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Original Research Article.

Analysis of Prevalence and Risk Factors of Anemia amongst Adolescent Girls: An Institutional Based Study

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ABSTRACT

Background: Anemia is a disorder that is considered by a reduction in level of hemoglobin in blood to a lower than the normal levels, and is normally associated with a decrease in the circulating red blood cell volume. Treatment of anemia in the initial days limits permanent damage; so early and prompt diagnosis of anemia is critical. The present study was performed to determine the prevalence and risk factors of anemia amongst adolescent girls.

Materials and Methods: The observational study was conducted in the Department of Community Medicine, Saraswathi Institute of Medical Sciences, Anwarpur, Hapur, Uttar Pradesh (India) for duration of 6 months. The study included adolescent girls of two neighborhood schools. All the subjects between 10-19 years of age were included in the study for screening of the incidence of anemia. The blood investigations were tested in all patients were Hemoglobin, TLC, DLC, Erythrocytic Sedimentation Rate, hematocrit values, Mean Corpuscular Hemoglobin concentration , Mean Corpuscular volume, Mean Corpuscular Hemoglobin, Packed Cell Volume, Serum folic acid levels, Reticulocyte count and Serum ferritin levels. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Results: There were a total of 2100 subjects evaluated, out of these 900 (42.8%) were anemic and 1200 were non anemic. The mean age of the subjects was 15.45+/-2.37 years. The mean TIBC levels were 398 ± 74 µg/dL. The mean TSI percentage was 16 ± 6 %.

Conclusion: Anemia is amongst all the phases of life. Children and females were the most frequently affected groups. There were 42% of the adolescent females our study that were anemic.

Keywords: Anemia, Females, Hemoglobin.

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INTRODUCTION

Anemia is a community health issue that affects different pupils both in undeveloped and the developing nations.[1-4] It carries a huge effect on the physical and mental health illness of the pupils. Anemia is a disorder that is considered by a reduction in level of hemoglobin in blood to a lower than the normal levels, and is normally associated with a decrease in the circulating red blood cell volume.[1,2]

The World Health Organization has described that the level of serum hemoglobin less than <13 mg/dL in males and <12 mg/dL in females and serum hematocrit <39% in males and <36% in females is considered as diagnostic of anemia.[4] Anemia can be due to decreased formation of red blood cells or due to their premature destruction, or because of loss from hemorrhage.[4] Treatment of anemia in the initial days limits permanent damage; so early and prompt diagnosis of anemia is critical. For fighting anemia, epidemiologic data on anemia is important. Additionally, deficiency of micronutrients such as vitamin B12 or folic acid also leads to macrocytic anemia. The present study was performed to determine the prevalence and risk factors of anemia amongst adolescent girls.

MATERIALS AND METHODS

The observational study was conducted in the Department of Community Medicine, Saraswathi Institute of Medical Sciences, Anwarpur, Hapur, Uttar Pradesh (India) for duration of 6 months. The study included adolescent girls of two neighborhood schools. The study was approved by the institutional ethical board and all the girls were informed about the study and a written consent was obtained from them in vernacular language.

All the subjects between 10-19 years of age were included in the study for screening of the incidence of anemia. Hemoglobin levels lesser than 12 amongst girls were categorized as anemic.

Under complete asepsis, 10 ml of blood was obtained from the antecubital vein, out of which 2ml was taken for complete blood count determination. The blood investigations were tested in all patients were Hemoglobin, TLC, DLC, Erythrocytic Sedimentation Rate, hematocrit values, Mean Corpuscular Hemoglobin concentration , Mean Corpuscular volume, Mean Corpuscular Hemoglobin, Packed Cell Volume, Serum folic acid levels, Reticulocyte count and Serum ferritin levels. The determination of serum ferritin levels is the most consistent and effective method for diagnosis of the iron deficiency anemia. If level of serum ferritin was lesser than 15ng/ mL, confirming the presence of iron deficiency. Vitamin B 12 deficiency was regarded if serum B 12 counts were lesser than 200 pg/mL. Folate deficiency was considered when serum folate levels was less than 2.6 ng/mL. Additional inquiries were performed as required for detection of underlying etiology like chest X-ray, Ultrasound, Upper Gastrointestinal endoscopy and tissue biopsy etc. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

RESULTS

Table 1 shows the incidence of anemia amongst the subjects. There were a total of 2100 subjects evaluated, out of these 900 (42.8%) were anemic and 1200 were non anemic. The mean age of the subjects was 15.45+/-2.37 years.

Table 2 shows the biochemical features amongst the subjects with anemia. The mean iron levels were 61 ± 33 µg/dL. The mean Serum ferritin levels were 202 ± 182 ng/dL. The mean TIBC levels were 398 ± 74 µg/dL. The mean TSI percentage was 16 ± 6 %. The mean Serum vitamin B12 levels were 280 ± 139 pg/dL. The mean platelet count was 265.5 ± 79.3. The mean level of hemoglobin was 10.1 ± 1.2. The mean Hematocrit was 34.2 ± 3.4. The mean MPV was 8.4 ± 1.2fL. The mean folic acid level was 8.4 ± 3.5 ng/ml.

Table 1: Incidence of anemia amongst the subjects

Characteristic	Frequency
Anemic	900
Non anemic	1200
Total	2100

Table 2: Biochemical features of subjects with anemia

Analytes	Mean ± SD
Serum iron level (µg/dL)	61 ± 33
Serum ferritin level (ng/mL)	202 ± 182
TIBC (µg/dL)	398 ± 74
TSI (%)	16 ± 6
Serum vitamin B12 level (pg/mL)	280 ± 139
Serum folic acid level (ng/mL)	8.4 ± 3.5
Hemoglobin (g/dL)	10.1 ± 1.2
Hematocrit (%)	34.2 ± 3.4
MCV (fL)	78.4 ± 8.1
RDW (%)	15.3 ± 1.3
Platelets (10 3 /µL)	265.5 ± 79.3
MPV (fL)	8.4 ± 1.2

DISCUSSION

Studies have proved that the prevalence of anemia increases with advancing age and before the age of 75 years, it is more common amongst females, but after 75 years it is more prevalent amongst males.[5] Numerous pathophysiologic concerns amongst patients with anemia are common. Deficiency of micronutrient as a reason of anemia have been commonly documented amongst almost all the subjects.[6] Below optimal level of iron, vitamin B12 and folic acid have been indicated to impair the cognitive body functions and immunological system. It is crucial, therefore, that the doctor is conscious of the existence of anemia amongst the subjects, although the presenting signs and symptoms could have been due to a different reason.

Lack of appropriate nutrition during the adolescent could have deleterious outcomes throughout the reproductive age group and beyond. Majority of the Indian girls are married and even get pregnant before the growth time is over and that enhances the risk of anemia.[7]

Especially in school adolescent girls, chronic anemia may alter performance at school, attendance and physical working capacity.[8] Different studies indicated that patients with deficiency of B12 or folic acid frequently had anemia but did not indicate the presence of macrocytosis, since megaloblasts are only seen during later stages of the deficiencies.[9-11]

Megaloblastic anemia could also result in psychiatric, hematologic, and neurologic changes in the human body. Neurological indications are the most deleterious outcomes as they are permanent and do not revert. Neurological sequelae of B12 Deficiency can be seen even without anemia. Due to this, deficiency of vitamin B12 should always have a prompt diagnosis and be managed before macrocytosis.[12,13]

The most commonly used classification of anemia is dependent upon 3 main causative types of anemia: nutritional, bone marrow changes, and hemolytic alterations. Nutritional anemias due to iron, vitamin B12 and folic acid deficiencies, are very frequently seen forms of anemia globally. The other reasons of anemia include blood loss due to menstruation, or parasitic manifestations including hookworms and ascaris.[4] Some studies included only subjects that were hospitalized[14], whilst others included adolescents or children.[15] Few others studies included patients admitted to the hospital because of any other reason[6], with pica[16], preschoolers[14], or healthy pupils.[7] Analytic methodologies were also variant in some studies like CBC was used as diagnostics, whereas others used more advanced diagnostic modalities .

CONCLUSION

Anemia is amongst all the phases of life. Children and females were the most frequently affected groups. There were 42% of the adolescent females in our study that were anemic. It is crucial to diagnose anemia at initial stages so that it could be completely eliminated.

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