (29.1%) in class I and II. Adolescent daughters of fathers who were professionals had least prevalence of anemia.<sup>9</sup> The study done by Joshi M and Gumashta R shows that weekly supplementation of 'Iron and Folic Acid' in 'Iron Deficiency Anemia' patients has a definite role and is as good as daily supplementation with added benefits of less adverse reactions and better compliance.<sup>10</sup> However, there may also be an important role played by inflammatory disease as well as iron deficiency in the causation of anemia among adolescent girls. The relationship between iron deficiency, inflammatory disease, and anemia has been seen. The prevalence of anemia was more than twice as high in the lowest as in the highest income group.<sup>11</sup> Controlling iron deficiency among adolescents requires coordination with other nutrition and primary health care programs as part of an integrated approach to improved health and nutrition of the population.<sup>12</sup> It is in this context that a nation- wide Weekly Iron and Folic Acid Supplementation (WIFS) program has recently (July 2013) been launched.

This study was planned to highlight the problem of anemia in adolescent females and to study socio-demographic factors related to anemia. The compliance to WIFS was also assessed among the adolescent girls.

## Materials and Methods

### Study Design

It was a descriptive cross- sectional study conducted in an urban health centre at Delhi gate, Delhi, for a period of 2 months among the females aged 10-19 yrs residing in this area. This area was selected as there is paucity of studies in low income group of urban areas. The adolescent girls approaching the health centre were included in this study, where their interview was taken and then general physical examination and blood sampling was done. The study got the approval from ethical committee of the Maulana Azad Medical College. The option to opt out of the study was kept open for the participant

without any clause. The identification data collected included serial number and not the name of the subject to ensure confidentiality.

### Study Materials and Instruments/ Tools

1. **Semi- structured schedule:** A pre tested, semi-structured questionnaire was designed and customized for gathering following information in different sections:
  - *Section 1:* Demographic and Socioeconomic Information: This section consisted of items covering the adolescent's age, gender, family structure, education etc. Parental Profile: This section will consist of items relating to parental education, income and occupation etc. Socio- economic status was assessed using Modified Kuppaswamy Scale.<sup>14</sup>
  - *Section 2:* Individual's health profile: This section consisted of items e.g. personal health at present, past history of illness or hospitalization, present weight and height, pallor.
  - *Section 3:* Estimation of hemoglobin (Hb) level: using HemoCue method.
2. **Equipments for sampling** e.g., Hb estimation apparatus, needles, strips, sterile swabs.
3. **Other equipments:** weighing machine and measuring tape.

### Study Methodology

The study was approved by the Institutional Ethics Committee. After obtaining written informed consent from the guardians and assent from the adolescents, information about the socio-demographic characteristics was recorded by investigator in the predesigned, pretested performa. This was followed by general physical examination of the subject including height and weight. Socio-economic status (SES) was estimated according to modified Kuppaswamy's scale.<sup>13, 14</sup> Hemoglobin (Hb) level, which was a primary outcome variable in the study was estimated using automated Haemoglobinometer by investigator. One drop of venous blood was taken on strip and then the estimation of hemoglobin was done. (Hemoglobin determined by the HemoCue method is comparable to that determined by the other methods. The HemoCue photometer is therefore recommended for use as on- the- spot device for determining hemoglobin in resource poor setting).<sup>15</sup>

The next day, the results of the hematological investigations were conveyed to the subjects and

those found to have anemia were given appropriate treatment and advice regarding proper diet.

**Classification criteria for Anemia:** Hb < 12.0 gm% for nonpregnant adolescent, Hb < 11.0 gm% for pregnant adolescent.<sup>16</sup> Symptom classification: Malaise, weakness, fatigue, dizziness, drowsiness and palpitation.

#### **BPL (Below the Poverty Line)**<sup>13, 14</sup>

Families having total family income upto Rs. 24,200/-p.a. were identified under this category.

#### **Statistical Analyses**

The data collected were coded, entered into Microsoft Excel 2007, and analyzed using SPSS 17.0. Descriptive statistics, including mean, standard deviation, and range, for quantitative data and proportions for qualitative data were used to characterize the study population. For qualitative data,  $\chi^2$  or Fisher's exact test was used to observe differences between proportions for independent groups. Box plots were made to compare the

distribution of quantitative variables between independent groups. The difference between the two groups was considered significant at p value 0.05. Mann Whitney U test was used for finding the difference between the two groups.

#### **Results**

**Socio- demographic profile of girls:** In the present study, mean age of the participants was  $15.8 \pm 3.6$  years. It was found that out of 60 subjects, 9 (15.0%) belonged to BPL (Below Poverty Line). Mostly (51.7%) participants belonged to upper middle socioeconomic status, followed by lower middle status (30.0%). Out of 60 subjects, 71.7% participants were Muslims and 28.3% belonged to Hindu religion.

**Prevalence of anemia:** Out of all the participants, 43 (71.7%) subjects were found to be anemic and mean Hb level was found to be  $10.6 \pm 1.7$ g/dl. It was seen that among the anemic adolescent girls, 25.0% had mild anemia, 40.0% had moderate anemia, and 6.7% had severe anemia. Overall prevalence of moderate anemia was found to be more (figure 1).

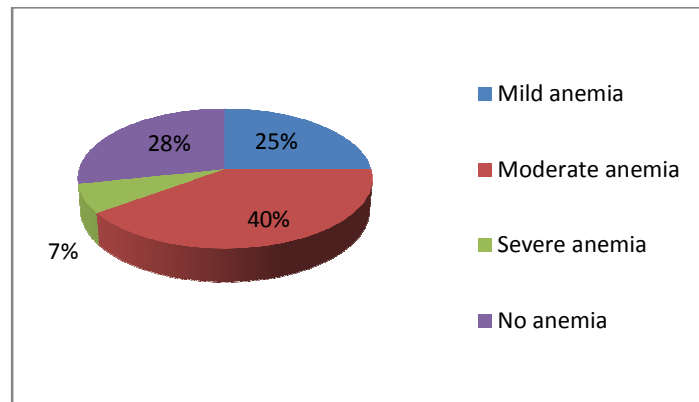


Figure 1. Pie diagram showing the prevalence of various grades of Iron deficiency anemia

#### **Association of anemia with socio-demographic factors**

**Age:** Mean value of Hb in the age group of 10-14

years is  $10.1 \pm 1.3$  mg/dl as compared to  $10.9 \pm 1.6$  mg/dl in 16-19 years age group (p value of 0.12, figure 2).

Figure 2: Box Plot showing comparison of Hb with age of the adolescents.

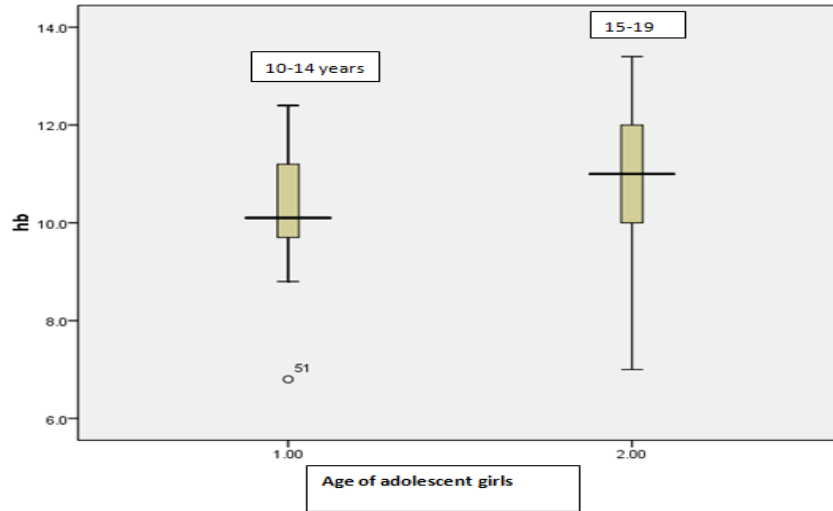


Figure 2.Box plot showing comparison of Hb with age of the adolescents

**Socio economic status:** Highly statistical significant difference in hemoglobin levels was found between the ones belonging to lower and those belonging to middle socioeconomic status (p value of 0.002). Mean value of Hb in lower socioeconomic group

was found to be  $9.2 \pm 1.9$  g/dl as compared to  $11.0 \pm 1.5$  g/dl in middle socio- economic group (p value – 0.002, figure 3). There was a positive correlation of mean value of Hb with total family income.

Figure 3: Box Plot showing comparison of Hb with Kuppuswamy score.

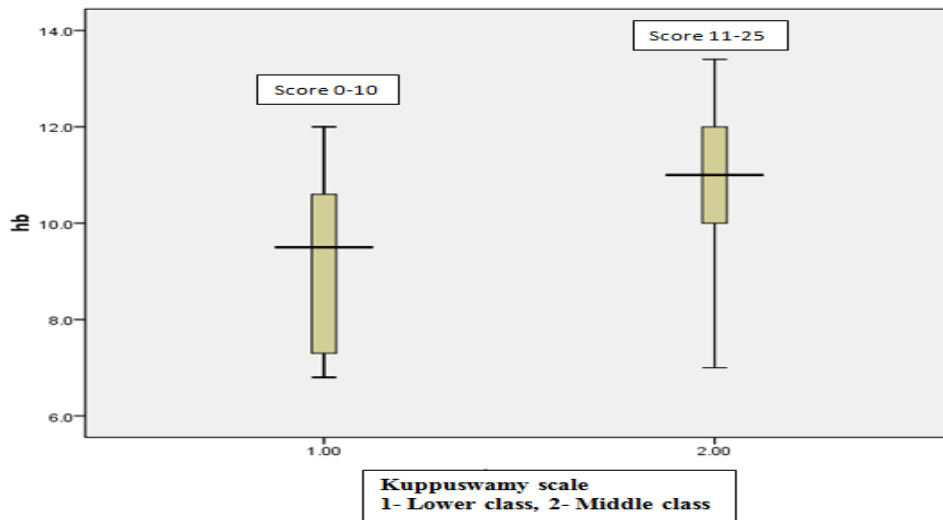
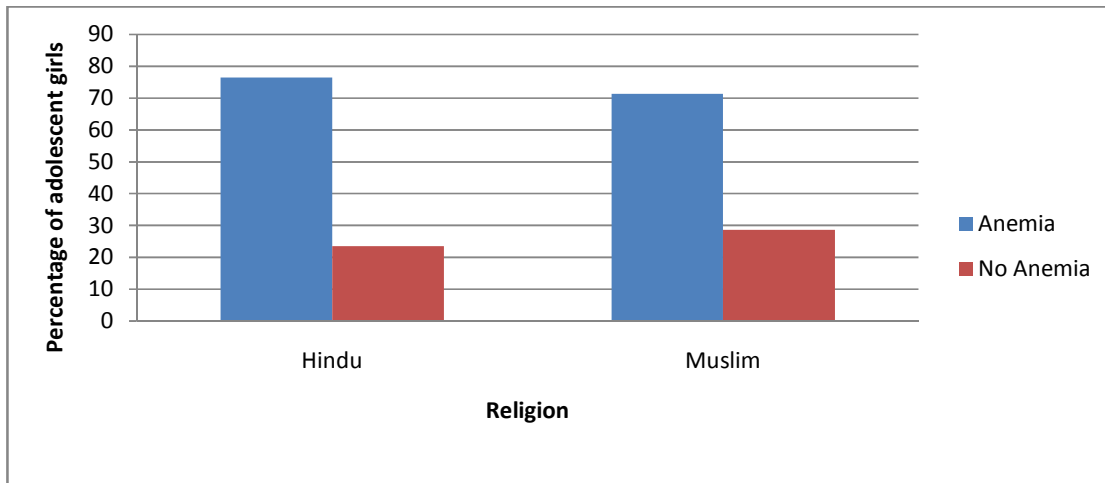


Figure 3.Box plot showing comparison of Hb with Kuppuswamy score

**Association of anemia with religion:** There was no significant difference in the mean value of Hb between Muslim and Hindu girls (p= 0.5), although the mean Hb value was lower in Muslim females as compared to Hindu females (figure 4). The

correlation of anemia with religion also was not significant (Pearson’s correlation coefficient-0.051). The time onset of menarche and BMI also had no significant effect on the prevalence of anemia.



**Figure 4.** Bar diagram depicting the distribution of anemia among adolescent girls (religion- wise)

**Compliance:** Majority of them, i.e. 54 (90.0%) were receiving iron tablets from school once in a week. Out of these, only 39 (70.2%) were consuming the tablets. Only one out of six participants who were not receiving the tablets was consuming the iron tablet by buying on their own expenditure. The main reasons for not consuming were intolerance/side effects (50.0%), unwillingness (30.0%) and forgetfulness (15.0%). There was statistically significant difference in mean Hb level between those who were consuming iron and those who were not, with mean Hb of  $11.1 \pm 1.4$  gm/dl and  $10.1 \pm 1.6$  gm/dl respectively (p value= 0.019).

## Discussion

**Prevalence of anemia and role of WIFS:** In our study, the mean Hb level of anemic adolescent girls was found to be  $10.6 \pm 1.7$ g/dl. In this study, the overall prevalence of anemia was found to be 71.7%. The anemia findings in this study are comparatively lesser than those noted by J Rajaratnam et al.<sup>17</sup> in Tamil Nadu. Study by Toteja GS et al.<sup>18</sup> shows that 90.1% prevalence of anemia was found among adolescent girls from 16 districts of India, with 7.1% having severe anemia. The observed difference in the prevalence of anemia could be due to considerable difference in the study setting and considering a comparatively larger population as compared to ours. The existing difference may be attributed to the fact that this magnitude of anemia is before the implementation of intervention programme (WIFS). The intervention study done by Joshi M in Nagpur in urban area also reflects almost similar finding with mean Hb of  $10.4 \pm 1.1$ gm/dl.

This study also points out that there is a definite role of WIFS in preventing and treating anemia. The

WIFS has not only comparative but better impact on improvising the Hb levels among adolescent girls. Another study<sup>9</sup> addresses that compliance in weekly supplementation is better as compared to daily supplementation in treating anemia. However, there is paucity of studies showing the compliance status of weekly supplementation affecting Hb levels. In the community based study done by Chaudhary SM<sup>4</sup> prevalence of anemia was found to be 35.1% which is much below the prevalence found in this study. This could be due to the difference in study setting, diet, lifestyle and living standards or could be due to better implementation of WIFS program over there.

**Compliance:** In the present study, out of all 41 anemic girls, 17 (89.5%) were not consuming IFA tablets weekly. Various reasons contributing for incompliance were intolerance, unwillingness and forgetfulness. The study done by Vairavasolai P<sup>19</sup>, shows that the various reasons for incompliance were discomfort when taking daily iron tablets, low motivation and ability of health workers to provide appropriate counseling, limited availability of supplies due to insufficient funds and problems in the procurement and distribution of supplements and inaccessibility, that is problems with cost, time and efforts required to reach a health centre where iron tablets are available. The reason for existing difference in contributing factors leading to incompliance may be due to closed ended questions asked in the present study.

**Role of socio economic status and other demographic factors:** The study done by Toteja GS et al.<sup>18</sup> shows that significant association of anemia exists with socio- economic status, which might be due to existing affordability of high quality nutritious food in better socio- economic status category.<sup>2</sup> Study done by Lokare PO shows the

prevalence of anemia with respect to religion, wherein it was observed that 94.3% Hindus were suffering from anemia as compared to 84.9% and 82.2% of Muslim and Buddhist women, respectively.<sup>20</sup>

**Role of religion:** It has been observed that the prevalence of anemia between Hindus and other religions during pregnancy was statistically significant ( $p < 0.05$ ).<sup>18</sup> Similarly, in the present study, the difference has been found, although statistically insignificant. Another study finds approximately the same prevalence of anemia as ours in adolescent girls in India, with over 70.0% being anemic. This study confirms that supplementation with IFA tablets improves the adolescent growth and Hb levels.<sup>21</sup> A significant association of anemia was found with socio-economic status and literacy status of parents in the study done by Chaudhary SM,<sup>2</sup> as in the present study. In another study,<sup>21</sup> a high prevalence of anemia was observed among pregnant Hindu women as compared to Muslim women. The religion itself may not be the cause for this finding, but probably it works through different dietary patterns, food taboos, and so on.

### Conclusions and Recommendations

The overall prevalence of anemia among adolescent girls has been found to be 71.7%. It is seen that anemia affects the overall nutritional status of adolescent females. A significant association of anemia with socio-economic status and parents' educational status suggests a need to develop strategies for intensive adult education and to improve the socio-economic status of the population through poverty alleviation programs. This should be supported by programs for the prevention of anemia among adolescent girls through nutrition education and anemia prophylaxis. There are various factors which were found to be contributing for incompliance in IFA tablets supplementation and measures should be taken for their improvement.

### Strengths

1. The study brings out identification of anaemia and associated factors and also for non intake of iron by the adolescents, challenging factors for not consuming the IFA supplementation. If they are removed, then the prevalence of anemia can be reduced. Hence, the study shows the success of the WIFS program.

### Limitations

1. Factors affecting dietary absorption of iron, family beliefs, myths and stigma associated were not assessed.

2. Sample size is small.
3. Most of the girls were in the age group 17-19 years, so the results cannot be generalized to each age group.

### Future directions of the study

The present study addresses the current magnitude of the anemia prevalence and the various factors playing role behind the causation. The study also addresses the impact of WIFS program. The study also provides insight to the planners and policy makers to revamp the ongoing strategy to curb the existing burden of anemia among adolescent girls.

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