Int J Biol Med Res.2015;6(4):5332-5335

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

Prevalence and association of various risk factors with Anemia among adolescent girls of Vallabh Vidyanagar (Gujarat)

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ARTICLE INFO

Keywords:
Anemia
Adolescent girls
Anemia prevalence
Risk factors

ABSTRACT

Introduction- Anemia is known to be a significant public health problem in many countries. India has the world's highest prevalence of iron deficiency anemia among females, with 60 to 70% of the adolescent girls being anemic. Aim- The present study was aimed to estimate the prevalence and associated risk factors of anemia among adolescent girls of Vallabh Vidyanagar. Method- Cross sectional population (N=500) was taken for the study purpose from schools of Vallabh Vidyanagar. The blood samples were estimated for hemoglobin and complete hemogram by the automated Hematology analyzer. The statistical analysis was done by using the SPSS version 15.0 for the windows.Result- The prevalence of anemia among adolescent girls was found to be very high. 26.4% adolescent girls were mildly anemic while 19.4 % and 2.4% were moderately and severely anemic. The prevalence was significantly higher (P≤0.05) in those belonging to schedule tribe community and those from urban area. The associated risk factor of anemia was found to be caste. The multiple regression analysis showed a significant association between Hemoglobin and HCT (Hematocrit Value) and MCHC (Mean Corpuscular Hemoglobin Concentration). The blood hemoglobin also showed a significant association with two clinical symptoms namely white pale glazed tongue and pale nails.Conclusion- The present study calls for a need to improve nutritional status of adolescent girls through counseling as well as health education and school programme should be implemented to improve the awareness on healthy dietary habits.

1. Introduction

Iron deficiency is the most common form of nutritional deficiency in both developing and developed countries. In anemia, there is an inadequate supply of red blood cells which results decrease in the oxygen carrying capacity of the blood to the tissues and organs. WHO has defined anemia as a condition in which hemoglobin content of blood is lower than the normal (11g/dl of blood) as a result of deficiency of one or more essential nutrients [1]. Adolescence is the formative period of life when the maximum amount of physical, psychological and behavioral changes takes place. This is a vulnerable period in the human life cycle for the development of nutritional anemia which has been constantly neglected by public health programmes [2]. IDA in adolescent girls causes reduced physical and mental capacity, diminished concentration in work and educational performance and also poses a major threat to their future safe motherhood [3]. A study on the prevalence of anemia among adolescent girls of scheduled caste community of Punjab revealed that in age group 11+, only 35.38% girls were normal and 64.62% were affected with various grades of anemia. The prevalence of anemia increases with age and becomes maximum (78.57%) in the age group 15+ (15-18 years). The frequency of mild anemia was displayed to the maximum (38.46%) by age group 11+ (11-15 years) and the minimum (21.43%) by age group 15+ (15-18 years) [4].

2. Methods:

The study was carried out during the period of November-2011 to March-2012. All the schools of VallabhVidyanagar were enlisted, thereafter adolescent girls of the age group 13-19 years (N=500) were included in the study. A written consent was taken from the authority of the respective schools of the respondents. A socio-demographic profile of the students including parent's education, family structure, awareness regarding anemia and dietary pattern was noted by the use of pretested structured questionnaire. Diet survey was conducted using food frequency method having information on frequency of consumption of iron rich foods. The body dimensions such as height, weight, Mid-Upper-Arm-Circumference (MUAC) and waist to hip ratio (WHR) were carried out by standardized procedures. The hemoglobin and complete hemogram (Hemoglobin, RBC, HCT, MCV, MCH, MCHC, WBC, Platelet Count) were estimated under strict quality control in the reputed pathological laboratory of Vallabh Vidyanagar. The analysis was done by using the automated Haematology Analyzer (Sysmexpoch-100i). The obtained data was analyzed by SPSS for windows version15.0.

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Results:

500 adolescent girls aged between 13-19 years were included in the study. The prevalence of anemia among adolescent girls was found very high with 26.4% mildly anemic while 19.4% and 2.4% were moderately and severely anemic respectively (Table-1).

The prevalence of anemia among adolescents of urban population (55.12%) was significantly higher (P≤ 0.05) as compared to the rural population (36.6%). The prevalence of anemia was significantly higher (P≤0.05) among adolescent girls having 5-10 family members (58.6%) as compared to those who had 1-4 members (43.75%) and < 10 members (14.29%). It was observed that the prevalence of anemia in adolescent belonging to Schedule Tribe community was found to be significantly (P≤ 0.05) higher (74.47%) as compared to OBC (60.58%), schedule caste (54.84%) and general category (8.42%) (Table-2). A significant difference (P≤ 0.05) was observed between anemia and consumption of tea and Ready to Eat foods. 63.05% girls who consumed tea and 55.85% girls consumed RTE foods were suffering from anemia (Table-2).

The data about the relationship of anemia with clinical symptoms shows that 12.2% anemic girls complaint about dizziness which is significantly correlated (P≤ 0.05) with the prevalence of anemia (Table-3). There was a high significant correlation (P≤0.05) of anemia with incident of cough, viral fever, typhoid and other infectious diseases (Table-3). A high significant correlation (P≤ 0.05) existed between the anemia prevalence and symptoms like pallor of eyes, pale nails as well as white pale glazed tongue (Table-3).

In the regression analysis, BMI, MUAC, WHR, RBC, HCT, MCH and MCHC are independent variables studied with dependent variable hemoglobin. From all the variables, HCT and MCHC showed a positive and significant (P≤0.05) relationship with Hb (R2= 0.995, F=40964.684, P=0.00). The excluded variables are BMI, MUAC, WHR, RBC and MCH (Table-4). The following regression equation was obtained:

Hb= 10.299 + 0.301 * HCT + 0.343 * MCHC

Multiple regression analysis showed a significant (P ≤ 0.05) association of hemoglobin with bio-chemical parameters (HCT and MCHC) and clinical symptoms (white pale glazed tongue and pale nails). White pale glazed tongue and pale nails has largest value than 0.05 but those variables were significant in $\chi 2$ test of association (Table-5).

Table-1 Prevalence of anemia according to WHO classification

Grading of anemia*	Frequency	Prevalence
Severe Anemia (<8)	14	2.8
Moderate Anemia (8-10.9)	97	19.4
Mild anemia (11-12.9)	132	26.4
Non-anemia/Normal (≥12)	257	51.4
Total	500	100

***Source: WHO, 2011**

Table-2 Association of anemia prevalence with socio-demographic characteristics

Variables	No. of Adolescent Girls	Anemic	Prevalence %	χ^2 Value	df	Significance
Region				10.067*	1	0.002
Rural	90	33 (6.6%)	36.67			
Urban	410	226 (45.2%)	55.12			
Total	500	259 (51.8%)	51.8			
Caste				21.868*	3	0
SC	31	17 (3.4%)	54.84			
ST	47	35 (7.0%)	74.47			
OBC	137	83 (16.6%)	60.58			
General	285	24 (8.0%)	8.42			
Total	500	259 (51.8%)	51.8			
No. of Family members				19.495*	10	0.034
1-4 members	208	91 (18.2%)	43.75			
5-10 members	285	167 (33.4%)	58.6			
>10 members	7	1 (0.2%)	14.29			
Total	500	259 (51.8%)	51.8			
Beverage Consumption				25.698	4	0
Milk	219	90 (18.0%)	41.1			
Tea	249	157 (31.4%)	63.05			
Coffee	10	4(0.80%)	40			
Health Drink	18	6(1.20%)	33.33			
Others	4	2(0.40%)	50			
Total	500	259 (51.8%)	51.8			
Consumption of RTE Foods				4.893*	1	0.027
Yes	299	167 (33.4%)	55.85			
No	201	92 (18.4%)	45.77			
Total	500	259 (51.8%)	51.8			

Table-3 Association of anemia with various clinical symptoms

	ANEMIC	NON-ANEMIC	TOTAL	χ^2 VALUE	DF	SIGNIFICANCE
Dizziness						
yes	39 (7.8)	61 (12.2)	100	4.237*	1	0.04
no	202 (40.4)	198 (39.6)	400			
total	241	259	500			
Diseases suffered				7.818*	1	0.05
Cough	17(14.5%)	27(23.1%)	44(37.6%)			
Viral fever	18(15.4%)	26(22.2%)	44(37.6%)			
Typhoid	1(0.9%)	1(0.9%)	2(1.7%)			
Others	19(16.2%)	8(6.8%)	27(23.1%)			
Total	55(47%)	62(53%)	117(100%)			
Pallor of eye				51.695*	1	0
yes	10	0	10			
no	41.8	241	90			
total	51.8	48.2	100			
Pale nails				121.511*	1	0
yes	21.6	0.4	22			
no	30.2	47.8	78			
total	51.8	48.2	100			
White,pale.glazed tongue				47.140*	1	0
yes	9.2	0	9.2			
no	42.6	48.2	90.8			
total	51.8	48.2	100			

Table-4 Relationship between different variables with hemoglobin

Variable	R^2	Adjusted R^2	F-value	Coefficient constant	t-value
Constant	0.995	0.994	40964.684*	-10.299	-111.935*
HCT				0.301	181.215*
MCHC				0.343	98.470*

Table-5 Multiple logistic regression: risk factors associated with anemia

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.	
							Lower	Upper
HCT	-8.239	1.859	19.643	1	0	0	0	0.01
MCHC	-10.127	2.341	18.721	1	0	0	0	0.004
White, pale, glazed tongue	-27.139	3,182.96	0	1	0.993	0	0	.
Pale nails	5.307	2.102	6.375	1	0.012	201.695	3.278	12,410.01
Constant	675.578	6,367.58	0.011	1	0.916	2.511		

Discussion:

The world's adolescent population is facing a series of serious nutritional challenges which are not only affection their growth and development but also their livelihood as adults. Anemia is currently one of the most common and intractable nutritional problems globally.

Biradar et al (2012) reported that 41.1% of adolescent girls suffered from anemia in Belgaum among which 0.6% was severely anemic, 6.3% were moderately and 34.6% were mildly anemic. The present study also shows a high prevalence of mild anemia in adolescent girls. [5]

A study by Baral and Onta (2009) in Morang district of Nepal reported the 62.4% prevalence in rural community while that in urban community was 70%. In the present study, a bit similar results were obtained. [6]

Sidhu et al (2005) estimated the prevalence of anemia among adolescent girls of scheduled caste community of Punjab and noted the high prevalence (70.57%) of anemia among the scheduled caste community of Punjab. In the present study, the prevalence of anemia among Schedule Tribe community was high (74.47%) which could be due to poverty or more number of children in the family and also lack of knowledge about child care practices. [4]

Goel and Gupta (2007) estimated the low anemia prevalence among adolescents of an urban hilly community and stated that symptoms like headache and fatigue were significantly more prevalent in anemic subjects. In the present study, dizziness showed a significant relation with prevalence of anemia.[7]

Conclusion:

The findings of this study leads to the conclusion beyond doubt that mild anemia was more prevalent among adolescent girls of Vallabh Vidyanagar. The associated risk factor of anemia was found to be caste. The multiple regression analysis showed a significant association between hemoglobin and HCT and MCHC. The blood hemoglobin also showed a significant association with two clinical symptoms namely white pale glazed tongue and pale nails. From the results it can be concluded that nutrition education and food based approach may be useful to transform mildly anemic subjects to normal.

Acknowledgement:

The contributors are thankful to the UGC SAP DRS-I for their support to conduct this study.

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