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# Prevalence of anemia among rural adolescent girls-Hospital based study from South India

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## Abstract

**Introduction:** The aim of the study is to determine the prevalence of anemia among adolescent girls in rural area and to study the association of anemia with respect to the age of the patients and their socio-demographic profile.

**Materials and Method:** This was a cross sectional hospital based study, conducted on 779 adolescent patients (aged 10-19 years) attending out-patient departments and in-patients departments of Thuvakudi government hospital, Trichy district, between March 2015 and February 2016. Estimation of hemoglobin was carried out by cyanmethaemoglobin method. Statistical analysis was performed by using simple percentage method.

**Results:** A total of 779 adolescents were evaluated anemia. 297 had anemia and accounted for 38.13%. Most of patients who had anemia were related to the age 14(23.23%). The prevalence of mild, moderate and severe anemia was 67.68%, 27.61% and 4.71% respectively. The prevalence of anemia was substantially high among the patients who were from low socio-economic status.

**Conclusion:** Among adolescents girls, the prevalence of anemia was substantially high. Socio economic status and illiteracy are the major factors that contribute to high prevalence of anemia.

**Keywords:** Prevalence, Anemia, Adolescent, Girls

## Introduction

Adolescence is a stage of conversion from dependent childhood to independent adulthood. According to World Health Organization (WHO), adolescents are the population of 10 to 19 years of age.[1] The word adolescence is originated from the Latin word, 'adolescere' which means "to grow, to mature".[2] Adolescent population of India is 21% which in numbers 253 million. Sizable number of adolescents face challenges to their healthy development due to various factors, such as poverty, social demarcation, negative social norms, and early marriage and child-bearing, especially in the marginalized and under-served sections of the population.[3] In a family with measured resources, the girl child is more likely to be ignored. She is underprivileged of having good food and better education, and also employed to carry out the household duties. In addition, menstrual blood loss precipitates the crises too often.[4]

In India, anemia is one of the most familiar health problems which is much more widespread in the rural than in the urban areas. Anemia is a nutrition problem worldwide and its prevalence is higher in developing countries when compared to the developed countries.[5] Anemia affects mainly women of child-bearing age, and adolescent girls. Adolescent girls are more prone to anemia and malnutrition. Insufficient nutritional diet in adolescent age can have disastrous effects during their reproductive period.[2] If adolescents are well nourished, they can make optimal use of their skills, talents and energies today, and be healthy and responsible citizens and parents of healthy babies tomorrow. Data from our country shows 25%-85% of anemia among adolescent children. Majority of these studies are from rural areas.[6,7]

In the present study we aimed to assess the prevalence of anemia among adolescents girls and to probe socio-demographic variables among anemic adolescents girls.

## Material and Methods

Cross-sectional, hospital based study conducted on 779 adolescent patients (aged 10-19 years) attending out-patient departments and in-patients departments of Thuvakudi government hospital, Trichy district, between March 2015 and February 2016.

**Inclusion criteria:** Unmarried, non-pregnant, and non-lactating girls in the age group of 10-19 years were included in the study.

**Exclusion criteria:** Known cases of haemoglobinopathies, bleeding disorders, taking medication and chronic diseases were excluded.

Socioeconomic status (SES) score was done by using the Modified Kuppuswamy scale. After obtaining written consent from the subjects and their parents/guardians, a pre-test questionnaire was administered to collect information on basic demographic details. Clinical examination was also performed in brief.

Estimation of hemoglobin was performed by the cyanmethaemoglobin method.[8]

Classification of the anaemia according to its severity:[9]

| Anemia | Hb(range in gm/dl) |
|---|---|
| Mild | 10-11.9 |
| Moderate | 7-10 |
| Severe | <7 |

## Results

Out of 779 adolescents evaluated anemia, 297 were anemic with a prevalence rate of 38.13%. Majority of participants who had anemia were belonged to the age 14(23.23%) followed by 15(19.87%) and 13(14.48). In our study least number of participants with anemia were belonged to age group of 16 and 19 which accounted only for 4.38%. Table 1

**Table 1: Age wise distribution of anemia among adolescence**

| Age in years | Anemic patients | Percentage |
|---|---|---|
| 10 | 17 | 5.72 |
| 11 | 29 | 9.76 |
| 12 | 18 | 6.06 |
| 13 | 43 | 14.48 |
| 14 | 69 | 23.23 |
| 15 | 59 | 19.87 |
| 16 | 13 | 4.38 |
| 17 | 15 | 5.05 |
| 18 | 21 | 7.07 |
| 19 | 13 | 4.38 |
| Total | 297 | 100% |

Based on hemoglobin level of anemic adolescence they were categorized into three groups. The prevalence of mild, moderate and severe anemia was 67.68%, 27.61% and 4.71% respectively.(Table 2)

**Table 2: Severity of anemia**

| Category | Anemic adolescents | Percentage |
|---|---|---|
| Mild | 201 | 67.68% |
| Moderate | 82 | 27.61% |
| Severe | 14 | 4.71% |
| Total | 297 | 100% |

The prevalence of anemia among the girls who belonged to class IV (upper lower) was high which accounted for 52.19% followed by class II (upper middle) with 27.95%. Least number of anemic adolescents were from class III(lower middle) with 19.87%. In the present study, no participant from socioeconomic strata I (upper) and V (lower). Other socio demographic details are listed in Table 3.

**Table 3: Socio demographic profile of anemic adolescence**

| Socio demographic status | Number percentage |
|---|---|
| **Socio economic status** | |
| II (upper middle) | 83(27.95%) |
| III (lower middle) | 59 (19.87%) |
| IV (upper lower) | 155(52.19%) |
| **Father's education** | |
| Illiterate | 177 (59.60%) |
| Primary | 61(20.54%) |
| Secondary | 40(13.47%) |
| Higher secondary and above | 19(6.40%) |
| **Religion** | |
| Muslim | 73(24.58%) |
| Hindu | 224(75.42%) |
| **Diet** | |
| Vegetarian | 211(71.04%) |
| Non vegetarian | 86(28.96%) |
| **Type of family** | |
| Nuclear | 112(41.08%) |
| Joint | 185(62.29%) |

## Discussion

In our study, the prevalence of anemia among adolescent girls was 38.13%. This result is matching with the observation of previous research by Chaudhary and Dhage(35.1%).[4] And also our results are parallel to the reports of CMS Rawat et al.[10] A study on nutritional status of adolescents from various countries by the International Centre for Research on Women (ICRW), showed 32-55% prevalence of anemia.[11] In Nepal, the prevalence rate of anemia was 68.8% among adolescent females.[12] But, in United States of America(USA) the prevalence rate of anemia was only 2%.[13] High prevalence rate was observed by J Rajaratnam et al.[14] According to Al-Sharbati et al,[15] high prevalence of anemia was noted among adolescents of rural(12.9%) than urban(17.6%). Our study is not in agreement with the study conducted by Akramipour et al in which anemia was accounted for 46.6%.[16] Other Studies from rural parts of Wardha and Lucknow to assess the prevalence of anemia among adolescent girls, found to be high and accounted for 59.8% and 56% respectively.[17] Studies from under developed countries such as Peru, Indonesia and Bangladesh, the prevalence of anemia in girls has been found to be around 25-30%.[18]

In our country, Jharkhand state showed highest prevalence of anemia, where approximately all adolescent girls were found to be anemic. Least prevalence of anemia was found in the northeastern part of country, due to high living standard of population in this region.[19] Prevalence rate of anemia vary from region to region within the nation.[15]

In the present study, mild anemia (67.68%) was frequently observed which was followed by moderate (27.61%) and severe anemia(4.71%). Similarly,

according to Rita singh,[20] prevalence of mild anemia(19.4%) was observed frequently followed by moderate(14.9%) and severe anemia(2.2%) while Rawat et al[9] reported 19.0 per cent mild, 14.1 per cent moderate and 1.4 per cent severe anemia. Study from Orissa conducted in three districts showed 96.5% of anemia among non-school going adolescent girls. Narrow difference was noticed between mild (42.2%) and moderate anemia (46.9%). Severe anemia was noted among only 4.4%.[21]

According to the study conducted by Toteja GS et al,[22] 90% prevalence of anemia was found among adolescent girls and 7% of their participants were belonged to category of severe anemia. Shield, et al [23] reported significant inverse association between hookworm egg count and hemoglobin level.

In this study, high prevalence of anemia was seen among girls who belonged to upper lower socio-economic groups (52.19%) as compared to upper middle (27.95%) and lower middle(19.87%) . Study conducted by R. Gawarika et al.[24] observed the prevalence of 96.5% in weaker income group and 65.18% in middle or higher middle group. Similarly Kapoor et al.[25] also reported 56% in lower middle and 46% in high socio-economic group. This may be due to the availability of good nutritional diet among families of better socio-economic status. Intake of snacks and junk foods, which lack micro-nutrients may be the cause for anemia among higher socio-economic category.[26]

In the present study, majority of anemic adolescents fathers were illiterates. As per Rawat et al,[10] 44% of participants were from labour families and also observed anemia in 43.2 per cent of adolescent daughters of illiterate mothers. Rawat et al[10] also showed higher prevalence of anemia among adolescent girls who are illiterate (42.2%) and just literate (40.3%) mothers as compared to educated mothers.

Considerable association was noted between vegetarianism and anemia which was similar to the findings by Verma, et al.[26] The study conducted by Koc et al[27] in Şanlıurfa city demonstrated the effects of habitual food consumption on anemia. In this region consumption of red meat is high and may be the cause for low prevalence of anemia(1.5%). Religious issues and financial constraints may, however, pose a problem. In such a situation, they should be encouraged to take citrous fruits and vegetables, which will promote iron absorption. The germination of cereals and legumes prior to consumption will also improve iron absorption by increasing vitamin C and lowering tannins and phytates.[28]

In our study, the Prevalence of anemia was high among adolescents belonged to Hinduism (75.42%) than muslims adolescents(24.58%).This is in agreement with the reports of Kakkar et al[29] may be due to the intake of vegetarian food with low bioavailability of iron.

This was the hospital based study and remained as limitation. Another limitation was, no stool examination was not performed for the detection of intestinal parasites which may contribute to anemia particularly among adolescents.

## Conclusion

Among adolescent girls, the prevalence of anemia was substantially high. Factors responsible high prevalence of anemia are, socio economic status and illiteracy. By giving timely prophylaxis along with enlightening the parents of adolescent girls will go along way in improving their hemoglobin status.

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