Original Research Article

PREVALENCE OF ANEMIA IN SCHOOL GOING CHILDREN OF HAPUR REGION, WESTERN UTTAR PRADESH

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Abstract

Background: Anaemia is a condition in which the number of red blood cells or the haemoglobin concentration within them is lower than normal. It affects roughly one third of the world's population and over 800 million women and children. Anemia during pregnancy is linked to poor birth results (such as preterm and low birth weight) as well as an increased risk of perinatal and maternal mortality. It causes symptoms that are associated with brain developmental outcomes in children, can cause fatigue and poor physical outcome. **Materials and Methods:** This study (cross-sectional) was conducted at GS Medical College and Hospital, HAPUR, spanned 18 months from September 2022 to February 2024. Ethical approval was taken from the institute's committee, and informed consent was secured from parents of 381 children aged 6-12 years who visited the outpatient and inpatient departments. The study included comprehensive history taking, physical examinations, hemoglobin estimation using an auto-analyzer, and examination of peripheral blood smears. The aim was to know the prevalence and factors associated with anemia in my study population. **Result:** A total of 381 cases were studied of which 199 (52.2%) were male and 182 (47.7%) were female. Out of 381 patients, 223 (58.5%) were found to be anaemic. The prevalence of anaemia was higher in females 119 (65.3%) as compared to males 104 (52.2%). 99 (25.9%) had mild anemia, 119 (31.2%) had moderate anaemia and only 5 (1.3%) had severe anaemia. Prevalence of anaemia was more in vegetarian group 140 (68.2%) as compared to mixed group 83 (47.1%). Majority of children were from lower socio-economic strata (class 3,4 and 5 as per kuppuswamys grading). Anaemia was more observed in children in government school 154 (64.7%) as compared to private schools 69 (48.2%). Majority of patients had microcytic hypochromic anaemia 116 (52 %), 86 (38.5 %) had normocytic normochromic anaemia, 17 (7.6 %) had macrocytic anaemia and only 4 patients (1.79 %) had dimorphic anaemia. **Conclusion:** Anaemia in still a major health problem in our country. Childhood anaemia still continues to be a significant public health problem in school children between 6-12 years. By proper health and dietary education, supplementation of Iron and folic acid and deworming periodically in children we can further improve the health status and iron status of the children and thereby giving them a better quality of life.

INTRODUCTION

Anemia is a hemodynamic disorder recognised by a decrease in RBC count or haemoglobin content. Roughly 1/3rd of the world's population is affected by it, mostly women & children.[1-3] Anemia during pregnancy is linked to poor birth results (such as preterm and low birth weight) as well as an increased risk of perinatal and maternal mortality. It causes symptoms that are associated with brain developmental outcomes in children, can cause fatigue and poor physical outcome.[4]

Mechanism of development of anemia:
1. Ineffective erythropoiesis
2. Haemolysis
3. Loss of blood

Nutritional deficiencies & haemoglobin related disorders are the most common causes of anemia.[2]

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Iron deficiency, haemoglobinopathies and tropical infections like malaria are regarded as the world's most common sources of anemia[1]. Anemia is a widespread condition that affects people of all ages and genders in India.[5] The prevalence among children of school age in underdeveloped countries ranges from 20 to 60 percent.[6-8] In many tropical countries, anemia is a serious problem. According to WHO data, iron deficiency anemia affects 30% of individuals worldwide.[9] Research has shown that anemia affects Indian children more frequently than other country children, with rates ranging from 27% to 90%.[10]

Grading of Anemia,[11]

Mild Anemia
- Hb concentration of 10–11.9 g/dl for 12–15years.
- Hb concentration of 10–11.4 g/dl for 5–11 years.

Moderate Anemia
- Hb concentration between 7–9.9 g/dl.

Severe Anemia
- Hb concentration lower than 7 g/dl.

Aims and Objective

Aims- To study prevalence of anaemia in school going children of Hapur Region,

Western Uttar Pradesh.

Objectives
1. To study and analyse the problem of anemia in school going children (6-12 year).
2. To find the correlation between Socio-Economic Status (SES) and anemia.
3. To assess the severity of anemia in school going children (6-12 year).

MATERIALS AND METHODS

This study (cross-sectional) was conducted at GS Medical College and Hospital, HAPUR, spanned 18 months from September 2022 to February 2024. Ethical approval was taken from the institute's committee, and informed consent was secured from parents of 381 children aged 6-12 years who visited the outpatient and inpatient departments. The study included comprehensive history taking, physical examinations, hemoglobin estimation using an auto-analyzer, and examination of peripheral blood smears. The aim was to know the prevalence and factors associated with anemia in my study population.

Inclusion Criteria

School going children in the age group of 6-12 years both boys as well as girls.

Exclusion criteria
1. Children suffering from chronic illness are not taken into the study.
2. patients who do not wish to participate in the study.

The study was conducted after necessary approval from the institutional ethics and scientific committee. Appropriate informed consent was taken from parents.

Statistical Analysis: Data will be entered into Microsoft excel sheet and analysed using IBM SPSS version 27 software. Categorical data will be represented in the form of frequencies and proportions. Chi-squares used for qualitative data analysis. Continuous data will be represented as mean and standard deviation. Independent t test will be used to analysed quantitative data. P value<0.05 will be considered as statistically significant. Statistical test of significance will be applied where-ever found necessary.

RESULTS

Total 381 cases were analysed out of which 52.23% were males and 47.7% were females.

As per [Table 1], Out of 381 students, 223 (58.5%) children had anemia. Out of 223 99 (25.9%) were having mild anemia, 119 (31.2) had moderate anemia and 5 (1.3%) were having severe anemia.

As per [Table 2], Association between prevalence of anemia in gender and diet was statistically significant. Males (56.7%) and females (80.1%) had anemia among vegetarians. Prevalence of anemia among non- vegetarians: males (31.57%) and females (65.4%). Vegetarian group had more prevalent of anemia (68.2%) compared to non-vegetarians (47.1%).

As per [Table 3], Association between socioeconomic status and gender was statistically insignificant (p> 0.05). Majority of children in our study belonged to class 3,4 and class 5 as per modified kuppuswamy scale.

Association between socio-economic status and diet was statically insignificant (p>0.05). Majority of children 205 (53.8%) were pure vegetarian as compared to children consuming mixed diet 176 (46.1%).

As per [Table 4], Association between prevalence of anemia in socioeconomic and gender was found to be statically significant. In our study majority of children belong to class 3 and 4 as per modified kuppuswamy scale. In class 3, 62.5 % females had anemia and 47.2% male's had anemia. 67.9% of female had anemia as compared to 55.6% of males belonging to class 4 socioeconomic status. In class 5, 69.7% female had anemia as compared to 60% of males.

381 Total cases 244 Children had Normocytic normochromic (NN) picture (86 Children {38.5%} had Normocytic normochromic anemia) 17 Children {7.6%} had macrocytic (M) picture.

116 Children (52.0%} had Microcytic hypochromic (MH) picture 4 Children {1.79%} had Dimorphic anemia.

Out of 244 normocytic normochromic, 158 (41.4%) had no anemia, 51 (59.3%) had mild anemia and 35 (40.6%) had moderate anemia.

Out of 116 microcytic hypochromic, 39 (33.6%) had mild anemia, 72 (62%) had moderate anemia and 5

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(4.3%) had severe anemia. 4 children with dimorphic picture had mild anemia.

Out of 17 macrocytic anemia, 5 (29.4%) had mild anemia, 12 (70.5%) had moderate anemia. There were statistically significant results between grading of anemia and peripheral smear.

- Mild anemia – Total number of cases: 99 (25.9%)
- 51 (59.3%) were normocytic normochromic
- 5 (29.4%) were macrocytic

- 39 (33.6%) were microcytic hypochromic
- 4 had dimorphic anemia
- Moderate anemia- Total number of cases 119 (31.2%)
- 35(40.6%) were normocytic normochromic
- 12(70.5%%) were macrocytic
- 72(62 %) were microcytic hypochromic
- Severe anemia- Total number of cases 5(1.3%) had microcytic hypochromic anemia.

Table 1: Prevalence of anemia in children between 6 to 12 years according to anemia grading.

Grade	Total
Normal (>11.5gms/dl)	158 (41.4%)
Mild (10-11.4gms/dl)	99 (25.9%)
Moderate (7-9.9gms/dl)	119 (31.2%)
Severe (<7 g/dl)	5 (1.3%)

Table 2: Prevalence of anemia according to gender and diet.

Diet	Male			Female			Prevalence (%)
	Normal	Anemia	Total	Normal	Anemia	Total	
Vegetarian	45 (43.2%)	59 (56.7%)	104 (100.0)	20 (19.8%)	81 (80.1%)	101 (100.0)	68.2%
Non-Veg/ mixed	65 (68.4%)	30 (31.5%)	95 (100.0)	28 (34.5%)	53 (65.4%)	81 (100.0)	47.1%
Total	110 (55.2%)	89 (44.7%)	199 (100.0)	48 (26.3%)	134 (73.6%)	182 (100.0%)	58.5%

Table 3: student socioeconomic status (SES) and gender distribution

SES	Gender		Total
	Male	Female	
Class 1	2 (1%)	1 (0.54%)	3 (0.78%)
Class 2	5 (2.51%)	4 (2.19%)	9 (2.36%)
Class 3	55 (27.63%)	56 (30.76%)	111 (29.13%)
Class 4	97(48.74%)	78 (42.85%)	175 (45.93%)
Class 5	40 (20.10%)	43 (23.62%)	83 (21.78%)
Total	199 (100.0%)	182 (100.0%)	381 (100.0%)

Table 4: Association between prevalence of anemia in socioeconomic status and gender

SES	Male				Female			PREVA LENCE (%)
	Normal	Anemia	Total		Normal	Anemia	Total	
Class 1	2 (100%)	0	2 (100%)		1 (100%)	0	1 (100%)	0 %
Class 2	5 (100.0%)	0	5 (100%)		3 (75.0%)	1 (25.0%)	4 (100%)	11.1%
Class 3	29	26	55		21	35	56	54.%
	(52.7%)	(47.2%)	(100.0)		(37.5%)	(62.5%)	(100.0)	
Class 4	43	54	97		25	53	78	61.1%
	(44.3%)	(55.6%)	(100.0)		(32.0%)	(67.9%)	(100)	
Class 5	16	24	40		13	30	43	65.0%
	(40.0%)	(60.0%)	(100.0)		(30.2%)	(69.7%)	(100.0)	
Total	95 (47.7)	104 (52.2)	199 (100.0)		63 (34.6)	119 (65.3)	182 (100.0)	58.5%

DISCUSSION

Our study was undertaken to know the prevalence of anemia in school going children and to understand the influence of various factors like sex, socioeconomic status and diet in cases of anemia. This is a cross-sectional study spanned over 18 months from September 2022 to February 2024. Total 381 children were studied. Children belonging to both government and private school were randomly selected during OPD visit.

A total of 381 children were included in the study. Children attending both public and private schools in the HAPUR district were selected.

Comparison of the number of cases analysed and the age and gender distributions.

In our study, total no of males was more as compared to females whereas other studies like M Verma et al,[12] and Sethi V et al,[13] had female students more than male.

Studied	M Verma et al study,[12]	Our study
Cases studied (total number)	2000	381
Age – Group	5-15 years	6-12 years
Male	916	199
Female	1084	182

Prevalence of Anaemia

Prevalence	M Verma-et al study,[12]	WHO world-wide study	Our study
Rate	51.5%	46%	58.5%

Prevalence of Anemia was higher in our study than M Verma et al.[12]

Reason for the difference: Our study included both government and private schools of urban slums, whereas the WHO prevalence of anemia is 46%, which includes children from worldwide of both developed and developing countries.

Our outcomes were steady with the Mishra SS study,[14] which showed that iron deficiency impacted 58% of kids between the age of 6 to 16.

Prevalence of Anemia According to Gender

Anemia	M Verma et al study,[12]	Our study
Male	37.5%	52.2%
Female	51.4%	65.3%

Both studies showed that female children were affected more as compared to males.

Our results were also comparable to study by Mishra SS and Jhansi Rani P where prevalence was high in female as compared to males.[14,15]

Prevalence of Anemia According to Dietry Habit

Diet	M Verma et al study,[12]	Our study
Vegetarian	65.9%	68.2%
Mixed Diet (veg. +non veg.)	38%	47.1%

Based on both studies, vegetarians were more likely to suffer from anemia than those who consume mixed diet (non-vegetarian + vegetarian).

Our results were also comparable to study by Jhansi Rani P.[15]

Prevalence of anaemia and relation to SES

Prevalence	M Verma et al study,[12]	Our Study
Class I	14.0%	0%
Class II	39.4%	11.1%
Class III	69.6%	54.9%
Class IV	93.2%	61.1%
Class V	87.5%	65.0%

Increased incidence of anemia is correlated with a lower socioeconomic status. Majority of children in our study were from grades II, III, IV, and V.

Results of the investigation by Jhansi Rani P were likewise comparable.[15]

Our research indicates that children attending government schools had a greater prevalence of anemia (64.7%) than children attending private schools (48.2%), which is in line with previous findings by Jhansi Rani P.[15]

Of 381 children included in our study, 223 of them had anemia.Out of 223, 52% had microcytic hypochromic anemia, 38.5% had normocytic normochromic anemia, 7.6% had macrocytic anemia, and 1.79 % had dimorphic anemia.

Our results comparable to study by M Verma et al,[12] but contradictory to result by Jhansi Rani P,[15] and Mishra SS,[14] where majority of patients had normocytic normo-chromic.

CONCLUSION

1. In our nation, anemia is a serious health concern.
2. School going children (6 to12 years old) still face a serious public health issue with childhood anemia.
3. The current study found that girls, vegetarians, and people from lower socioeconomic levels had higher prevalence.
4. Children can further enhance their health status and, consequently, their quality of life by receiving periodic deworming, iron and folic acid supplements, and good health and food education.
5. Our study found that the overall prevalence of anemia was high in vegetarian group than the non-vegetarian(mixed) group.
6. Children belonging to low socioeconomic backgrounds are more likely to suffer from anemia than those from high socioeconomic backgrounds. Anemia was more common in female-child populations across all socioeconomic strata.
7. Compared to students in private schools, prevalence of anemia was more in government school students.

The majority of children who were anemic had moderate anemia. Deworming is advised as a regular procedure for those who are diagnosed and are at risk. To address the issue of anemia at its basic core, government guidelines have to be established to fortify iron with foods like bread, salt, and oil, among other things.

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