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PREVALENCE OF ANAEMIA AND FACTORS INFLUENCING ANAEMIA IN ADOLSCENT GIRLS IN URBAN AND RURAL AREA OF A SOUTH INDIAN CITY:A COMPARITIVE STUDY.

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ABSTRACT

Adolescents in India represent over 1/5th (22.3%) of the total population. Iron deficiency anaemia is the commonest medical disorder and is a problem of serious public health condition with epidemic proportions. It has an impact on all developments. To determine prevalence of anaemia among adolescent girls and to study the various factors associated with anaemia in urban and rural field practice areas of Osmania Medical College. A total of 760 adolescent girls (380 in each area) were interviewed and examined. BMI was calculated with anthropometric calculator available in WHO Anthroplus. Method of haemoglobin estimation is by cyneametheheamoglobin. Anaemia was classified based on WHO classification. The prevalence of anaemia was 74.5% and 82.6% in rural and urban area respectively. Severe anaemia was more in urban area when compared to rural area i.e. 8.4% & 3.4% respectively. Prevalence of Anaemia found to be increased with age. In rural area, 84 (87.5%) of girls were anaemic who were menstruating more than 7 days and only 31(45.6%) were anaemic who were menstruating less than 3 days. In urban area, 91(79.8%) of girls are anaemic who were menstruating more than 7 days and only 14(31.1%) were anaemic who were menstruating less than 3 days. Majority of married subjects were anaemic in both urban (82.4%) and rural (95.8%) area. Religion did not have a significant relation with anaemia.

KEY WORDS:- Adolescent girls, anaemia, hunger scale, body mass index, cyneametheheamoglobin.

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INTRODUCTION

Adolescents in India represent over 1/5th (22.3%) of the total population. Though they constitute the healthiest section of the population they are considered as vulnerable group. This is because of the rapid physical, mental and psychological changes occurring in this age, coupled with lack of proper sources of information and education from parents, teachers and peers[1]. In India poor nutrition and early child bearing and reproductive health complications compound the difficulties of Adolescent physical development. In India 15.4% of girls are married by age 13yrs, 33.3% by time they are 15yrs and 64.6% girls are married by age 18 yrs [2] .In addition to the psychological immaturity of an adolescent girl , very often her body is not prepared to accommodate the early onset of child bearing . So nutritional deprivation, increased demand of her body, excessive menstrual loss and early /frequent pregnancies, all aggravate and exacerbate anaemia and its effects. Iron deficiency anaemia is the commonest medical disorder and is a problem of serious public health condition with epidemic proportions. It has significant impact on physical, psychological development, immunity, behaviour, and work performance [3]. It is most prevalent nutritional problem in the world today effecting more than 700 million people [4]. Since adolescence is a significant period of human growth and maturation, unique changes occur and many adult patterns are established. Following early childhood (<2yrs), during the adolescent growth spurt the risk of iron deficiency and anaemia reappears for both boys and girls. After which subsides in boys but remains for girls because of menstrual blood loss [5]. So it is now viewed anaemia as FEMALE DISEASE which is causing RED alert for Indian women. Poor nutritional status and anaemia in pregnancy have consequences that extend over generations. Girls born underweight are at risk of producing small premature infants. It becomes a vicious cycle of anaemic girls giving birth to anaemic infants and these infants will become future anaemic mothers. Anaemia is the leading cause of maternal deaths (20-40%)[6]. It is also one of the important cause of perinatal morbidity and mortality [7]. Anaemia is the biggest cause of school dropouts in India [8]. According to NFHS-3 (2005-06) the prevalence of anaemia in adolescents is 55.8%. The prevalence of anaemia is highest in poor adolescent girls (65-90%) and coincides with the onset of menstruation and growth [9] .A new strategy called 12 by 12 initiative for controlling adolescent anaemia is implemented on 25th April 2007 by GOI , WHO, UNICEF, and FOGSI collaboration. The main goal of this strategy is to achieve 12gms of haemoglobin by 12yrs of age by 2012. So by decreasing the prevalence of anaemia in adolescents, 20-40% of maternal deaths can be prevented. Infant mortality and child mortality can also be reduced there by reaching goals of RCH and NRHMprogramme. Taking this initiative the present study was done.

AIM

To study the prevalence of anaemia among adolescent girls in urban and rural field practice area of Osmania Medical College Hyderabad, AP.

OBJECTIVES

1. To determine prevalence of anaemia among adolescent girls in the study areas.
2. To study the various factors associated with anaemia in the study area.

MATERIALS AND METHODS

Study design:- Community based cross sectional study,

Sample size estimation

$$n = \frac{t^2 \times p \times q}{d^2}$$

n = first estimate of sample size
t = confidence 95% (1.96)
d = precision (0.05)
p = proportion of the target population with the characteristics being measured
q = 1 – *p*/100
According to NFHS – 3 prevalence of anaemia was 55.8%. Hence p was taken as 55% to calculate sample size
P= 55
q = 1-55/100=45

$$n=\frac{1.96 \times 1.96 \times 55\% \times 45\%}{0.5\% \times 0.5\%} = 380$$

Sample size required was 380 in each area i.e 380 in urban field practice area (Harrajpenta) and rural field practice area (Patancheru) each.

Study Setting
Osmania Medical College field Practice area. Harazpenta [urban] Patencheru [rural], study population:- adolescents girls[11-19yrs] of age in harazpenta and patencheru.sample size:- 360[urban] 360[rural] study period:-one year [jan 2012-dec 20012].

BMI
was calculated with anthropometric calculator available in WHO Anthroplus. WHO AnthroPlus is software for the global application of the WHO Reference 2007for 5-19 years to monitor the growth of school-age children and adolescents. Method of haemoglobin estimation is by cyneametheheamoglobin. Anaemia is classified based on WHO classification[10].

STAGE	HEAMOGLOBIN LEVEL
1. Mild	10-11.9 g/dl
2. Moderate	7-10 g/dl
3. Severe	<7 g/dl

Instruments used
Stethoscope , Sphygmomanometer, Prestige weighing scale. ERBA chem. 5 plus V2 to estimate haemoglobin

Data analysis
by using Epinfo 3.5.1, MS Excel.

Statistical test
chi-square percent.

RESULTS

Majority of Adolescent girls from rural area were in 14-16 yrs age group where as in urban area they were in 12-14 yrs age group and most of them were students. The prevalence of anaemia was 74.5% and 82.6% in rural and urban areas respectively. Severe anaemia was more in urban area (8.4%) when compared to rural area (3.4%) respectively. Majority of girls in the age group 18-19 yrs were anaemic in both rural 10(83.3%) and urban16 (100%) area. It is observed that in urban area respondents belonging to 16-19 yrs age group were more in number when compared to a rural area and they were mostly college going girls whose eating habits were different from rural girls. As the age increased prevalence of anaemia was found to be increasing.

Table 1
Distribution according to Grades of Anaemia among Study population in Rural and Urban area.

Grades of Anaemia	Rural		Urban		Total	
	No.	%	No.	%	No.	%
Mild (10-11.9 g/dl)	148	38.9	144	37.9	292	38.5
Moderate (7-10g/dl)	122	32.2	138	36.3	260	34.2
Severe (<7g/dl)	13	3.4	32	8.4	45	5.9
Non-anaemic (≥12g/dl)	97	25.5	66	17.4	163	21.4
TOTAL	380	100.0	380	100.0	760	100.0

Majority of married subjects were anaemic in both urban (82.4%) and rural (95.8%) areas. Religion did not have a significant relation with anaemia. Prevalence of anaemia was more in lower and lower middle class. In NFHS-3[41] data prevalence of anaemia (64.3%) was more in low socioeconomic group. The present study supports this finding in urban area as 31(88.6%) of girls belonging to lower class were anaemic, where as in rural area girls 51(78.5%) of lower middle class were anaemic. Mother `s education did not have statistical association with their haemoglobin concentration. But had significant association with father`s occupation. As the educational status of the girl increases prevalence of anaemia decreases in both areas. Appetite was less in anaemic girls in both the areas.

Table 2
Relationship between educational status of girl with anaemia in rural and urban area.

Educational status	Rural			Urban		
	Anaemic	Non-Anaemic	Total	Anaemic	Non-Anaemic	Total
Primary	19(86.4%) (6.7%)	3(13.6%) (3.1%)	22(100%) (5.8%)	30(100%) (9.6%)	0(0%) (0%)	30(100%) (7.9%)
Secondary	261(74.1%) (92.2%)	91(25.9%) (93.8%)	352(100%) (92.6%)	168(75%) (53.5%)	56(25%) (84.8%)	224(100%) (58.9%)
Intermediate	3(50%) (1.1%)	3(50%) (3.1%)	6(100%) (1.6%)	116(92.1%) (36.9%)	10(7.9%) (15.2%)	126(100%) (33.2%)
TOTAL	283(74.5%) (100%)	97(25.5% (100%)	380(100%) (100%)	314(82.6%) (100%)	66(17.4%) (100%)	380(100%) (100%)

Rural- Chi-square 3.5 df-2 p-value 0.16
Urban- Chi-square 23.2 df-2 p-value 0.000001

Table 3
Relationship between BMI (Based on Z- value) and Anaemia in rural and urban study population.

BMI	Rural			Urban		
	Anaemic	Non-Anaemic	TOTAL	Anaemic	Non-Anaemic	TOTAL
Thinness (<-2SD)	37(97.4%) (13.1%)	1(2.6%) (1.0%)	38(100%) (88.2%)	91(94.8%) (29.0%)	5(5.2%) (7.6%)	96(100%) (25.3%)
Normal (-2SD-+1SD)	244(72.8%) (86.2%)	91(27.2%) (93.8%)	335(100%) (0.5%)	218(79.9%) (69.4%)	55(20.1%) (83.3%)	273(100%) (71.8%)
Overweight (>1SD)	2(40.0%) (0.7%)	3(60.0%) (3.1%)	5(100%) (1.3%)	4(50.0%) (1.3%)	4(50.0%) (6.1%)	8(100%) (2.1%)
Obese(>2SD)	0(0.0%) (0.0%)	2(100%) (2.1%)	2(100%) (10.0%)	1(33.3%) (0.3%)	2(66.7%) (3.0%)	3(100%) (0.8%)
TOTAL	283(74.5%) (100%)	97(25.5%) (100%)	380(100%) (100%)	314(82.6%) (100%)	66(17.4%) (100%)	380(100%) (100%)

For Rural area Chi square 19.9112 df- 3 P-value = 0.0002
For Urban area Chi square 22.3747 df-3 P-value = 0.0001

In both rural and urban areas being thin was related to anaemia as adolescent girls who are thin were found to be anaemic. In present study those who were taking meat more than once a week had less percentage of Anaemia 38 (36.9%) than who never consumed meat 24 (82.8%) in rural area. similarly in urban area 56 out of 62(90.3%) who never consumed meat were anaemic when compared to 108 out of 144 (75%) who consumed more than once per week. The difference is statically significant in both rural and urban areas. Those respondents who never took green leafy vegetables have more prevalence of Anaemia in both rural (90%) and in urban (96.6%) areas. In this present study in both rural (92.1%) and urban (86%) area girls who had never or occasionally consumed citrus fruits were more anaemic than who consumed thrice or more per week. All were statistically associated.

DISCUSSION

In studies done by Saibaba A, M. Mohan Ram, G.V. Ramana Rao, Uma Devi, T.S. Syamala[11], stated that Iron deficiency Anaemia was found to be the most common nutritional problem encountered by respondents. About 88% of subjects were anaemic using WHO classification. Survey on Prevention and Control of Anaemia in Rural Adolescent Girls through School System, Medak, and Andhra Pradesh by Indian institute of health and family welfare[12] stated that Iron deficiency Anaemia was found in 81 per cent of respondents. Verma A, Rawal V S, Kedia G, Kumar D, Chauhan[13] also stated that Majority (81.8%) of girls were anaemic. Survey by Indian institute of health and family welfare[13] stated that Iron deficiency Anaemia was found in 81 per cent of respondents. Mild, moderate and severe grades of Anaemia were observed in 63.2 per cent, 12.5 per cent and 5.3 percent of respondents, respectively. Verma A, Rawal V S, Kedia G, Kumar D, Chauhan[13] in their study found that majority (81.8%) of girls were anaemic, out of which 55.2 per cent were mildly anaemic, 0.6 per cent severely anaemic and the rest were moderately anaemic. Results found by Soon-Myung Hong, Jee-Ye Cho, and Hea-Jung Chung [14] in their study found that amount of menstruation were correlated with iron status, and it is not statically significant. S. Kaur, P.R. Deshmukh, B.S. Garg[15] stated that strongest predictor of Anaemia was vegetarian diet followed by history of excessive menstrual bleeding. M E Bentley and P L Griffiths[16] in their study showed that more than 40% of women in the highest socio economic group are anaemic as are 62% of urban poor and 54% of rural poor women. Study of J.S Asokan [17](1999) reported that mothers education are significantly (> 0.001) positively correlated with their haemoglobin concentration. Sanjeev M Chaudhary, Vasant R Dhage[18] found that out of 296 subjects, 104 (35.1%) subjects were found to be anaemic. A statistically highly significant association of Anaemia was found with the mother's and father's educational status. In NHFS-3[19] Anaemia is more i.e. 60.1% in illiterate group. Shubhada J. Kanani and Rashmi H. Poojara[20], in their study stated that, increase in perceived level of hunger was consistently and significantly higher in the experimental group after the intervention with iron and folic acid when compared with the control group. Rajarathnam Abel et al [21] stated that those girls whose height was more than 145cms had less prevalence of Anaemia (43.5%) and high mean Hb concentration (11.5g/dl) and those who had less than 145cms height had more prevalence of Anaemia (52.1%) and less mean Hb (11.27g/dl). The difference is not statically significant. M E Bentley and P L Griffiths in their study [16] stated that thin women (BMI< 18.5kg/m^2) were marginally significantly more likely to be anaemic. Verma A, Rawal V S, Kedia G, Kumar D, Chauhan[13] revealed that those having a BMI of 18.5 or lower (82.4%) were having high percentage of Anaemia, as compared to those with BMI more than 18.5 (79.7%). Nelson et al[22] (1994) in their study stated that prevalence of low Hb was 20% in vegetarians, higher in white vegetarians compare with non vegetarians(23 vs 4%) but, lower in the Indian vegetarians, compare with non vegetarians (17 vs 32%), and another study done by Verma A, Rawal V S, Kedia G, Kumar D, Chauhan [13] stated that the prevalence of Anaemia was significantly lower in girls consuming green leafy vegetables ($p<0.01$). Study of Brise. H et al [23](1962) showed the effect of ascorbic acid on iron

absorption. When enough is added (200mg) ascorbic acid increases medical iron absorption by about 30%. Similar results found in Swarnalatha A, Yegammai C[24] stated that supplementation of iron with absorption enhancers, vitamins A (1.54+0.52 g/dl) increment and C(1.10+0.45 g/dl) in the case of adolescent girls resulted in better iron absorption, when compared to the girls who were supplemented with iron alone. But the difference is found in Verma A, Rawal V S, Kedia G, Kumar D, Chauhan[13], that no significant relationship of Anaemia was observed with daily consumption of lemon/ sour fruits.

CONCLUSION

A high prevalence of anaemia among the rural and urban girls was alarming looking to the grave consequences of anaemia. It is a well-known fact in India that every alternate pregnant woman is anaemic and anaemia in pregnancy is the most common cause of post-partum haemorrhage (leading cause of Maternal Mortality in India). The association of anaemia with various other risk factors is also established, and there is a dire need to improve the nutrition of the adolescent girls who are the future mothers. So, the present study highlights the need to develop pragmatic intervention programmes incorporating various strategies to improve dietary intake and bioavailability of iron; nutritional supplementation of iron and folic acid tablets and fortification of edible dietary items with iron for the adolescent girls.

Conflicts of Interest
Conflicts of Interest declared none

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