Anemia among Adolescent Girls and its socio-demographic Associates

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Abstract—*Adolescents are the future resources for any country to progress and prosper. According to Census 2001, in India, adolescent constitute one-fifth of the total population. Adolescent AGs are one of the important segments of the population for they are the future mother whose nutritional status affects that of the newborn baby. Anemia being a major public health problem among adolescent girls, a study was conducted with the objective to determine the socio-demographic correlates of anemia among girls. Methodology: A cross-sectional study was conducted among 467 adolescent AGs in Ahmadabad city during May 2011 to august 2012 in Adolescent Friendly Health Services clinics. Results: Prevalence of anemia among adolescent girls was 85.9%. Highest prevalence was observed during mid-adolescence phase. As the age of girls increases, Hemoglobin tends to get on the lower side. A statistically significant association was observed between anemia and nutritional status. No association was observed between anemia and religion, birth order, type of -family, education of parents and occupation of parents. Conclusion: Association between anemia and under-nutrition has been reported earlier in numerous studies; however present study highlights the fact that it is not common to have anemia among girls who are over nourished or obese. Hence, special efforts should be made to address this issue among girls by doing dietary modifications.*

Key-words: Adolescent girls, Anemia, Socio-demographic Variables

I. INTRODUCTION

According to the World Health Organization, an adolescent is defined as an individual between 10-19 years of age. South-East Asia Region accounts for about 350 million adolescents comprising about 22% of the total population.[1] According to Census 2001, in India, this age group forms 21.4 percent of the total population. [2]

Adolescents are a heterogeneous group of population existing in a variety of circumstances, having diverse needs. Their needs are determined by age (early, middle and late adolescence), sex (males / females), marital status, residence (urban / rural), schooling, socio-cultural environment, and economic status. [1] It is a transition period involving dramatic physical, sexual, psychological and social developmental changes, all taking place at the same time. Adolescents acquired new capacities and face new situations while growing up which along with creating many opportunities for development also poses a risks to their health and well-being. This is a period which is generally perceived to be healthy since mortality is quite low in this age group. However, this is deceptive since adolescents are faced with several public health challenges that are, of course, different from the ones that they faced when they were children. [1]

Adolescence is also a phase where a rapid upsurge is seen in growth and development which leads to increase requirement of nutrition especially high micronutrients requirement. Adolescents, particularly AGs, are vulnerable to iron deficiency and anemia due to accelerated increase in requirements for iron,

poor dietary intake of iron, high rate of infection and worm infestation as well as the social norm of early marriage and adolescent pregnancy. [3]

One of the most common and intractable nutritional problems globally is anemia. According to WHO estimates approximately 50% of all anemia is attributable to iron deficiency. Studies indicate that the incidence of anemia in adolescents tends to increase with age and corresponds with the highest acceleration of growth during adolescence. The functional consequences are known to occur prior to onset of clinical stage of iron deficiency. Many more adolescents are in fact suffering from iron deficiency with its adverse effects on health and physical stamina, than are frankly anemic. Iron deficiency and iron deficiency anemia (IDA) in adolescence is thus a major public health problem.[3]

Hence, it was decided to study the socio-demographic associates of anemia among adolescent AGs attending Adolescent Friendly Health Service (AFHS) Clinics in Ahmadabad city.

II. METHODOLOGY

A descriptive analysis with special reference to anemia and its socio-demographic associates was done of 467 adolescent AGs attending AFHS clinics in Ahmadabad city during May 2011 to august 2012.

Adolescent Friendly Health Services (AFHS) clinics:

Ahmadabad city is divided into 6 zones having 57 wards with Urban Health Centers. As an initiative of Gujarat state health and family welfare department, ten AFHS clinics were established in 10 UHCs to delivered AFHS services to adolescents. AFHS services includes growth monitoring, Hemoglobin (Hb) testing to detect anemia, deworming, health education, information and counseling on sexuality, safe sex and reproductive health; contraceptive provision, HIV counseling (and referral for testing and care); pregnancy testing and antenatal and postnatal care; counseling on sexual violence and abuse (and referral for needed services); and post abortion care counseling and contraception.

Sample size:

Sample size was calculated 278 subjects at 95% confidence level and 6% absolute allowable error assuming prevalence of anemia 50% in adolescent aged girls.[3] So for the study purpose minimum of 300 adolescent AGs attending Adolescent Friendly Health Service (AFHS) Clinics in Ahmadabad city were taken.

Questionnaire:

A semi-structured pre-tested questionnaire was used to obtained information regarding socio-demographic profile, nutritional status and physical examination while Hb testing was done using Sahli's Hemoglobinometer. An assumption was made that anemia detected among AGs is IDA as it is the most common form of anemia among AGs.[3] Inclusion criteria included all the AGs aged 10-19 years registered and present at that time in AFHS clinics, all apparently normal AGs and all AGs who gave written consent while all the AGs who suffered from any moribund diseases or apparent mental illness and who did not gave written consent were excluded.

Ethical Consideration:

Permissions were obtained from all the concerned authorities prior to the study and written informed consent were obtained from the guardian of the adolescent girls regarding physical examination and

hemoglobin estimation prior to conducting the test. Out of 467 girls, 325 girls gave the consent and they were subjected to further test.

Present study was conducted in all the ten AFHS clinics and all the adolescent AGs who were present on the day of visit were interview. Strict confidentiality and privacy was maintained. Ethical clearance was obtained from Intramural Ethical Committee, Smt. NHL MMC, Ahmadabad prior to the study. Written consent was obtained prior to the interview from the guardian of the AGs.

Data thus collected were compiled in Microsoft Excel worksheet 2007 and were analyzed using statistical software Primer version 6. Frequencies were obtained using descriptive statistics. Associations were inferred by Chi-square test. P value <0.05 was considered significant.

III. RESULTS

Out of 325 AGs, majority (42%) belonged to the age group 13-15 years (mid adolescence) while 23.4% AGs were in early adolescence (10-12 years) and 34.6% AGs were in late adolescence (16-19 years). Age range of studied AGs was from 10-19 years with mean age 14.5±2.4 years. (Table 1)

There were 89.9% AGs who were Hindus and the rest were Muslims. Majority (77%) AGs belonged to nuclear families. According to birth order, 43.7% AGs were of 1st birth order, 34.3% were of 2nd birth order and 3.9% were of birth order 3 and above. One percent AGs were married at the time of the study. (Table 1)

Table 1

Socio-demographic Characteristics of participants

S. No.	Socio-demographic Variables		Number	Percentage
1	Age	Early adolescence	75	23.08
		Mid adolescence	136	41.85
		Late adolescence	114	35.08
2	Religion	Hindu	292	89.85
		Muslims	33	10.15
3	Type of Family	Nuclear	250	76.92
		Joint	75	23.08
4	Birth Order	First	142	43.69
		Second	111	34.15
		Third and above	72	22.15
5	Marital Status	Unmarried	322	99.08
		Married	3	0.92

Maximum numbers of AGs were studying in primary followed by secondary school. As the educational level increases number of AGs studying were decreasing. Only 13 AGs were currently studying after 12th standard. School dropout rate was 19%. Maximum (54%) dropout occurred at Primary level. Five per cent AGs were gainfully employed amongst which 2% were studying as well. While 1.3% AGs were illiterate. (Table 2)

Table 2

Education Related Variables of participants

S. No.	Education Related Variables of participants		Number	Percentage
1	Education	Illiterate	4	1.23
		Primary	163	50.15
		Secondary	85	26.15
		Higher secondary	67	20.62
		Graduate and above	11	3.38
2	School Drop outs	Yes	62	19.08
3	Year of School Drop Out	Primary	175	53.85
		Secondary	87	26.77
		Higher secondary	62	19.2

Prevalence of Illiteracy among parents of AGs was 10.5% in fathers and 26.1% in mothers. 23.6% fathers had studied upto primary, 23.3% upto secondary and 23.1% were graduate and above. While 27.2% mothers had studied upto primary, 17.6% upto secondary and 17.3% mothers were graduate and above. (Figure 1)

Most of the parents of AGs were semi-skilled workers. 71.9% mothers were housewife while 1.1% fathers were unemployed. Eighteen per cent of the father and 9% of the mother were skilled workers. (Figure 2)

Figure 1

Educational Status of Parents of AGs (in %)

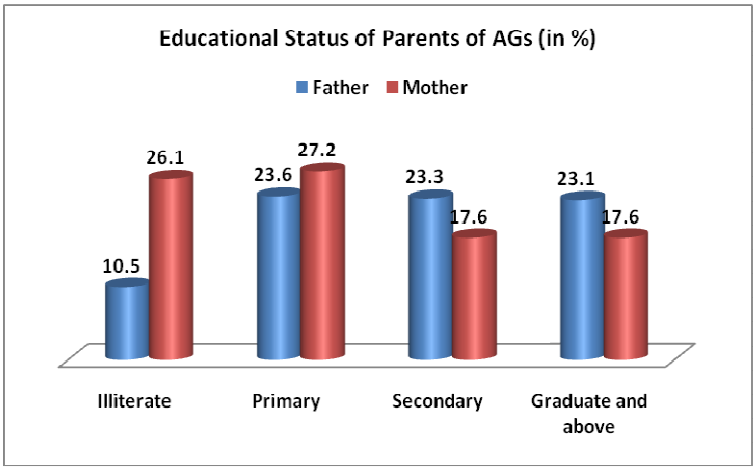
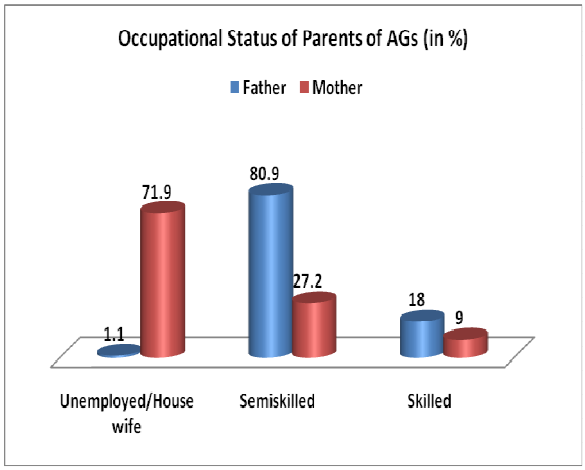


Figure 2

Occupational Status of Parents of AGs (in %)



Mean systolic blood pressure (SBP) was 112.8+13.7mmHg and mean diastolic blood pressure (DBP) was 74.9+9.8 mmHg. Mean Hb was 10.18±1.28 gm/dl. (Table 3)

Table 3

Quantitative Parameters of Study Participants

S. No.	Quantitative Variables	Mean	SD
1	Age (in Years)	14.5	2.4
2	Age at menarche	13.1	1.3
3	SBP (in mm of Hg)	112.8	13.7
4	DBP (in mm of Hg)	74.9	9.8
5	Hemoglobin (>12 gm/dl)	10.18	1.28

According to CDC charts for AGs, Proportion of AGs with under-nutrition was 32.1%, 8.6% were overweight and 0.4% were obese. (Figure 3)

Proportion of anemic girls was 85.9%. Mild anemia was observed in 59.1% AGs, moderate anemia in 26.2% while severe anemia was seen in 0.6% AGs. (Figure 4)

Figure 3

Nutritional Status of Adolescent Girls

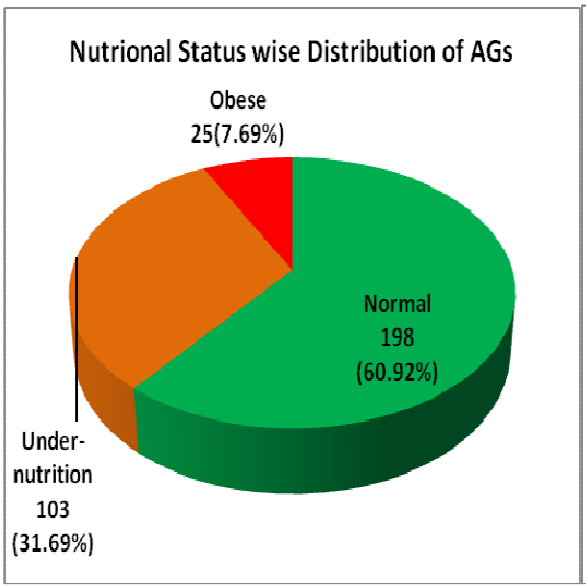
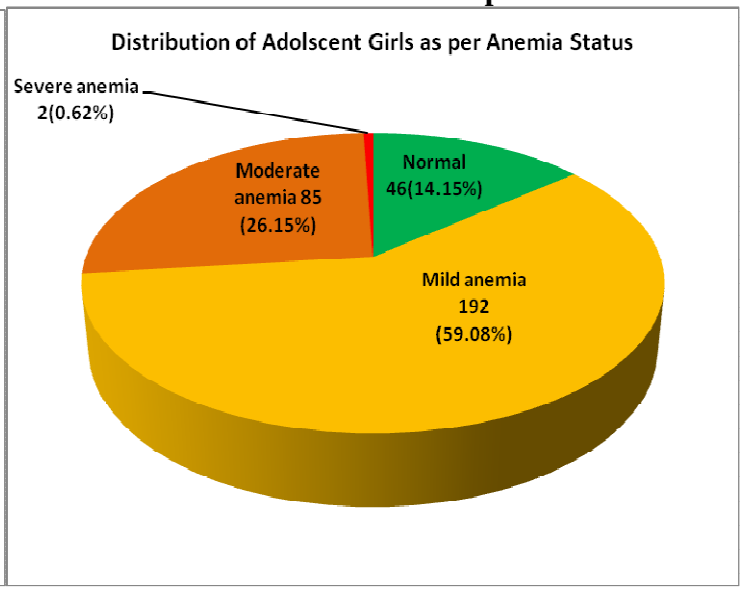


Figure 4

Distribution of Adolescent Girls as per Anemia Status



When association of anemia with phase of adolescent was analyzed it was found that although proportion of non anemic AGs were more in early adolescent girls and as the age increases proportion of animec AGs increases but this difference was not found significant (p>0,05). (Table 4)

Table 4

Association of Anemia Status with Phase of Adolescent

S. No.	Anemia Status	Total	Phase of Adolescent		
			Early adolescence	Mid adolescence	Late adolescence
1	Normal (>12 gm/dl)	46	16	19	11
2	Mild (10-11.9 gm/dl)	192	37	83	72
3	Moderate (7.1-9.9 gm/dl)	85	21	34	30
4	Sever (<7 gm/dl)	2	1	0	1
5	Total	325	75	136	114

Chi-square = 7.744 with 6 degrees of freedom; P = 0.257 LS=NS

Out of 198 AGs who had normal BMI, 31(15.7%) had normal Hb while the rest had anemia whereas out of 103 AGs who were undernourished, 94(91.3%) had anemia. One fourth of all over nourished AGs had normal Hb. This variation in proportion of anemic AGs as per nutritional status was found significant ($p<0.05$). (Table 5)

Table 5

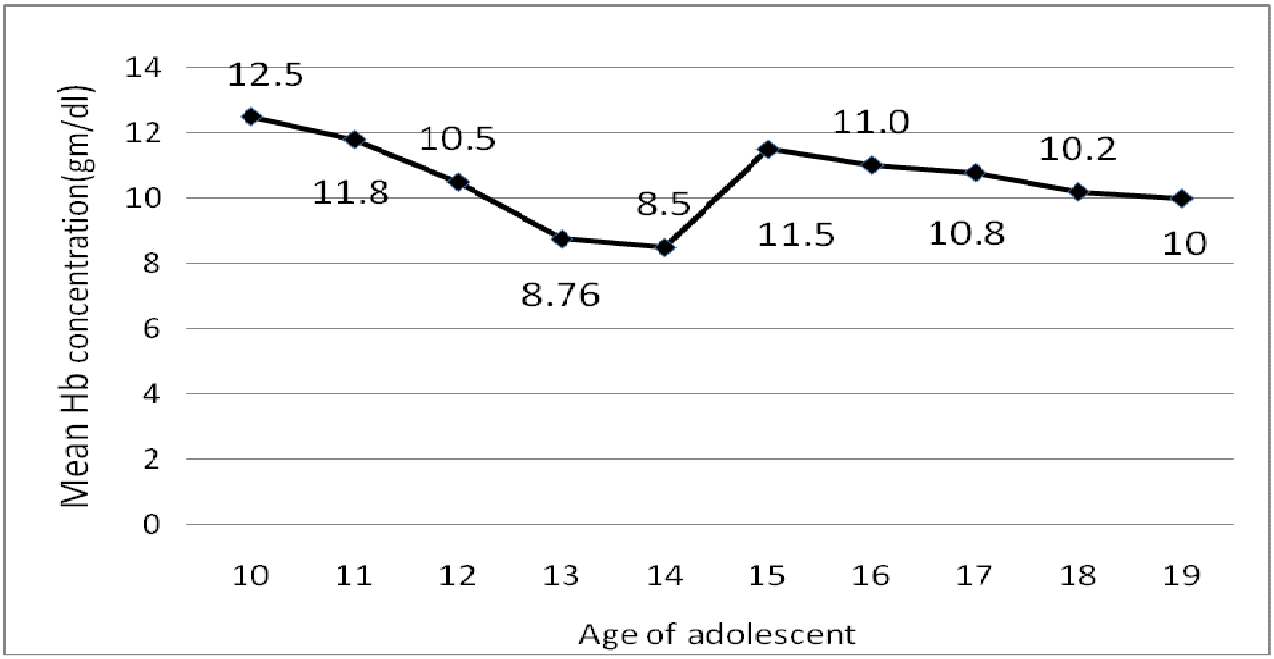
Association of Anemia Status with Nutritional status of Adolescent

S. No.	Anemia Status	Total	Nutritional Status		
			Normal	Undernourished	Over nourished
1	Normal (>12 gm/dl)	46	31	9	6
2	Mild (10-11.9 gm/dl)	192	120	56	16
3	Moderate to severe (<10gm/dl)	87	47	38	2
4	Total	325	198	103	25

Chi-square = 12.815 with 4 degrees of freedom; P = 0.012 LS=S

It was also found in this study that as age of AGs increases, mean Hb concentration falls, a sharp fall is seen at 13-14 years which coincides with mean age at menarche, i.e. 13.1$\pm$1.3 years. This is followed by a small rise in mean Hb concentration, but definitely below the normal cut off level of 12gm/dl. (Figure 5)

Figure 5
Correlation of Hemoglobin concentration and Age of Adolescent Girls



Correlation (r)=-0.32649 **Regression line (Y) = 12.53152 + (-0.24518)X**

Occurrence of anemia was not associated with religion, type of family, birth order, education status and occupation of parents.

IV. DISCUSSION

Adolescence is generally perceived to be a healthy period owing to low mortality. However, this is deceptive since IDA is a major public health problem in this age group.[4] According to WHO, out of two billion anemic people worldwide, 50% of all anemia is attributable to iron deficiency. Studies indicate that the highest prevalence of IDA is between the ages 12-15 years when the requirements are at peak. More than 50% AGs in this age group have been reported to be anemic.[3]

In this present study, mean Hb was 10.18±1.28 gm/dl and the prevalence of anemia was 85.6%. Highest prevalence was observed among mid adolescence phase, where 85% of the AGs were anemic. Observations regarding prevalence of anemia in AGs made by studies conducted in India by other authors were well in resonance with the observations of this present study. In the study of Kulkarni et al[5] mean Hb was reported 10.33.+1.34 gm/dl and prevalence of anemia was 90.1%, out of which 88.6% were having mild to moderate anemia and only1.5% AGs were severely anemic. Although in the study of Kotecha et al[6] prevalence of anemia was observed little lower i.e. 74.7% but in the study of Joshi et al[7] it was reported that 93.5 percent of the AGs were anemic and mean hemoglobin was 9.6+1.7. Likewise, in the study of Indupalli et al[8] and Verma et all[9] prevalence of anemia was reported 94% and 81.8% respectively.

The nutritional status of young AGs, prior to pregnancy, is important and impacts on the course and outcome of their pregnancy. Entering motherhood in a deficient nutritional state places both the mother and the newborn at risk of an adverse outcome. Foundations of adequate growth and development are laid during childhood and adolescence.[4] In the present study, anemia was observed in both undernourished and over nourished adolescent AGs and the association was statistically significant. In

another study conducted by Premlatha et al in Chennai among adolescent AGs, a similar trend was observed. Both undernourished and over nourished adolescents had anemia. Presence of anemia in over nourished adolescent AGs stresses the focus on inbuilt absorption of micronutrients. [10]

CONCLUSION

Most of adolescent girls were having anemia. Adolescence anemia increase with age of adolescent. Occurrence of anemia was not associated with religion, type of family, birth order, education status and occupation of parents. Seeing the grave consequences of anemia among AGs, it is highly important to develop a programme for dietary modification and nutritional supplementation among AGs for prevention of anemia. Special Rasoi shows can be organized in community to highlight the use of iron rich items in different recipes.

CONFLICT OF INTEREST

None declared till now.

LIST OF ABBREVIATIONS

Adolescent girls: AGs
Adolescent Friendly Health Services: AFHS
Iron Deficiency Anaemia: IDA
Haemoglobin: Hb

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