

**A Cross sectional study of presence of iron deficiency anemia in adolescent girls**<sup>1</sup>Dr Tasneem Zahra, Associate Professor, Department of Obstetrics and Gynaecology, GMC, Dausa<sup>2</sup>Dr Lakshmi Salodia, Assistant Professor, Department of Obstetrics and Gynaecology, GMC, Dausa<sup>3</sup>Dr Ankita Kasliwal, Assistant Professor, Department of Obstetrics and Gynaecology, GMC, Dausa**Corresponding Author:** Dr Tasneem Zahra, Associate Professor, Department of Obstetrics and Gynaecology, GMC, Dausa**How to citation this article:** Dr Tasneem Zahra, Dr Lakshmi Salodia, Dr Ankita Kasliwal, “A Cross sectional study of presence of iron deficiency anemia in adolescent girls”, IJMACR– October– 2026, Volume – 9, Issue – 5, P. No. 16 – 21.**Open Access Article:** © 2026 Dr Tasneem Zahra, et al. This is an open access journal and article distributed under the terms of the creative common’s attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non - commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract****Background:** IDA is a preventable and treatable nutritional disease. Adolescent children are more vulnerable to develop iron deficiency anemia due to accelerated increase in requirements for iron, poor dietary intake of iron, high rate of infection and worm infestation as well as the social norm of early marriage and adolescent pregnancy.**Methods:** This was a hospital-based cross-sectional study. Adolescent girls aged 10 to 19 years, attending the Outpatient Department (OPD) of Obstetrics & Gynaecology (OB&G) and who expressed willingness to participate, were enrolled in the study.**Results:** The prevalence of anemia among adolescent girls was found as 73.00%. Out of 73 anemic girls, 52 girls were suffering from mild degree of anemia and 19 girls were having moderate degree of anemia. Only two girls was found severely anemic.**Conclusion:** The findings of this study revealed that the adolescent females had a high hospital prevalence of anemia, with the majority of these instances classified as mild to moderate in intensity, whereas the hospital prevalence of absolute ID and IDA was low.**Keywords:** Prevalence, Anemia, Adolescent.**Introduction**

Iron deficiency anemia is the most common cause of anemia in the world. According to WHO report in 2001, around two billion individuals have been estimated to suffer from anemia out of which 50% of cases have been documented as IDA.<sup>1</sup> The proportion of anaemia caused by iron deficiency in south Asia is 54.8%. Previous studies in India have shown that the prevalence of anaemia varies between 46% and 88% and 50 % of those cases have been reported as IDA.<sup>2</sup>

Most of the previous studies on anemia in India were conducted on school children and pregnant women and their predictive factors. However, there is limited

information about the prevalence and risks factors of IDA among the Indian adolescent school children. IDA results from long-term negative iron imbalance. Usually, deficiency of iron develops gradually and does not have clinically apparent symptoms until anemia becomes severe. IDA in adolescence may lead to impairment in learning, intellect and work performance.<sup>3</sup>

Haemoglobin and ferritin are considered by World Health Organization to be the most effective indices for determining the population burden of Iron deficiency anaemia.<sup>4</sup>

According to NFHS 5 prevalence of anemia in adolescent girls was 59.4% in Rajasthan. In India, it is estimated that about 56% of the Adolescent girls are prone to Anemia, which means at any given point of time about 6.40 Crore adolescent girls are suffering from Anemia.<sup>5</sup>

An adolescent age is when the overall growth takes place whereby, a unique identity is being formed for the individual which shall shape the rest of the life of the Individual. Anemia at this stage of life shall have some serious long term issues like:

Poor performance at academics, and co-curricular activities. Poor memory retention, reduced attention span, and increased school dropout. Reduced immunity, stamina for sports and other physical activities. Complications in mensuration, pregnancy and motherhood. All this would, directly and indirectly impact the growth of the nation as well as the economy.

Fighting anemia requires the willingness & interest of both the general population and the administration to accept the existence and prevalence of such an issue among the society. Strategically focusing on adolescents and taking measures by giving in additional supplements of Iron intake to counter the iron deficiency related

Anemia can be one major problem solver. Such strategic focus can be implemented by introducing health education programmes at school level and creating an awareness among the adolescents – both boys and girls.

According to WHO, IDA is defined when haemoglobin concentration is less than 13g% in an adult male, 12g% in an adult female or 11.5g% in a child between 5-11 years in combination with a serum ferritin concentration less than 30µg/L in an adult or 20µg/L in a child.<sup>6</sup>

Iron in the form of heme is vital to many metabolic functions including oxygen transportation in haemoglobin. The liver, which is the site of production of iron transport proteins, contains the largest non-functional iron stores either as ferritin or hemosiderin. Ferritin is both diffuse and soluble, and is the primary iron storage protein.<sup>7</sup>

Dietary iron is absorbed mainly in the duodenum. Only ferrous iron is absorbed, and it is transported across the apical membrane of the enterocyte by a divalent metal transporter. It is then transferred across the enterocyte to the basolateral membrane by an unknown mechanism.<sup>8</sup>

Good dietary sources of iron are liver, ironenriched breakfast cereal, roast beef, steak nuts (cashews, almonds), roast lamb sweet corn, potato, eggs lentils, baked beans in sauce, bean soup, chilli with beans, dark-flesh tuna wholegrain foods (oatmeal, sunflower seeds),lean pork, ham enriched bread, mostly wholemeal, skinless chicken, green leafy vegetables (broccoli, spinach, cabbage),turkey milk chocolate, white fish, dried fruit (prunes, apricots, raisins),fresh fruit and soy (tofu, soybeans, soymilk).<sup>9</sup>

IDA is a preventable and treatable nutritional disease. Adolescent children are more vulnerable to develop iron deficiency anemia due to accelerated increase in requirements for iron, poor dietary intake of iron, high

rate of infection and worm infestation as well as the social norm of early marriage and adolescent pregnancy. Adolescents frequently consume snacks prepared from refined cereals and have a habit to consume carbonated drinks while there is a lower inclination to eat fruits and vegetables.<sup>10</sup>

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

Adolescent girls (10–19 years) are at a high risk of IDA due to accelerated increase in requirement, poor dietary intake, physiological losses like menstrual blood losses, high rate of infection and worm infestation as well as the consequence of early marriage and adolescent pregnancy.<sup>8-10</sup>

Anaemia in adolescent girls in future attributes to high maternal mortality rate, high incidence of low birth-weight babies, high perinatal mortality as well as foetal wastage.<sup>10,11</sup>

Hurdles related to the building of iron stores during pregnancy provide a strong rationale for health education concerning the iron status of women before pregnancy.<sup>12,13</sup>

It can be engaged by increasing knowledge and the promotion of correct attitudes and practices about anaemia by providing nutritional education. Nutrition education is the type of intervention that aims to address malnutrition by initiating behavioural change.<sup>14</sup>

#### Materials and Method

This was a hospital-based cross-sectional study. Adolescent girls aged 10 to 19 years, attending the Outpatient Department (OPD) of Obstetrics & Gynaecology (OB&G) and who expressed willingness to participate, were enrolled in the study.

Elevated CRP levels were considered indicative of chronic conditions such as bacterial infections (e.g., sepsis) and fungal infections, ensuring the exclusion of acute etiologies of anemia. Exclusion criteria included a recent history of blood transfusion or blood donation within the past three months; major surgical procedures or significant blood loss due to recent accidents within the past six months; and a history of chronic diseases such as hypertension, diabetes mellitus, tuberculosis, cardiac diseases, and chronic kidney disease.

A semi-structured questionnaire was created and validated through pilot testing prior to data collection. The questionnaire was developed in consultation with four subject experts, and modifications were made following the pilot testing. Patient slips containing details such as a unique hospital registration number (CR number), age, and gender - written in English and Hindi - were distributed to all adolescent girls visiting these OPDs, with the help of the staff posted in the respective departments, to maintain confidentiality. The parents/caregivers of adolescent girls meeting the inclusion and exclusion criteria were informed about the study's purpose by the consulting doctor.

Participants were instructed to undergo blood sample collection to investigate their iron profile. Following aseptic procedures, 6 mL of venous blood was collected from all enrolled adolescent girls free of cost.

Data were entered into Microsoft, cleaned, and categorized according to standard operational definitions. Analysis was performed using IBM SPSS Statistics for Windows, Version 22. The independent variables of the study were the sociodemographic profile of the participants and the laboratory investigation measures, whereas the prevalence of anemia, ID, and IDA were the dependent variables. Descriptive statistics

were used for categorical variables like sociodemographic details of the participants and prevalence of anemia, ID, and IDA, which are represented as frequency (percentage), while continuous variables like hemoglobin levels and iron profile are represented as mean  $\pm$  standard deviation (SD) or median and interquartile range (IQR), considering the normality of the data. Pearson's chi-square test or Fisher's Exact test determined associations between categorical variables, with significance set at  $p < 0.05$ . The strength of association was measured using Phi and Cramer's V values (0.1 as weak, 0.3 as moderate, and 0.5 and greater as strong). Parametric (Student's t-test) or non-parametric tests (Mann-Whitney U test) compared means or medians of continuous variables, considering a p-value  $< 0.05$  as statistically significant. Levene's test for equality of variances assessed variance equality between groups.

## Results

Table 1: Prevalence of anemia among adolescent girls (N = 100)

| Hb level (g/dl) | No. of girls | Percentage |
|-----------------|--------------|------------|
| >11             | 27           | 27.00      |
| 10.0-11.9       | 52           | 52.00      |
| 7.0-9.9         | 19           | 19.00      |
| <7.0            | 2            | 2.00       |
| Total           | 100          | 100.00     |

The prevalence of anemia among adolescent girls was found as 73.00%. Out of 73 anemic girls, 52 girls were suffering from mild degree of anemia and 19 girls were having moderate degree of anemia. Only two girl was found severely anemic.

Table 2: Distribution of adolescent girls according to general appearance

| General appearance   | No. of girls | Percentage |
|----------------------|--------------|------------|
| Well nourished       | 64           | 64.00      |
| Moderately nourished | 25           | 25.00      |
| Mal nutrition        | 11           | 11.00      |
| Total                | 100          | 100.00     |

The above table reveals that out of 100 of the adolescents girls 64(64.00%) adolescents girls were well nurshied, 25(25.00%) were moderately nourished and remaining 11(11.0%) were malnourished.

## Discussion

Anemia during adolescence influence women's entire life cycle. It also has negative consequences for survival, growth, development of their children later in life. The Government of India has made the adolescent health as a part of RCH package since 1997.

Later to combat the problem, Government of India started Adolescent Girls anemia Control Program with technical support from UNICEF. The main interventions of this program were later continued under the heads of SABLA and WIFS scheme under Rashtriya Kishor Swasthya Katakram (RKSK). In the base line survey for the program by UNICEF, 65- 99% of adolescent girls were found anemic, at various states of country.<sup>15</sup>

In this study the prevalence of anemia among adolescent girls was observed as 73.00%, which is very close to the observations taken by Rati et al<sup>16</sup> and Patnaik et al<sup>17</sup>, who found the prevalence as 80% and 78.8% in their studies in rural areas of Karnataka and Odisha respectively. Though Kaur et al<sup>18</sup> observed anemia prevalencerate as 59.8% in rural Wardha (Maharashtra). Whereas a very high prevalence of anemia (90.1%) was noted by Kulkarni et al<sup>19</sup> in adolescent girls of a urban slum in Nagpur.

## Conclusion

The findings of this study revealed that the adolescent females had a high hospital prevalence of anemia, with the majority of these instances classified as mild to moderate in intensity, whereas the hospital prevalence of absolute ID and IDA was low. This highlights the need to determine the underlying cause of anemia and underscores the importance of screening for ID before the actual onset of clinical IDA. The utilization of precise and reliable methods to assess biochemical markers - such as hemoglobin, serum ferritin, serum iron, percentage saturation of iron, and CRP - enhanced the robustness of the analysis, which is a major strength of this study. The hospital prevalence of ID and IDA among adolescent girls highlights the necessity of identifying additional nutritional factors contributing to anemia. This will enable the implementation of focused public health interventions and the prioritization of screening, prevention, and treatment methods to enhance overall health outcomes in adolescent girls.

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