Section: Paediatrics

Original Research Article

EVALUATION OF PREVALENCE AND RISK FACTORS OF ANEMIA IN ADOLESCENT GIRLS POPULATION AT A TERTIARY CARE HOSPITAL

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Abstract

Background: Anemia is linked to heightened rates of morbidity and mortality among women and children, adverse birth outcomes, diminished work productivity in adults, and hindered cognitive and behavioral development in children. The various factors contributing to anemia significantly heighten the risk faced by adolescents, a demographic experiencing increased micronutrient demand during a critical period of physical development. Hence, the present study was conducted to evaluate prevalence and risk factors of anemia in adolescent girl's population at a tertiary care hospital. **Materials and Methods:** A cohort of 500 adolescent girls aged between 10 and 18 years who visited a tertiary hospital was recruited for the study. Venous blood samples, totaling 2 mL, were obtained through venipuncture of the antecubital vein and collected in ethylenediaminetetraacetic acid (EDTA) vacutainers, adhering to strict aseptic techniques. The blood samples were subsequently analyzed using an auto-analyzer. The criterion for determining anemia was set at a hemoglobin (Hb) percentage of less than 12 g/dL. Anemia was categorized into three levels of severity: mild (10 to less than 12 g/dL), moderate (7 to less than 10 g/dL), and severe (below 7 g/dL). Statistical analysis was performed using SPSS software version 22, with descriptive statistics presented as percentages to depict the prevalence and severity of anemia. **Result:** A total of 500 adolescent girls were evaluated. Among these 500 girls, anemia was seen in 293 subjects. Hence; overall prevalence of anemia among adolescent girls was 58.6 percent. Increasing age, lower level of educational qualification of parents, subjects staying in nuclear family, lower socio-economic status and presence of menstruation were found to be significant risk factors associated with occurrence of anemia among adolescent girls. **Conclusion:** Anemia persists as a prevalent and critical global health issue that has not been sufficiently tackled, especially in developing countries where advancements have been inconsistent. To enhance understanding of the primary factors contributing to anemia among adolescent girls, it is essential to conduct further research. This knowledge will enable the implementation of targeted interventions tailored to specific contexts.

INTRODUCTION

Anemia is characterized by a reduction in hemoglobin (Hb) concentration and/or a decrease in the number of red blood cells (RBCs) to levels that are inadequate for fulfilling the physiological requirements of an individual. This condition impacts approximately one-third of the global population.[1,2] Anemia is linked to heightened rates of morbidity and mortality among women and children, adverse birth outcomes, diminished work productivity in adults, and hindered cognitive and behavioral development in children. Notably, preschool children (PSC) and women of reproductive age are especially vulnerable to its effects.[3,4] The various factors contributing to anemia significantly heighten the risk faced by adolescents, a demographic experiencing increased micronutrient demands during a critical period of physical development. This vulnerability is particularly pronounced among young females, who not only have elevated nutritional requirements but also encounter additional obstacles such as menstrual

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blood loss, insufficient dietary intake, and a range of socioeconomic influences. The implications of anemia in this age group leads to hindered growth, reduced physical stamina, greater susceptibility to infections, and increased reproductive health issues as they transition into adulthood.[5,6] WHO defines adolescence stage is recognized as a critical transition from childhood to adulthood. During this time, individuals experience significant psychological, behavioral, and physical changes, necessitating increased nutritional intake due to heightened physical activity and rapid growth. Recent statistics indicate that there are approximately 1.2 billion adolescents globally, representing one-fifth of the world's total population, with numbers on the rise. In India, adolescents make up about 21% of the overall population.[7-9] Additionally, cognitive development may be adversely affected, and recurrent illnesses, along with physical weakness, can lead to lower school attendance, thereby impacting educational success. These effects can persist into adulthood, compromising future workforce productivity. Consequently, anemia represents a significant issue that not only affects individuals in the present but also influences the future development.[7- 9]

Present study was conducted to evaluate prevalence and risk factors of anemia in adolescent girls population.

MATERIALS AND METHODS

Present study was a quantitative survey approach and descriptive design to find out the proportion of anemia among adolescent girls. A cohort of 500 adolescent girls aged between 10 and 18 years who visited a tertiary hospital was recruited for the study. Data concerning age, sociodemographic background, menstrual history, and brief clinical information were systematically documented.

Venous blood samples, totaling 2 mL, were obtained through venipuncture of the antecubital vein and collected in ethylenediaminetetraacetic acid (EDTA) vacutainers, adhering to strict aseptic techniques. The blood samples were subsequently analyzed using an auto-analyzer. The criterion for determining anemia was set at a hemoglobin (Hb) percentage of less than 12 g/dL. Anemia was categorized into three levels of severity: mild (10 to less than 12 g/dL), moderate (7 to less than 10 g/dL), and severe (below 7 g/dL). Statistical analysis was performed using SPSS software version 22, with descriptive statistics presented as percentages to depict the prevalence and severity of anemia. Additionally, bivariate analysis was conducted to ascertain the associated risk factors.

RESULTS

A total of 500 adolescent girls were evaluated. Among these 500 girls, anemia was seen in 293 subjects. Hence; overall prevalence of anemia among adolescent girls was 58.6 percent. Increasing age, lower level of educational qualification of parents, subjects staying in nuclear family, lower socio-economic status and presence of menstruation were found to be significant risk factors associated with occurrence of anemia among adolescent girls.

Table 1: Prevalence of anemia.

Anemia	Number	Percentage
Present	293	58.6
Absent	207	41.4
Total	500	100

Table 2: Risk factors of anemia

Risk factors		Anemia present (n=293)	Anemia absent (n=207)	p-value
Age group (years)	10 to 13	77	89	0.000*
	14 to 16	93	62	
	17 to 18	123	56	
BMI (Kg/m2)	Underweight	54	46	0.452
	Normal	65	40	
	Overweight	82	42	
	Obese	92	79	
Father's educational qualification	Illiterate/ upto primary	112	62	0.040*
	Secondary	98	58	
	Graduation/ postgraduation	83	87	
Mother's education qualification	Illiterate/ upto primary	118	71	0.023*
	Secondary	93	61	
	Graduation/ postgraduation	82	75	
Type of family	Nuclear	168	102	0.000*
	Joint	125	105	
Socio-economic status	Upper	50	25	0.000*
	Upper-middle	56	45	
	Lower-middle	82	83	
	Lower	105	54	
Menstruation	Started	136	69	0.001*
	Not started	157	138	

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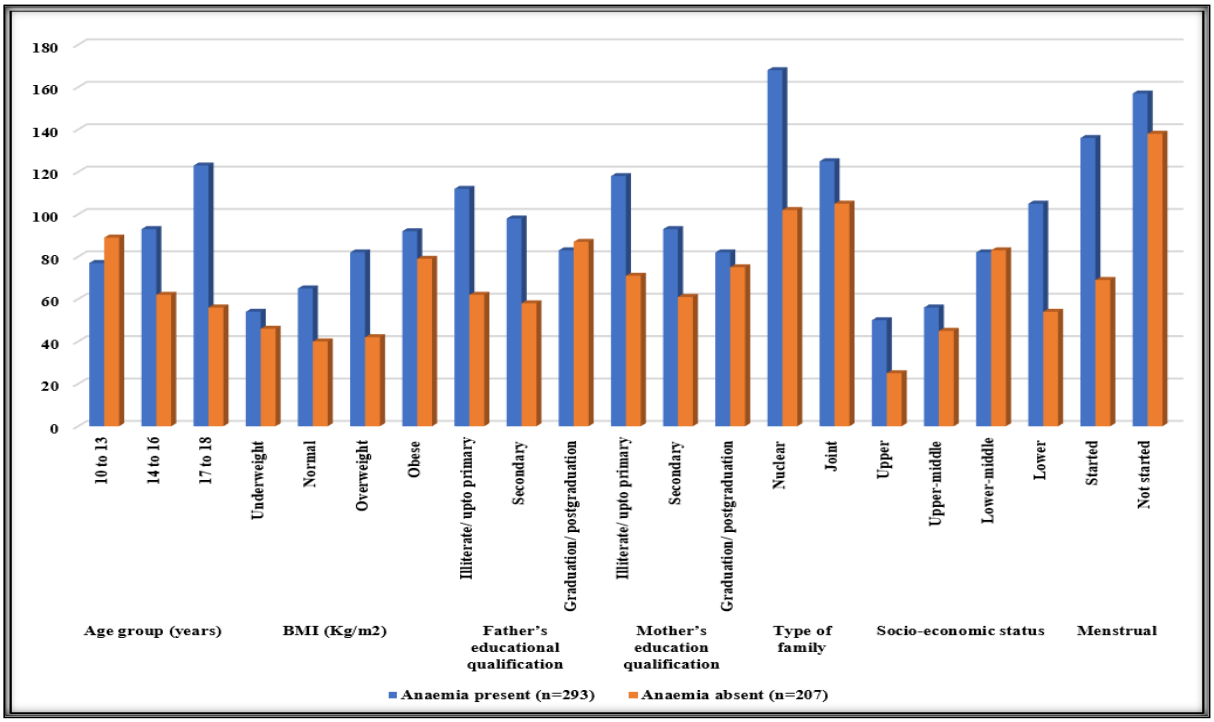

Figure 1: Risk factors of anemia

DISCUSSION

Anemia is characterized by inadequate levels of hemoglobin (Hb) and/or red blood cells to meet the physiological demands of the body. Iron deficiency stands as the predominant cause of anemia worldwide, affecting approximately 1.9 billion individuals as of 2017, thus representing a significant public health concern. This condition is associated with substantial morbidity, contributing to 58.2 million years lived with disability. Although anemia is a global issue, its prevalence is particularly acute in low- and middle-income nations. In India, the most affected demographics include women of reproductive age, lactating mothers, children, and adolescent girls. India has a substantial adolescent population of 243 million, accounting for 21.4% of its total population. The adolescent period, spanning ages 10 to 19, is marked by rapid physical, cognitive, and psychosocial development. In 2016, iron deficiency anemia was identified as the second leading cause of years lost to death and disability among adolescents globally. The health implications of anemia in this age group are significant, leading to diminished cognitive abilities, poor concentration, memory deficits, suboptimal academic performance, weakened immune responses, increased susceptibility to infections, impaired motor development, and irregular menstrual cycles. Adolescent girls are particularly vulnerable, as they may soon enter motherhood, and the depletion of iron reserves often begins with the onset of menstruation. In the Asian context, anemia ranks as the second leading cause of maternal mortality. Furthermore, complications arising from pregnancy and childbirth are the leading cause of death among girls aged 15 to 19. Adolescents who become pregnant face heightened risks of adverse obstetric outcomes due to their physical immaturity.[10-14] Hence; the present study was conducted for assessing prevalence and risk factors associated with anemia amongst adolescent girls.

A total of 500 adolescent girls were evaluated. Among these 500 girls, anemia was seen in 293 subjects. Hence; overall prevalence of anemia among adolescent girls was 58.6 percent. Chandrakumari AS et al assessed the prevalence of anemia among adolescent girls. It was a cross-sectional study conducted among 255 adolescent girls. After getting informed consent from the subjects, the information regarding age, sociodemographic status, menstrual history, and short clinical details were recorded. Blood samples were collected and analyzed using automated hematology analyzer. Overall prevalence of anemia was found to be 48.63% (n = 124). The majority of the anemic girls (55.64%, n = 69) were having mild degree of anemia. Among 255 girls, 188 (73.73%) were from the early adolescent age group (10–14 years). Prevalence of anemia (52.24%) was high among the late adolescents and those belonging to low socioeconomic class.[13]

Gore MN et al evaluated the prevalence of anemia, along with socioeconomic and nutritional statuses among adolescent girls attending rural public schools in Indian population. A sample of 400 girls was selected from 22 villages. The findings revealed an overall anemia prevalence of (42.75%), comprising severe (2.5%), moderate (21%) and mild (20.25%) cases. Additionally, a substantial proportion (74.6%) of girls were classified as underweight. Socioeconomic analysis disclosed that 64.25% of families belonged to the lower middle class, and 27%

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in the upper lower class. Anemia was more prevalent in young adolescent girls (10-14 years) and in the families of adolescents who had low income, were illiterate, unemployed, and belonged to the lower-middle class and upper-lower-class socio-economic status (SES) and did not have a bank account.[14]

In the present study, increasing age, lower level of educational qualification of parents, subjects staying in nuclear family, lower socio-economic status and presence of menstruation were found to be significant risk factors associated with occurrence of anemia among adolescent girls. Similar to our study, Sampathkumar V et al investigated the prevalence of both anemia and hookworm infestation among 197 female adolescents, 13-17 years of age, attending 10 schools in a rural block of India. 19% of subjects belonged to a scheduled caste, 72% to a backward caste, and 9% to a forward caste. The prevalence of anemia was 76.6%. Of the 130 girls who provided stool samples, 63% had hookworm. When questioned about personal hygiene practices, 48.5% of girls reported they did not wear slippers when they went outside. Only 65% were bathing daily. Since anemia during adolescence can have an adverse impact on future pregnancies, measures such as iron and folic acid supplementation, as well as improved hygienic practices, are recommended.[15] Singh P et al estimated the prevalence of anemia among school going adolescent girls. A total of 430 adolescent females (10-19 years old) were included in this study. The prevalence of anemia found from this study was 61.39%. The statistically significant risk factors associated with anemia were age, nuclear family, low socio-economic status, high intake of junk food; low intake of green leafy vegetables, citrus fruit, no iron folic acid intake and menorrhagia. A high prevalence of anemia among adolescent females was found, which was higher in nuclear family, low socio-economic strata; girls who were consuming less citrus fruits, less green leafy vegetables, more junk food and not taking any iron folic acid (IFA) supplement.[16]

CONCLUSION

Anemia persists as a prevalent and critical global health issue that has not been sufficiently tackled, especially in developing countries where advancements have been inconsistent. To enhance the understanding of the primary factors contributing to anemia, it is essential to conduct further research. This knowledge will enable the implementation of targeted interventions tailored to specific contexts.

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