European Journal of Molecular & Clinical Medicine (EJMCM)
ISSN: 2515-8260 Volume 09, Issue 07, 2022

**Original research article**

# A Clinico - Hematological Profile of NutritionalAnaemia Among Adolescents: at a Tertiary Care Centre

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## Abstract

**Background & Objective:** This study is a descriptive hospital study in adolescents in Government medical college Bettiah. with the following objective. To assess the nutritional and socio demographic factors contributing anemia.

**Methods:** It's a hospital based descriptive study. Adolescents attending OPD at GMC Bettiah, and inpatients, will be participating in this study,

**Conclusion:** Nutritional anemia is a burden on adolescent children, as it affects the transition of childhood to adulthood and it influences the future health. .All anaemias are not due to iron deficiency. Combined deficiency of iron and B12 is prevalent which should be looked through and vitamin B 12 supplementation to be given along with IFA. B12 deficiency is highly prevalent among the vegetarians. Therefore, early screening and supplementation is essential. Nutritional awareness education should be given to adolescents as they fear of gaining weight, irregular food habits, food faddism, decreased intake of green leafy vegetables/animal proteins.

**Keywords:** Anemia, Adolescents, Nutrition

## Introduction

Anaemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development.[1]Anaemia is the world's second leading cause of disability and thus one of the most serious global public health problems. It is widely prevalent in the developing countries. Adolescence is a period of transition from childhood to adulthood, during which certain health problems and risk behaviours prevalent during this period influence their future health.[2] Iron deficiency anaemia is the most common nutritional anaemia affecting more than 2 billion people worldwide.[3] It can have profound negative impact on psychological and physical development, behaviour and learning performance, working capacities and reproductive health.[4] It can result from inadequate iron intake, reduced bioavailability of dietary iron, increased need for iron, chronic blood loss and parasitic infections.[5] Adolescents of both sexes are particularly vulnerable for developing anaemia because of rapid growth and girls additionally because of the onset of menstruation. Despite strong reasons focussing on anaemia on adolescents, only little research was done. There are not many studies on anaemia in adolescents, out of 523 reviewed for World Health Organisation (WHO) in anaemia only 39 studies included adolescents.[6] A study of health and family welfare (2000) showed point prevalence of anaemiain various age groups and was found to be high in both sexes. In adolescents, the prevalence rate of anaemia was very – very high I.e., 65.8 percent in boys and 81.3 percent in girls.[7] The population differences in the prevalence of anaemia are

explained by environmental factors affecting nutrition, chief among these are economic status, ethnic customs and geographic considerations.[8] This study will throw light on the cause of anaemia especially nutritional factors by assessing serum iron, TIBC, transferrin saturation, folic acid, ferritin and Vitamin B12 which can help in the management and dietary advises for adolescents in future.

**Objectives**

To assess the nutritional and socio demographic factors contributing anaemia.

**Material and method**

It's a hospital based descriptive study. Adolescents attending OPD at Government medical College and Hospital Bettiah, Bihar. Study duration of Two years. and in patients, will be participating in this study,

**Inclusion criteria**: Adolescents
*Age group: 10 - 19 years.
*Those who full fill the WHO criteria for anaemia.

**Exclusion criteria**: Adolescents with
*Hemolytic anaemia.
*Below 10 years and above 19 years of age.
*Who are not willing to give consent.
*Anaemia due to acute blood loss.
*Bone marrow suppression.

**Sampling method**

*****Random Sampling based on age.
*Adolescents attending OPD at GMC, Bettiah. And in patients. It's a hospital based descriptive study. Adolescents attending OPD at Government Medical College and Hospital and in patients, will be participating in this study as per the inclusion and exclusion criteria. Written informed consent of the child's parent or legally accepted representative will be obtained. A detailed history and physical examination will be done according to a predesigned proforma to elicit various nutritional and socioeconomic factors. Age of the child will be recorded in completed years. Then blood will be drawn and haemoglobin will be estimated by an automated analyser followed by a peripheral blood smear, serum Iron, TIBC, transferrin saturation, ferritin, folic acid and vitamin B12 levels will be estimated. Anaemia will be diagnosed according to the World Health Organisation (WHO) criteria.
Anaemia was graded as:[11]
*****Mild: Hb% above 10gm/dl and less than 12gm/dl.
*Moderate: Hb% between 7 gm/dl and 10gm/dl.
*Severe: Hb% lesser than 7 gm/dl.

**Results**

**Table 1: Age distribution of patients studied**

| Age in years | No. of patients | % |
|---|---|---|
| 10-13 | 32 | 40.0 |
| 14-16 | 40 | 50.0 |
| 17-19 | 8 | 10.0 |
| Total | 80 | 100.0 |

Mean ± SD: 13.78±2.03

Out of 80 adolescents studied, 40% belonged to early adolescence, 50% belonged to middle adolescence and 10% belonged to late adolescence.

**Table 2: Gender distribution of patients studied**

| Gender | No. of patients | % |
|---|---|---|
| Female | 55 | 68.8 |
| Male | 25 | 31.3 |
| Total | 80 | 100.0 |

In the study population, 68.8% were females and 31.3% were males.

**Table 3: Age distribution of patients studied**

| Age inyears | Gender | | T tal |
|---|---|---|---|
| | Female | Male | |
| 10-13 | 19(34.5%) | 13(52%) | 32(40%) |
| 14-16 | 28(50.9%) | 12(48%) | 40(50%) |
| 17-19 | 8(14.5%) | 0(0%) | 8(10%) |
| Total | 55(100%) | 25(100%) | 80(100%) |

In early adolescence, 34.5% were females and 52% were males. In middle adolescence, 50.9% were females and 48% were males. In late adolescence, 14.5% were females. There is significant relation between middle adolescence and anemia.

**Table 4: Peripheral smear according to gender**

| Peripheral smear | Gender | | Total |
|---|---|---|---|
| | Female | Male | |
| Microcytic hypochromic | 45(81.8%) | 21(84%) | 66(82.5%) |
| Macrocytic blood picture | 4(7.3%) | 2(8%) | 6(7.5%) |
| Dimorphic blood picture | 6(10.9%) | 2(8%) | 8(10%) |
| Total | 55(100%) | 25(100%) | 80(100%) |

p=1.000, not Significant, Fisher Exact test

Of 80 adolescents in the study, 82.5 % account to microcytic hypochromic picture and there is no significant variation in the peripheral blood picture among the adolescent boys and girls. Frequency distribution of Vitamin B12, Folic acid, Ferritin levels of patients studied

**Table 5:**

| | **Gender** | | **Total (n=80)** | **p value** |
|---|---|---|---|---|
| | **Female(n=55)** | **Male (n=25)** | | |
| **Vitamin B 12** | | | | |
| <250 | 25(45.5%) | 11(44%) | 36(45%) | 0.921 |
| 250-500 | 25(45.5%) | 11(44%) | 36(45%) | |
| >500 | 5(9.1%) | 3(12%) | 8(10%) | |

| | | | | |
|---|---|---|---|---|
| **Folic acid** | | | | |
| <5 | 10(18.2%) | 6(24%) | 16(20%) | |
| 5-10 | 36(65.5%) | 17(68%) | 53(66.3%) | |
| >10 | 9(16.4%) | 2(8%) | 11(13.8%) | 0.334 |
| **Ferritin** | | | | |
| <7 | 14(25.5%) | 7(28%) | 21(26.3%) | |
| 7-14 | 18(32.7%) | 8(32%) | 26(32.5%) | |
| >14 | 23(41.8%) | 10(40%) | 33(41.3%) | 0.209 |

There is decreased vitamin B12 levels in 45 % of the adolescents, folic acid deficiency accounted to 20%, ferritin level was decreased in 58.8% of the adolescents. There was no significant difference between the laboratory values of adolescentgirls and boys.

**Discussion**

The number of studies on adolescent nutritional anaemia is limited, the few studies which were done concentrated on adolescent girls. In this study, boys were also included to study their pattern of nutritional deficiency. A study done by Sahu ML[9] shows similar prevalence of anaemia among earlyand late adolescent males, and middle adolescent females.

**Table 6: Relation of Age and Sex with Anaemia**

| Age | Males | | Females | |
|---|---|---|---|---|
| | Sahu ML,2012 | Presentstudy | Sahu ML,2012 | Presentstudy |
| 10-13 | 16.3 | 16.2 | 9 | 23.7 |
| 14-16 | 3.6 | 15 | 36.3 | 35 |
| 17-19 | 0 | 0 | 34.5 | 10 |

Irregular eating habits and lower consumption of animal and green leafy foods contribute to the development of anaemia. Poverty limits the availability and consumption of foods of animal origin.[10] In this study, 48.8% adolescents consumed vegetarian diet where as in study conducted by Sahu ML, 61.8% adolescents consumed vegetarian diet.

**Table 7: Relation of Dietary Preference and Anaemia**

| Diet | Sahu ML, 2012 | Present study |
|---|---|---|
| Veg | 61.8 | 48.8 |
| Non veg | 38.1 | 51.2 |

In this study, 52.7% of girls and 40% of boys had given history of skipping breakfast regularly. A study done on food habits of adolescents showed 66% of adolescent boys and 59% of adolescent girls missed meals.[11]

**Table 8: Relation of skipping meals and Anaemia**

| Sex | Abdullah, 2009 | Present study |
|---|---|---|
| Adolescent Boys | 66 | 40 |
| Adolescent Girls | 59 | 52.7 |

Among the 80 adolescents studied none of them had adequate green leafy vegetable intake, which is similar to study done by Sahu ML in which 98.1% did not have adequate green leafy food.

**Table 9: Relation of SES to Anaemia**

| SES | Neelam, 2013 | Present study |
|---|---|---|
| Upper | 16 | 0 |
| Upper middle | 32.4 | 16.3 |

| | | |
|---|---|---|
| Lower middle | 33.9 | 30 |
| Upper lower | 12.4 | 27 |
| lower | 4.9 | 26.3 |

BMI is not significant with anaemia, a similar reference was seen in a study done by Anmol.[12]

**Table 10: Relation of BMI to Anaemia**

| BMI | Anmol, 2012 | Present study |
|---|---|---|
| Low | 60.9 | 68.8 |
| Normal | 37.6 | 29.9 |
| High | 3.1 | 1.3 |

Fatigue is the commonest complaint; it is similar in both adolescent males and females in present study and study done by Kaur.[13] Associated iron with B12 deficiency is similar to study done by Suarez.[14] Studies done by Yasemin[15] had shown increased prevalence of iron with B 12 deficiency. There was 90.9% folic acid deficiency in study conducted by Suarez whereas only 20% were deficient in the study group, this is probably because of the iron and folic acidsupplementation given by the government.

**Table 11: Sr. Iron Level in Relation to Sex**

| | Males | | Females | |
|---|---|---|---|---|
| Serum iron | Sahu ML, 2012 | Present study | Sahu ML, 2012 | Present study |
| Inadequate | 54.5 | 80 | 72.7 | 80 |
| adequate | 45.5 | 20 | 27.3 | 20 |

The peripheral blood picture is similar in adolescent girls in both study groups, but adolescent males have less microcytic hypochromic picture in the study done by Sahu ML**.**

**Table 12: Peripheral Smear in Relation to Anaemia**

| | Males | | Females | |
|---|---|---|---|---|
| Peripheral smear | Sahu ML,2012 | Presentstudy | Sahu ML,2012 | Presentstudy |
| Microcytic hypochromic including mixed picture | 14.5 | 43.6 | 69 | 63.7 |

The mean B12 levels were lower in study done by Yasemin[15]when compared to the present study.

**Table 13: Comparison of B12 Levels**

| Parameter | Yasemin, 2012 | Present study |
|---|---|---|
| Vitamin B12 | 169.2 | 287.97 |

## Conclusion

*Nutritional anaemia is a burden on adolescent children, as it affects the transitionof childhood to adulthood and it influences the future health.
*All anaemia's are not iron deficiency.
*Combined deficiency of iron and B12 is prevalent which should be looked through and vitamin B 12 supplementation to be given along with Iron and folic acid.
*B12 deficiency is highly prevalent among the vegetarians, early screening and supplementation must be done.
*Among all the adolescent groups, anaemia was more prevalent in middle adolescence.

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