Original article

SCREENING OF NOVICE ADOLESCENT GIRLS FOR ANEMIA STUDYING IN MEDICAL AND PARAMEDICAL COLLEGES AT CIVIL HOSPITAL CAMPUS, AHMEDABAD, GUJARAT, INDIA

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ABSTRACT

Introduction: Anemia is major public health problem in adolescents in India. This study was conducted to estimate the prevalence of anemia among novice medical and paramedical adolescent girls students and to study the socio-demographic factors associated with anemia in them.

Methods: This cross-sectional study was conducted by purposive non random sampling method in March 2011. Data was collected from 357 novice girl students of four medical and paramedical colleges and one nursing school in civil hospital campus Ahmedabad, Gujarat, India. Statistical analysis was done by Chi-square test and Z test.

Results: In present study, anemia was found in 43.52% girls. A significantly more girls were anemic in Physiotherapy College (58.2%) and Nursing College (53.2%) compared to other colleges. Anemia was more prevalent in the girls (61%) who had heavy menstrual bleeding and who resided (48.1%) in the hostel. Mean BMI of anemic girls was significantly less as compared to non anemic girls.

Conclusion: Association of anemia with academic course, hostel staying, previous operation/hospitalization and heavy menstruation was significant.

Key words: Anemia, Adolescent girls, Medical and paramedical students

INTRODUCTION

Adolescent[1-2] has been defined as the period of life spanning between 10-19 years. The true meaning of the word adolescence is "to emerge / to grow", leading to exploration and experimentation.

Adolescence is the stage of life in which physical changes generally commence, usually beginning with a growth spurt and soon followed by the development of the sex organs and secondary sexual characteristics.[3] Increased nutritional needs at this juncture and not gaining nutrition in sufficient amount leads to various nutritional disorders in adolescents.

Adolescent girls are more prone to nutritional difficulties than adolescent boys. In early childhood (0–4 years), the available international evidence suggests that differences in nutritional status between girls and boys are statistically negligible in all regions except South Asia. As the years pass, however, girls run a greater risk than boys of nutritional difficulties, notably anemia. [3]

In India, adolescent constitute over 23% of the population[4] of which 56 % are anemic.[3] A study conducted in Gujarat by Kotecha et al[5] found 74.4% girls of 13th to 17th years were anemic. Medical and paramedical students are required to spend a large fraction of their time in hospital environment, being constantly in contact with potentially infectious organisms. On one hand anemia decreases their capacity to learn with utmost concentration, low immunity related to under nutrition increases their susceptibility to diseases like tuberculosis. As the burden to sustain the health system rests on the shoulders of these novice medical and paramedical students in future, it is important that they themselves remain healthy. This can be achieved by early diagnosis of common morbidities in them followed by necessary corrective measures.

With this background, the present study was conducted to know the prevalence of anemia among novice medical and paramedical adolescent girl students, to know the socio – demographic characteristics in relation to anemia and to find out inter relation between anemia and weight disorders.

MATERIAL & METHODOLOGY

There is one medical college, one dental college, one physiotherapy college, one nursing college and one school of nursing in the Civil Hospital Campus, Ahmedabad, Gujarat, India.

This cross sectional study was conducted by purposive non random sampling method in March 2011. After taking permission from the respective authority and explanation of objective to the study population, data was collected through pre-tested pre-designed proforma from 357 novice girl students at four colleges and one school in civil hospital campus viz. B. J. Medical College, Government Dental College, Government Physiotherapy College, College of Nursing & School of Nursing. The proforma was distributed to novice girls in batches and they were asked to fill it up. The proforma was filled up by the students under direct supervision of investigators to avoid the discussion among the students. The supervision by the teachers was also avoided to enable the students to answer freely. Study was permitted by institutional ethical committee. Written informed consent was taken from the students before initiation of study.

After a brief clinical examination, anthropometric measurement in the form of weight & height was taken using standardized technique by trained investigators. The Body Mass Index (BMI) is used as the criterion for classifying nutritional status. BMI is also called Quetelet Index and was derived by dividing ones weight in kilograms by the square of his height in meters. Height and weight of the study subjects were measured using the standard procedure suggested by Jelliffe. [6] Weight was measured with standard digital weighing machine. Height was measured using calibrated fixed scales while subject remained bare feet. After taking all aseptic precaution, Blood sample (2 ml in EDTA bulb) was collected from all the participants by qualified laboratory technicians at accredited laboratory of pathology department of civil hospital, attached to B. J. Medical College, Ahmedabad. Haemogram, including haemoglobin was generated by automated cell counter method – CELDYNE: 3700 (Abert). Anemia levels were assessed by adopting anemia classification used by NFHS-III[7] and weight disorders was assessed on the basis of BMI. [8-9] Data is analyzed by Epi-info 6 software. Chi-square test and Z test were used for the statistical analysis. The differences were considered as significant at a p value of <0.05.

RESULTS

Total 357 novice girls from medical and paramedical colleges participated in the study.

Table- I: Status of Anemia in Novice Medical and Paramaedical Girls

Anemic Group[7]	Girls (n = 324)*(%)
Non Anemic (Hb > 12 gm %)	183 (56.48)
Mild/Gr I Anemia (Hb 10-11.9 gm %)	120 (37.04)
Moderate/Gr II Anemia (7- 9.9. gm %)	19 (5.86)
Sever / Gr III Anemia (< 7 gm %)	02 (0.62)
Mean Hemoglobin (gm%) (Mean ± SD)	11.99 ± 1.36

* Hb was not possible for 33 girls out of 357 girls

Majority of the girls 299 (83.75%) were in the age group of 17-18 years. Maximum 93 (26.05%) number of girls were from Medical College followed by school of nursing (24.65%), Dental college (19.05%). Nearly 17% girls were from Physiotherapy college and 13.72% were from nursing college. Out of 357 girls, 165 (46.22%) girls came from family having monthly family income of less than Rs. 15000.

Table -I shows that mean age of study group was 17.95 ± 0.65 years. The mean hemoglobin level of the study group was 11.99 ± 1.36 gm%. Out of 357 girls, 141 (43.52%) were anemic with hemoglobin less than 12 gm%. It also shows that 120 (37.04%) girls had grade I (mild) anemia, 19 (5.6%) girls had Grade II (moderate) anemia and 2(0.62%) girls had Grade III (severe) anemia. It is to be noted that 9.2% girls did not give blood for examination.

Table- II: Status of Anemia According to Age, Course of Education & Socio-Economic Factors in Study Group

Indicator	Total (n=324)	Anemic (n= 141)	Non Anemic (n= 183)	P value
Age (in years)				
< 17	71 (21.9)	33 (46.5)	38 (53.5)	0.56
18-	198 (61.1)	84 (43.4)	114 (56.6)	
19-	51 (15.7)	21 (41.2)	30 (58.8)	
≥20	4 (1.3)	3 (75)	1 (25)	
Type of Course				
Medical College	92 (28.4)	31 (33.7)	61 (66.3)	0.006
Dental College	42 (13.0)	12 (28.6)	30 (71.4)	
Physiotherapy College	55 (17.0)	32 (58.2)	23 (41.8)	
Nursing College	47 (14.5)	25 (53.2)	22 (46.8)	
School of Nursing	88 (27.1)	41 (46.6)	47 (53.4)	
Permanent Residential Status				
Gujarat	309 (95.4)	136 (44.1)	173 (55.9)	0.58
Other than Gujarat	15 (4.6)	5 (33.3)	10 (66.7)	
Present Residential Status				
Home	78 (24.1)	31 (39.7)	47 (60.3)	0.04
Hostel	206 (63.6)	99 (48.1)	107 (51.9)	
Paying Guest	40 (12.3)	11 (27.5)	29 (72.5)	
Time since resides in Hostel	**(n=206)**	**(n=99)**	**(n= 107)**	
< 6 Months	19 (9.2)	9 (47.4)	10 (52.6)	0.85
> 6 Months	187 (90.8)	90 (48.1)	97 (51.9)	

Table – II shows that out of 198 (61.1%) girls in 18 years of age, 84 (43.4 %) were anemic. Anemic girls were more in Physiotherapy College (58.2%) and Nursing College (53.2%) than Medical (33.7%) college, dental (28.6%) college and school of nursing (46.6%). This difference was found to be statistically significant. Anemia was equally prevalent in girls from various religions and in different income groups. Though statistically not significant, Gujarati girls were more anemic (44.1%) as compared to girls from other states (33.1%). Out of 206 (63.6%) girls who resided in the hostel, 99 (48.1%) were anemic. Only 39.7% girls who reside in their home were anemic. This difference was statistically significant. Duration of hostel stay did not show any effect on prevalence of anemia as almost similar prevalence (48 %) was observed among girls who resided in the hostel for more than or less than 6 months.

Table – III shows that prevalence of anemia among vegetarian and non-vegetarian girls was 43.3% and 46.2% respectively. Out of 148 girls, who skipped meal as part of dieting, 48% of them were anemic compared to 40% in those girls who did not skipped their meal. 26(35.14%) girls who consumed green leafy vegetables in diet were anemic as compared to 115(46%) who didn't. Habit of consumption of tea or coffee has significantly associated with anemia where as citrus fruits immediately or with food and daily consumption of citrus fruits in diet have no relation with anemia in study group. Overall, 12 (3.7%) students had suffered from one or other chronic illness. Only 4 (1.2%) students gave history of passing worms in stool, among them, 50% were anemic as compared to 43.4% who didn't pass worms in stool.

Table-III: Anemia According to Dietary Habit and Presence of Morbidity in Study Group. (N=324)

Indicator	Total (n=324)	Anemic (n=141)	Non Anemic (n=183)	P value
Taking Vegetarian Diet	298 (92)	129 (43.3)	169 (56.7)	0.7
Taking Tea/Coffee immediately or with Breakfast/Snack	303 (93.5)	139 (45.6)	164 (53.8)	0.002
Taking Citrus fruits immediately or with Lunch/Dinner	50(15.43)	23(46)	27(54)	0.70
Skipping meal as dieting	148 (45.7)	71 (48)	77 (52)	0.13
Taking green leafy vegetables daily	74(22.84)	26(35.1)	48(64.86)	0.09
Taking citrus fruits daily	28(8.65)	12(42.9)	16(57.14)	0.94
Taking Jaggery daily	39(12.04)	15(38.5)	24(61.54)	0.50
Sprouted Pulses daily	57(17.59)	22(38.6)	35(61.40)	0.41
Malaria / Piles / Ulcer in last 3 months	12 (3.7)	5 (41.7)	7 (58.3)	0.87
Notice worm in stool	4 (1.2)	2 (50)	2 (50)	0.81
Underwent Surgery / Hospitalization in Past	20 (6.2)	5 (25)	15 (75)	0.04

Table- IV: Status of Anemia According to Menstrual Cycle in Study Group.

Indicator	Total (n- 324)	Anemic (n - 141)	Non Anemic (n - 183)	P value
Age of Menarche (years)				
< / = 12	43 (13.2)	17 (39.5)	26 (61.5)	0.22
13	99 (30.6)	38 (38.4)	61 (62.6)	
14	99 (30.6)	42 (42.4)	57 (57.6)	
>/= 15	83 (25.6)	44 (53.0)	39 (47.0)	
Menstrual Cycle				
Regular	270 (83.3)	117 (43.3)	153 (56.7)	0.88
Irregular	54 (16.7)	24 (44.4)	30 (55.6)	
Menstrual Bleeding				
Adequate	264 (81.5)	111 (42.1)	153 (57.9)	0.02
Inadequate	19 (5.9)	5 (26.3)	14 (73.7)	
Heavy	41 (12.7)	25 (61)	16 (39)	
Duration of menstruation				
2-5	112(32.6)	46 (41.1)	66(59.9)	0.51
5-7	192(59.3)	84(43.8)	108 (56.2)	
≥7	20(0.1)	11(55.0)	9(45.0)	
Menstrual Experience				
Painful	112 (34.6)	49 (43.8)	63 (56.25)	0.95
Painless	212 (65.4)	92 (43.4)	120 (56.6)	

Table-V: Anemia According to Antrhopometric Measures in Study Group (N=324)

Parameter	Anemic girls (n=141) (Mean ± SD)	Non Anemic girls (n=183) (Mean ± SD)	P value
Height (Cm)	155.61 ± 5.45	155.73 ± 5.73	0.89
Weight(Kilogram)	48.52 ± 7.72	51.57 ± 10.32	0.004
BMI (Kilogram/meter^2)	20.02 ± 2.93	21.22 ± 3.79	0.002
Waist Circumference (Cm)	68.22 ± 7.96	70.63 ± 8.44	0.009
Hip Circumference (Cm)	87.66 ± 7.73	92.22 ± 9.61	0.000
Waist Hip Ratio	0.78 ± 0.05	0.77 ± 0.06	0.084

Table – IV shows that as the age of menarche increased, prevalence of anemia was also increased. Anemia is equally prevalent in girls having regular (43.4%) or irregular (44.4%) menstruation cycle. Anemia was significantly more prevalent in the girls (61%) who had heavy menstrual bleeding as compared to girls who had adequate menstrual bleeding (42.1%) or inadequate menstrual bleeding (26.3%). Anemia has no association with duration of menstruation. Similarly anemia has no relation with menstrual experiences.

Table – V shows no difference in mean height of anemic and non anemic girls but mean weight of anemic girls was less (48.52 ± 7.72) as compared to non anemic girls (51.57 ± 10.32) which was statistically significant. Not only that, mean BMI was also low in anemic girls. Waist circumference and hip circumference were also significantly low in the anemic girls.

On clinical examination, out of 58 girls who had breathlessness, 72.2% were anemic. Similarly correlation was also found with palpitation (80%), conjuctival pallor (88.9%), tongue pallor (90.3%) and nail pallor (82.5%) with anemia. The differences were found to be statistically significant.

DISCUSSION

A total 357 novice girl students were studied at colleges in civil hospital campus, Ahmedabad. In this study, various socio-demographic information were collected. Anemic and non-anemic girls were compared for various factors which are responsible for anemia.

In the present study, the prevalence of anemia is 43.3% among medical and paramedical girls, which was similar to the prevalence of 45% present in the adolescent girls in urban slum area in the study conducted by vankudre A.J [10] and 40.3% [11] in the nursing students of College of nursing, PDIMS, Rohtak. But the study conducted by Saratha A. et al. [12] in the medical institute's girls, the prevalence of anemia was 76% which was higher than the present study. In the study conducted by B.C. Mehta [13], 20.3 % nursing students were found anemic, which was lower than the present study. WHO/UNICEF has suggested that problem of anaemia is considered to be of very high magnitude when prevalence exceeds 40%, and calls for action.[14] That's why regular checking of haemoglobin level should be ensured among students.

The overall prevalence of mild, moderate and severe anemia was 120 (37.04%), 19 (5.6%) 2(0.62%) respectively. Saratha A. et al [12] reported 170 (56.67%) had mild and 58 (19.33%) had moderate anemia. None of the girls had severe anemia. Rajini S reported 76.5% of the rural girls had mild anemia while 2% had severe anemia. [15]

Present study reported mean hemoglobin was 11.99 ± 1.36 gm%. Similar observation was found in the study conducted by Punia anita et al in which Average hemoglobin level was observed 11.87 gm % ±2.79. [11] In another study, Mean haemoglobin was found to be 9.4gm% ± 1.2 which was lower than the present study. [10]

No significant relationship of anemia was observed with age of adolescents. Rajini S et al [15] had also observed similar finding in their study. Similarly Kotecha et al [5] & Metha et al [13] had reported that age is not a significant correlate of anemia, but Punia Anita et al reported anemia showed positive correlation with age and it increased significantly with age as anemia prevalence was only 18.2% among 17-19 years aged girls and increased to 54.1% and 62.5% among 20-23 and 23-25 years aged nursing students respectively. [11]

Course of education had significant effect on prevalence of anemia which was higher in physiotherapy girls (58.2%) followed by nursing girls (53.2%) compared to other colleges. Study on nursing students of PGIMS, Rohtak reported 40.6% students were anemic. [11]

Religion did not show any effect on the prevalence of anemia. Similar observation was done by Vanundre A.J. in his study. [10] Total family income per month also had no impact on the prevalence of anemia but Vanundre A.J. in his study showed significant effect [10]. This may be due to family income criteria was different in both the studies.

In this study, significant association was found between anemia and residential status of girls. As more girls (48.1%) who resided in the hostel were anemic. This may be due to poor quality food available to girls in the hostel. This highlights need of improvement of the food quality in the hostel.

No statistical significance was associated between dietary pattern (veg/non-veg) and prevalence of anemia. Similar finding were reported by Saratha A. [12] Taking tea/ coffee has significantly associated with anemia where as citrus fruits immediately or with food and daily consumption of citrus fruits in diet have no relation with anemia in study group and citrus fruits along with food did not have any significant effect on the prevalence of anemia. Also there was no significant difference was observed in the prevalence of anemia weather girls were taking green leafy vegetables and citrus fruits daily or not. This could be possibly due to the fact that dietary history was obtained by 24 hours recall method and was not adequate to bring out the true association between dietary intake and prevalence of anemia. Saratha A. reported significant association between daily intake of green leafy vegetables and anemia .[12] Kaur M et al [16] in his study had also documented the role of green leafy vegetables in anemia prevention among adolescent girls.

In present study, anemia was not significantly associated with chronic illness. Similarly Saratha

A. [12] documented that chronic illness did not have any effect on anemia. Thakur A. [17] found in his study that passing warms in stool was not the significantly associated factor for anemia. Similar finding was observed in present study. In contradiction to these findings Vankudre A.J. et al [10] and Saratha A. [12] had reported statistically significant association between passing warm in stool and anemia. In present study, Underwent hospitalization or surgery was significantly correlated with anemia.

Age at menarche is not a significant correlate of anemia. Similar finding was documented by various studies.[5, 15,17-18] No statistical significance could be associated between anemia and type (regular/irregular) of menstruation. Saratha A et al [12] al and Calis JC [19] et al had also similar observations in their study. Duration of menstrual cycle is considered to be major cause of anemia among young girls, but no significant relationship of anemia was observed with the duration of menstrual flow in present study. Other studies also reported similar negative relationship. [12, 15, 19] One of the important factors associated with prevalence of anemia was excessive bleeding during menstruation. This excessive bleeding leads to anemia and with decreased intake of iron as compared to high requirement during adolescence initiates a vicious cycle. In this study, 61% girls who had heavy bleeding during menstruation were anemic compared to 42.1% who had adequate bleeding during menstruation. This difference was found to be statistically significant. Similar statistically significant difference was documented in various studies. [10, 12, 15, 17, 19-20]

Thakur A. et al documented that clinically the symptoms and signs associated with anemia were significantly ($p<0.05$) higher among adolescents with anemia as compared to those without anemia. [17] Similar findings were present in this study. Present study breathlessness and palpitation were found significantly associated symptoms with anemia as well as tongue, nail and conjunctival pallor were important sign for anemia. As the severity of anemia increased the prevalence of symptoms were also increased.

We did not find any significant effect of anemia on height of the subjects. Similar findings have been reported by Thakur A. [17] and Kaur et al [20] in their study. This may be because most of them suffered from mild to moderate form of anemia. But, anemia had significant effect on weight, BMI, Waist and hip circumference.

CONCLUSION & RECOMMENDATION

The mean age of study group was 17.95 ± 0.65 years. Anemia was found in nearly half of the girls. That require Regular and compulsory screening programmme for anemia and should be implemented for novice medical and paramedical girls. Mild anemia was found in 37.04% of study group. Through proper counselling and monitoring, anemia can be cured in the study group by iron and folic acid supplementation. Nearly 6% girls had moderate and severe anemia. These girls referred for further treatment to specialist.

Association of anemia with academic course, hostel staying, previous operation / hospitalization and heavy menstruation was significant. As anemia is more prevalent in hostel girls, there is a need to improve the quality of food served at hostels.

Symptoms and signs which were significantly associated with anemia were breathlessness, palpitation, conjuctival pallor, tongue pallor and nail pallor. Not only that, these symptoms and signs increased as the severity of anemia increased. Anemia was not significantly associated with age, religion, diet (vegetarian / non-vegetarian), skipping meal, habit of taking citrus fruits with diet, exercise and other factors.

In the present study, mean weight and mean BMI of subjects with anemia was significantly less than subjects without anemia, which suggests that anemia affects the overall growth of adolescent girls. There is a need to develop and implement strategies for intensive health education regarding anemia in study group.

But, the results of this study is based on a highly selected institutional group (novice girls of medical and paramedical colleges), located primarily at urban area. Hence may differ from other groups of same age. There is a limited room for generalization of the results of this study to male students and older students. However, it is necessary to perform further research addressing the causes of these problems in Indian context in order to implement proper preventive strategies.

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