Assessment of Anemia and Its Determinants among Young Adolescent Girls of Lower Economic Grade – A Prospective Analytical Study

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Abstract:

Introduction: Anaemia is a chronic condition that is not well acknowledged and has a negative effect on over 2 billion individuals globally, with a particular focus on women, unborn babies, and children. Anaemia is among the top five causes of illness among adolescents in India. Hence, this study aimed to evaluate the frequency of anaemia among adolescent females from disadvantaged socioeconomic backgrounds who are undergoing medical intervention at Isnapur tertiary hospital.

Material and Methods: A total of 308 adolescent girls of lower socioeconomic status were selected. Four ml of blood was collected and through Sahli's hemoglobinometer evaluated Hb levels and anaemic females were assessed using a calorimeter. Their Hb values determined their anemia severity. Participants were tested on anemia knowledge and grades using a self-administered questionnaire.

Results: Anaemia had an overall prevalence rate of 60.38%. Severe anaemia was seen in 17.20% of cases, moderate anaemia in 67.74% of cases, and light anaemia in 15.05% of cases. The statistical analysis revealed a substantial correlation ($p<0.05$) between age, worm manifestation, and BMI for age across different stages of anaemia. The levels of knowledge on anaemia definition, anaemia causes, iron-rich dietary food, symptoms of anaemia, and anaemia related with menstruation were substantially raised from 13.44%, 5.37%, 22.58%, 4.30%, and 20.43% to 88.70%, 92.47%, 90.32%, 85.48%, and 96.23% respectively ($p<0.05$).

Conclusion: The main factors that were found to predict Anaemia were age, worm infestation, and BMI for age. Administering therapy for anaemia in teenage girls is an essential preventative action that greatly minimises the development of difficulties associated to anaemia during pregnancies, hence minimising both maternal mortality and morbidity.

Keywords: Anaemia, Low Economic Status, Prevalence, Adolescent Girls.

Introduction

Anaemia is a significant public health problem due to its detrimental impact on cognitive function, physical ability, and job productivity [1,2]. According to the World Health Organisation (WHO), the occurrence of anaemia is most common in children (42.6%) and least common in nonpregnant women (29.0%) [3].

In India, the prevalence of iron deficiency anaemia (IDA) varies from 38-72% depending on age and sex, with a higher proportion seen among women and children [4]. Approximately 22% of the overall population consists of teenage females, and estimates indicate that between 25% and 50% of these girls develop anaemia by the time they reach menarche [5,6].

Anaemia is more prevalent among teenagers, especially those residing in underdeveloped nations [7]. Anaemia has negative consequences on the current health of adolescents and may potentially lead to harmful implications in the future [8]. Adolescent girls are at a heightened risk of iron shortages due to a combination of fast development, monthly blood loss, and often insufficient dietary intake of iron [9].

Iron deficiency anaemia (IDA), particularly in severe cases, is linked to a higher likelihood of premature labour, low birth weight, and death for both the child and mother. Additionally, it may make teenagers more susceptible to infection and heart failure [10]. Anaemia in teenagers is caused by deficiencies in iron, folate, and vitamin B12 [11,12].

While there has been much research conducted on pregnant moms and young children, there is a scarcity of published studies on the frequency of anaemia among teenage girls from poor

socioeconomic backgrounds. Therefore, the current research was conducted to assess the prevalence of anaemia in teenage girls from lower socioeconomic backgrounds who are receiving medical treatment at Isnapur tertiary hospital.

Materials and Methods

The present prospective analytical study was conducted in the Department of Obstetrics and Gynaecology at Maheshwara Medical College and Hospital, Isnapur from April 2022 to December 2023. A total of 308 adolescent girls attending outpatient department of OBG belonged to adolescent age group were recruited. Young adolescent girls belonged to lower economic group, without pregnancy, not on iron & folic acid supplementation, attained menarche, with regular menstrual history and willing to participate were included.

Adolescent girls with history of bleeding tendency, under medication that provoke hematologic complications, history of menstrual disturbances, not willing to consume IFA supplementation, not attending follow up visits, not willing to follow suggested diet and not willing participate were excluded. Written informed consent was obtained from all the participants or parents or guardians. Study protocol was approved by institutional ethics committee. Study participants were tested on

anemia knowledge and grades using a self-administered questionnaire. Each girl gave a pinprick blood sample. Sahli's hemoglobinometer evaluated Hb levels, and anaemic females were assessed using a calorimeter. Their Hb values determined their anemia severity. All anaemic females had stool tests. The girls were dewormed with one Tab.Albendazole400mg.Adolescent anemia prevention project pills with 100mg elemental iron and 500microgram folic acid were given to anaemic females.

Since acidity enhances iron absorption, they were told to take the pill 30 minutes before lunch and to always take it. Supplementation lasted a year. Complaint was nice. Some females had temporary side effects such nausea, vomiting, and stomach discomfort. Pin-prick blood samples were taken from each daughter at three, six, nine, and one year. Blood flowed freely from the pierced fingertip without squeezing or compression.

The collected data was assessed using SPSS version 29.0. The data was represented in Mean and SD. The mean difference was analysed by using student 't' test. The comparison of levels was analysed by using chi-square test. $P<0.05$ was considered as statistically significant.

Results
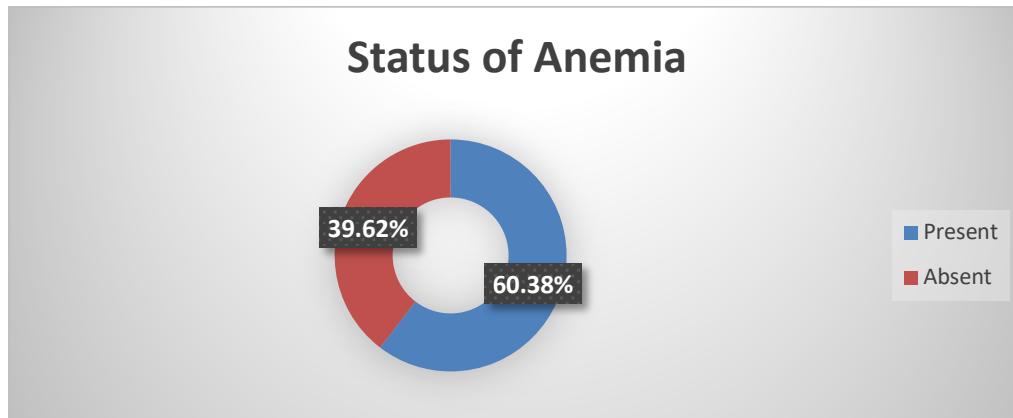
Graph 1: Status of Anemia among the study participants
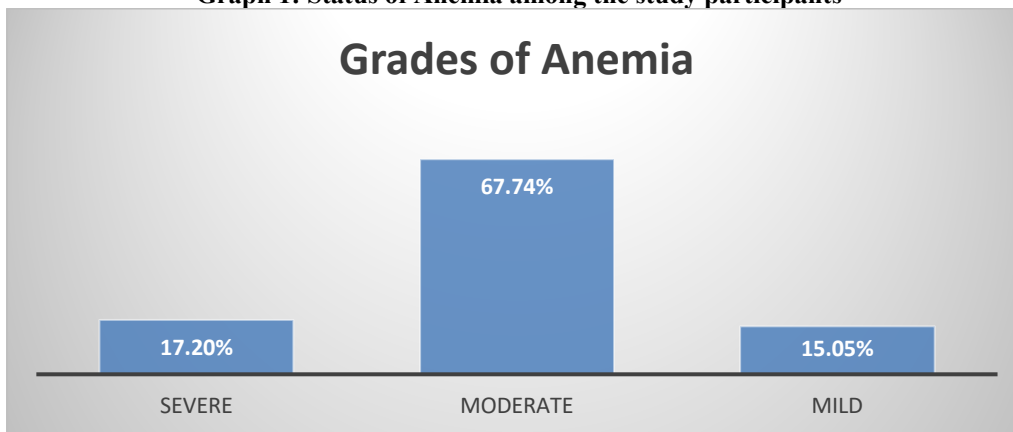
Graph 2: Distribution of cases based on different grades of anemia

Table 1: Demographic characteristics of cases with various grade of Anemia

Parameters	Total no of Cases (n=186)			p-value
	Mild (n=28)	Moderate (n=126)	Severe (n=32)	
Age (In years)				
12-15	08 (28.58%)	43 (34.12%)	12 (37.5%)	0.0172
16-19	20 (71.42%)	83 (44.62%)	20 (62.5%)	
Worm infestation				
Present	01 (3.58%)	108 (85.71%)	30 (93.75%)	0.001
Absent	27 (9.64%)	18 (14.29%)	02 (6.25%)	
BMI for age				
Normal	16	68	10	0.001
Thin	12	58	22	
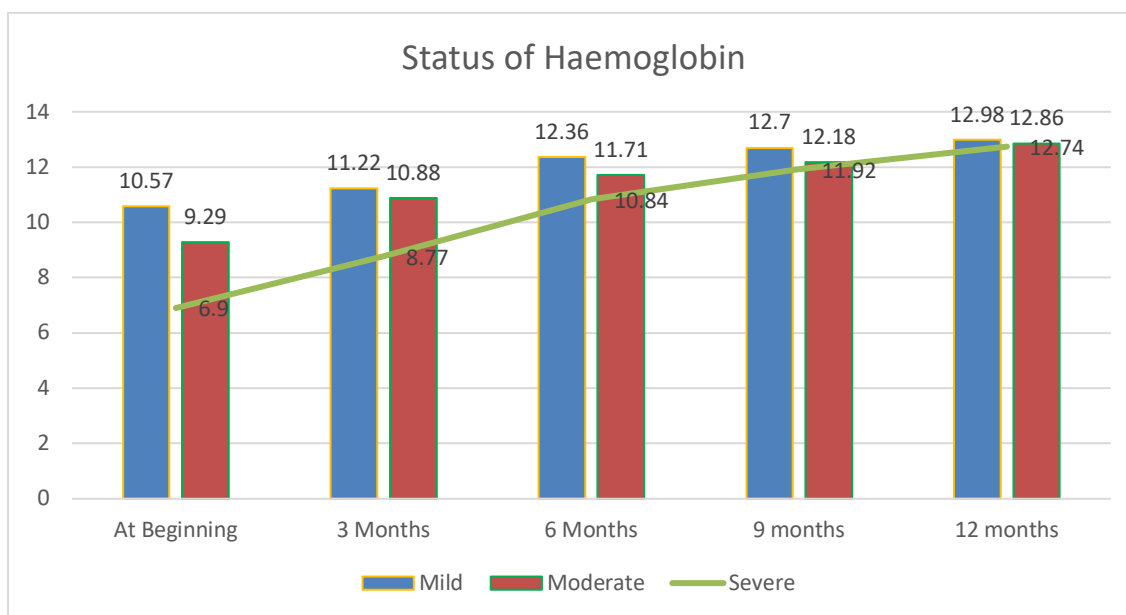
Graph 3: Status of haemoglobin at different follow up periods

Table 2: Outcome of knowledge assessment on anemia among study participants

Knowledge status	Before Counselling (n=186)			After Counselling (n=186)			Chi-square value	P-value
	Yes	No	Not sure	Yes	No	Remains same		
Anemia - definition	25 (13.44%)	152 (81.72%)	09 (4.83%)	165 (88.70%)	16 (8.60%)	05 (2.68%)	3.292	0.042
Anemia - causes	10 (5.37%)	161 (86.56%)	15 (8.06%)	172 (92.47%)	04 (2.15%)	10 (5.38%)	3.074	0.001
Iron rich dietary foods	42 (22.58%)	106 (56.98%)	38 (20.43%)	168 (90.32%)	14 (7.52%)	04 (2.15%)	2.190	0.0278
Symptoms of anemia	08 (4.30%)	171 (91.93%)	07 (3.76%)	159 (85.48%)	10 (5.38%)	17 (9.13%)	2.882	0.001
Anemia linked with menstruation	38 (20.43%)	136 (73.11%)	12 (6.45%)	179 (96.23%)	01 (0.53%)	06 (3.22%)	3.534	0.001

Discussion

A total of 308 adolescent girls attending outpatient department of OBG were screened for anemia. Among that 186 (60.38%) participants were confirmed with anemia (Graph 1). The severe grade anemia was observed in 17.20%, moderate grade in 67.74% and mild anemia in 15.05% of cases (Graph 2). Majority participants of various anemia grades were between 16-19 years (71.42% in mild, 44.62% in moderate, 62.5% in severe) and hook warm infestation was present in 3.58%, 85.71% and 93.75% of mild, moderate and severe grade anemia cases.

The comparison of age, worm manifestation and BMI for age among various grades of anemia was statistically significant (p<0.05). The levels of

haemoglobin in mild anemia were 10.57g/dl at beginning, 11.22g/dl at 3 months, 12.36g/dl at 6 months, 12.7g/dl at 9 months and 12.98g/dl at 12 months. In moderate anemia, the levels of Hb were significantly increased from 9.29g/dl, 10.88g/dl, 11.71g/dl, 12.18g/dl, 12.86 g/dl, at beginning, 3, 6, 9, and 12 months respectively. In severe anemia, the levels of Hb were significantly increased from 6.9g/dl, 8.77g/dl, 10.84g/dl, 11.92g/dl, 12.74g/dl, at beginning, 3, 6, 9, and 12 months respectively.

Before counselling, 13.44%, 5.37%, 22.58%, 4.30%, and 20.43% of cases aware of anemia definition, anemia causes, iron rich dietary food, symptoms of anemia, anemia linked with menstruation and 81.72%, 86.56%, 56.98%, 91.93% and 73.11% of cases were not aware of anemia definition, anemia causes, iron rich dietary food, symptoms of anemia, anemia linked with menstruation respectively. After counselling the levels of knowledge was significantly increased to 88.70%, 92.47%, 90.32%, 85.48%, and 96.23% of cases on anemia definition, anemia causes, iron rich dietary food, symptoms of anemia, and anemia linked with menstruation respectively ($p<0.05$) (Table 2).

Upadhye JV et al. investigated 300 females aged 12 to 16 years and detected anemia in 270 (90%) of them. Mild anemia was identified in 73.3% of the patients, moderate anemia in 16.6%, and no individuals had severe anemia [13]. Chaudhary SM and Dhage VR conducted a review of 296 adolescent females aged 10 to 19 in Nagpur's metropolitan region and found a prevalence of 35.1% [14]. Biradkar S et al. examined 840 individuals aged 10 to 19 years and found that the overall frequency of anemia was 41.1%. Severe anemia was detected in 0.6% of patients, moderate anemia in 6.3%, and mild anemia in 34.6% [15]. Kulkarni MV et al. identified a frequency of 90.1% among 272 teenage females, with mild to severe anemia accounting for 88.6% of cases [16]. Rawat CM et al. identified a 34.5% incidence among 504 teenage females aged 10 to 18.

Mild anemia was seen in 55.2% of patients, whereas severe anemia occurred in 4%. anemia was substantially associated with awareness of anemia ($p<0.05$) [17]. Toteja GS et al. examined 4337 Indian teenage females and found that 90.1% had anemia, with severe anemia occurring in 7.1% of cases [18]. Kotecha PV et al. undertook an adolescent anemia control campaign in Gujarat's Vadodara district, which included 69000 adolescent school girls aged 8 to 12, and discovered a 75% prevalence rate.

The intervention significantly decreased anemia prevalence from 74.7% to 53.2% ($p<0.05$) and improved haemoglobin levels in 80% of teenage females [19]. A study by Banumathy S et al., on 500 adolescent girls found out a prevalence of 68% for anemia under various degrees. The attributed causes of anemia were hookworm infestations and socioeconomic status [20]. Anshu Sharma et al. observed that anemia was prevalent in 61.9% of urban regions and 85.4% of rural areas in a study of 246 teenage females from disadvantaged groups in Delhi and Bharatpur, Rajasthan [21]. Akramipour R et al. observed that the frequency of anemia was 21.4% among teenage schoolgirls aged 14-20 years [22]. Chavada MV et al. included 357 novice girl students found anemia in 43.52% of girls [23]. Getachew M et al. conducted a study on 443 randomly chosen teenage school females and found that the prevalence of anemia was 11.1%.

The survey also indicated that a majority of 240 participants, accounting for 56.7%, had inadequate understanding on anemia. Approximately 43.3% of teenage females have a satisfactory level of understanding regarding anemia. Out of all the individuals included in the research, only 162 (38.3%) had a satisfactory understanding of the causes of anemia, 178 (42%) had a good grasp of the signs and symptoms of anemia, 196 (46.3%) were knowledgeable about the consequences of anemia, and 183 (38.5%) were well-informed on the prevention of anemia [24]. Halala Handiso Y et al., included 843 adolescent girls found an overall prevalence of anemia was 37.2%. Economic status and BMI were main predictors of the Anemia [25].

Similarly, our findings indicated a prevalence of anemia of 60.38%. Severe grade anemia was found in 17.20% of patients, moderate grade in 67.74%, and mild anemia in 15.05%. The present study has limitations in terms of low sample size and focused on adolescent girls attending tertiary care hospital only. Further community level studies are required to understand the knowledge and awareness on anemia.

Conclusion

The statistical analysis showed a substantial correlation ($p<0.05$) between age, worm manifestation, and BMI for age across different stages of anemia. Following counselling, there was a substantial improvement ($p<0.05$) in the levels of knowledge on the definition of anemia, its causes, iron-rich dietary foods, symptoms of anemia, and the association between anemia and menstruation. Therefore, age, worm infestation, and BMI for age were identified as the primary predictors of Anemia. Providing treatment for anemia in adolescent girls is a crucial preventive measure that significantly reduces the occurrence of anemia-related complications during pregnancies, hence decreasing both maternal mortality and morbidity. Therefore, it is essential to establish school-based programmes for iron folic acid supplementation, as well as frequent nutritional screening and

deworming, in order to assist teenage females who are vulnerable to anemia.

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