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Prevalence of Anemia among School Going Adolescent Girls and Boys (10-18 Years) InSouth India- A Community Based Cross Sectional Study

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Abstract
Introduction: Anemia has been reported as a major public health problem in developing and developed countries. The incidence of anemia had been found more in the adolescent age group and women. The adolescent period is the most important period from the productivity point of view. Objective: To assess the prevalence of anemia among adolescent boys and girls (10-18 years) in Nagari.
Methods: A community-based descriptive cross-sectional study was conducted in Nagari, the duration of the data collection period was three months, and data was collected using a pretested, semi-structured questionnaire. Blood samples were collected and Hemoglobin level was also estimated using Hemocue (Hb 301) and participants were classified as having normal, mild, moderate, and severe anemia based on the World health organization grading of anemia.
Results: The prevalence of anemia ranges from severe, moderate, and mild anemia in girls was 0.5%, 10.6%, and 27.9% respectively and 25% of them were under normal hemoglobin level. Among 200 respondents 84.5% of the respondents were under the healthy weight category, 12% of them are underweight, 3% of them were over-weight & 0.5% of them were obese.
Conclusions: In the present study, the overall prevalence of anemia was found to be 39% in adolescent girls and 8% in adolescent boys. Compared to school-going boys the prevalence of anemia was higher among school-going girls. Early detection of anemia can decrease mortality rates, improve the quality of life, and other consequences like postpartum hemorrhage, low birth weight baby.

Keywords: Prevalence, Anemia, Hemocue, Cross-Sectional Study and Adolescents

Introduction

Worldwide, anemia continues to a major public health problem but mostly ignored in developing countries as well as developed countries. In developing nations, anemia is a primary cause for 40% of maternal death either directly or indirectly. According to the World Health report of 2002 anemia is identified as one among the top 10 risks for infant mortality, maternal mortality, and preterm birth. Anemia is one of the most commonly recognized disorders among women and preschool Children all over the world. Prevalence of anemia is very high among adolescents therefore, it needs more attention. According toWHO adolescence age ranges from 10 to 19 years for both the sexes (married and unmarried). The adolescence is a stage of transition between childhood and adulthood. Nutritional necessities during adolescence phase increase tremendously compared to earlier years of development. The world's adolescent population (age 10–19 years) is estimated to stand at more than 1 billion, yet adolescents age group is remains often ignored difficult-to-measure and hard-to-reach population in which the needs of adolescent girls, in particular, are largely neglected. In India, adolescents constitute about 25% of the population and adolescent has more nutritional needs and they demand special attention. After China (207 million), India has the largest population of adolescents (243 million). The prevalence of anemia among women and men in Chittoor district is about 48.4% and 20.3%. "Anemia is defined as a low level of hemoglobin in the blood, as evidenced by a reduced quality or quantity of red blood cells. Anemia has negative

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consequences such as increased mortality in women and children, decreased learning capacity, and decreased productivity among all individuals." Iron deficiency anemia (IDA) constitutes the major anemia during the adolescent period. Major causes of anemia among adolescent girls include malnutrition, accelerated development, hormonal changes, and starting of menstrual. National nutritional anemia prophylaxis program, started in 1970 has been trying to control this avoidable cause of important public health problem of India by supplementing iron and Folic acid tablets.

Rationale

Adolescent's age group has increased risk of developing anemia due to increasing necessities of iron at the stage of puberty, menstrual, malnutrition, deficiency of iron intake, faulty nutritional habits, high rate worm infestation, and other infection, as well as the social norm of early marriage and adolescent pregnancy.[3,4]A plenty number of studies are there on the prevalence of anemia among adolescents and pregnant women when compared to this, very few studies are found on the prevalence of anemia among boys. The main objective of this paper is to assess the prevalence of anemia among adolescent girls and boys in the age group of 10-18 years in Nagari Mandal of Andhra Pradesh.

2. Materials & Methods

This study was conducted in Nagari Mandal. Nagari is one of the Mandal among 66 Mandals of Chittoor district of Andhra Pradesh. As per the 2011 census of India, Nagari Mandal has a population of 62,253 and the child sex ratio is, for every 1000 males there were 1001 females. Acommunity based descriptive cross-sectional study was conducted in Nagari, duration of data collection period was three months and data was collected using a semi-structured questionnaire. Study samples among adolescent girls and boys in the age group of 10-18 years.A study entitled ***"Rural and Urban Variation in Prevalance of Anaemia among Adolescent Girls in Visakhapatnam District, Andhra Pradesh"*** by Amarnth M et al states that prevalence of anaemia was 81.5 %. With the prevalence of anaemia being 81.5% among adolescent boys and girls, margin of error is 6%, 95% confidence interval, the sample size calculated is 161 and with 20% of non-responsive rate, the sample size is estimated to be 196 and 4 samples are over collected.Multi-stage sampling technique was used to obtain the sample. Nagari has a total of 24 wards with a total of 2200 households, ward list was obtained from the municipality office and From the 22 wards around 10 wards have been selected through the lottery method. The study respondent have been selected through a simple random sampling technique moving in one particular direction till we attain the sample and a total of 200 participants were selected from the community. Subjects have been interviewed by the principal investigator and the data collectors. The data regarding their socio-demographic profile, anthropometric measurements, and dietary pattern were collected using a semi-structured questionnaire. A pretested, validated, semi-structured questionnaire were used to gather the information of the respondents. The questionnaire was translated into local languages (Telugu and Tamil languages). Following the data collection, experienced nurses and lab personnel collected the sample and tested adolescent girls and boys for anemia using HemoCue (Hb 301) analyser. Hemoglobin level estimation was done using Hemocue (Hb 301) and participants were classified as having normal, mild, moderate and severe anemia based on WHO grading of anemia. For the bio-safety measures, trained staff nurse and lab personnel used sterile gloves to collect the blood samples and alcohol swap was used to clean the area. Sample was collected into microcuvettes and the filled cuvettes, collected blood samples were analysed by using Hemocue (HB 301).Within 10- 20 sec the Hb value were displayed after placing the blood samples in cuvette holder and is push drop of inside. The cuvettes are analysed free of air bubbles and without excess blood. Based to WHO Anaemia is detecting cases are detected, if the haemoglobin level is less the 12g/dl for girls and less than 13g/dl for boys are considered as anaemia.

Ethical Considerations

This study was approved by the Institutional ethical committee of SRM School of Public Health, Kattankulathur, and Tamilnadu. The principal investigator has discussed the study and the purpose of the study to the participant's parents in detail and informed consent was obtained from the parent as well as participation for collecting the of participant's blood sample. No incentives were offered to them to participate in the study. Four days training was given to the data collectors and staff nurse. Training is completely focused on the understanding of the study tools and interviewing skills of the data collector.

Statistical Analysis

The raw data was entered in Excel first, after that imported into SPSS. Analysis of the data was done using the SPSS19.0 trial version for Windows (Data base and Statistics Software for Public Health Professionals). The descriptive analysis done and chi-square analysis was performed to find the association between variables.

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3. Results

A Community based cross-sectional study was done to find out the prevalence of anemia among adolescent girls and boys in the eastern part of Rayalaseema region of Andhra Pradesh. A total of 200 adolescent boys and girls have participated with the consent of parents.

Table 1: Socio- Demographic Profile

Variables		Percentage	Frequency
Gender	Male	51	108
	Female	49	92
Mothers education	Primary Level	25	50
	Intermediate Level	57.5	115
	Undergraduate	13	26
	Postgraduate	1	2
Family Type	Nuclear Family	91	182
	Joint Family	9	18
Religion	Hindu	94.5	189
	Muslim	1.5	3
	Christian	3	6
	Jain	0.5	1
Caste	General	33	66
	OBC	59.5	119
	SC/ST	7.5	15

Table 1 shows, among the 200 respondent 51% of them were males & 49% of them were females. Most of their mother education were belongs to intermediate level (57.5%) followed by primary level (25%), Undergraduate (13%), No formal education (3.5%) & postgraduate (1.0%). Out these 200 participants most of them belongs to Nuclear family (91%) & about 9% of them only belongs to joint family. About 94.5% of them belong to Hindu community. The majority of participants belong to OBC categories which is about 59.5% followed by general category (33%) & SC/ST (7.5%).

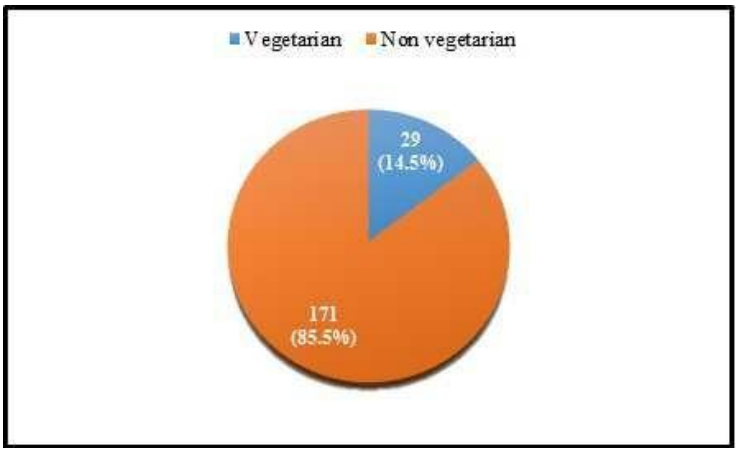

Figure 1: Type of Food Consumed by Respondent.

Figure 1 shows that, out of 200 respondents 171 (85.5%) of them are non-vegetarians and 29 (14.5%) of them are vegetarians.

Table 2: Consumption of Fruits

Variables		Percentage	Frequency
Fruits	Never	6.5	13
	At least once in a week	46	92
	Sometimes	47.5	95
Pomegranate	Yes	59	118
	No	41	82
Apple	Yes	67	134
	No	33	66
Dates	Yes	42.5	85
	No	57.5	115

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Fig	Yes	20	40
	No	80	160
Papaya	Yes	70	140
	No	30	60
Dry Fruits	Yes	81	162
	No	19	38

Table 2 shows, In the present study majority of the respondents consume fruits sometimes only which is around 47.5% & around 6.5% of them mentioned that they never consume fruits followed by 46% of them consume fruits at least once in a week. Among 200 respondents majority of them consume dry fruits once in two weeks which is around 81% followed by 59% of them consume pomegranate, 67% of them consume apple, 42.5% of them consume dates, 20% of them consume fig & 70% of them consume papaya.

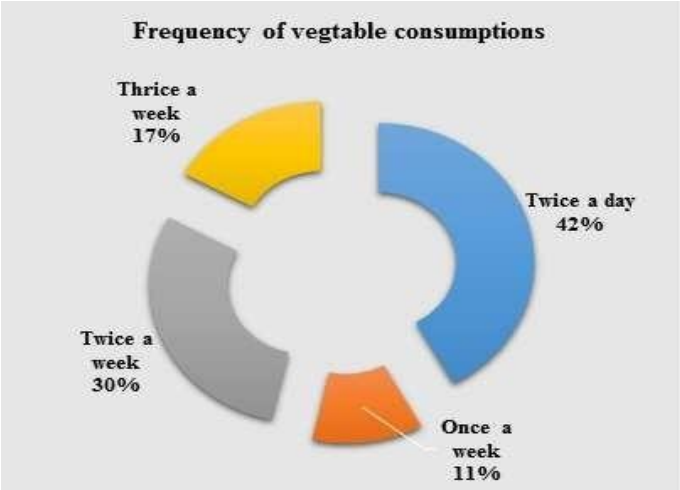

Figure 2: Frequency of Vegetables Consumption.

Above figure 2 explains about the consumption of vegetables. Out of 200 respondents 42% of them mentioned they consume vegetables twice a day followed by 11.5% said they consume vegetables once a week, 29.5% of them consume twice a week & 17% of them consume thrice a week.

Table 3: Type of Vegetable Consumption

Variables		Percentage	Frequency
Beetroot	Yes	56	112
	No	44	88
Tomato	Yes	59	118
	No	41	82
Spinach	Yes	51.5	103
	No	48.5	97
Broccoli	Yes	10..5	21
	No	89.5	179
Sweet Potato	Yes	52	104
	No	48	96

The frequency of consumption of beetroot was more 56% when compared to the frequency of consumption of sweet potatoes (52%) followed by frequency consumption of spinach 51.5% & consumption of broccoli 10.5%. Over all prevalence of anaemia among adolescent girls and boys was 75%.About 37% of the respondents haemoglobin level were under moderate level followed by 32.5% of them were under mild level, 5.5% of them were under severe level & 25% of them were under normal haemoglobin level. Among 200 respondents 84.5% of them BMI were under healthy weight category, 12% of them are under weight, 3% of them were over-weight & 0.5% of them were obese.

Table 4: Factors Associated with Anaemia

Characteristics	Variables	Anaemia	Non-Anaemic Condition	Significance
Gender	Male	73 (36.5)	29 (14.5)	0.253
	Female	77 (38.5)	27 (10.5)	

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Consumption of dates	Yes No	58 (29.0) 92 (46.0)	27 (13.5) 23 (11.5)	**0.05**
Consumption of vegetables	Twice a day Once a week Twice a week Thrice a week	64 (32.0) 18 (9.0) 39 (19.5) 29 (14.5)	20 (10) 5 (2.5) 20 (10) 5 (2.5)	0.203
Consumption of spinach	Yes No	76 (38.0) 74 (37.0)	27 (13.5) 23 (11.5)	0.683

Among the study participants, consumption of dates has positive impact over the health. The p value is 0.05 shows that there is significant association between anemiaand consumption of dates among adolescent study participants. There is no significant association between anemiaand gender, consumption of vegetables, and consumption of spinach.

4. Discussion

Our study aimed to find out the overall prevalence of anemia among school going children aged 10-18, both girls and boys. Current study revealed that over all prevalence of anemia was75%, and A community based cross sectional study conducted among adolescent in three district of Ethiopia, states that the magnitude of anemia was predominantly high among girls and our study revealed that, compare to school going boys the prevalence of anemia was higher among school going girls. There are only few studies conducted on the prevalence of anemia among boys. The present study reveals that magnitude of anemia among boys was 36.5% and a cross sectional study was conducted in the rural field practice area of udupi district of karnataka states that the prevalence of anaemia among boys was 30.7 but another cross sectional study conducted in the urban and rural areas of Chandigarh by **Sabita** et all shows that prevalence of anemia among boys was 8% only. A community based cross sectional study conducted by **Gupta D** et al among slum adolescent states that the prevalence of anemia among adolescent males and females was found to be 31.6% and 52.8% respectively and our study reveals that anemia among adolescent girls and boys was found to be 38.5% and 36.5%. A study conducted in semi urban area of Nepal shows that the overall prevalence of anemia was 68.8% among adolescent girls aged 11-18 years and current study shows that the prevalence of anaemia among girls was 38.5%.

5. Conclusions

Prevalence of anaemia among adolescents is alarmingly high like serum transferring, serum ferritin, etc.Anaemia is contributing to the 40% maternal death either directly or indirectly in developing nation. According to 2002 World Health report states anemia as one of the top 10 risks for maternal mortality, infant mortality, and preterm birth.[1]Adolescences with anaemia can lead to reduced quality of life which may increase the risk of mortality rates; high number of maternal deaths, Premature and low birth weights, and decrease their academic performance and other activities. Early detection of anemiacan decrease the mortality rates, improve the quality of life and other consequences like postpartum haemorrhage, low birth weight baby.

Contributors: SR was involved in critical revision of the manuscript for important intellectual content and helped in collection of data. DK involved in analysis and interpretation of data, drafting of manuscript. MB supervised conception and design, acquisition of data.

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Conflict of Interest: None**.**

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