A Study on Anaemia in Relation to Age and Sex among the School Students, T. Sindalaichery, Theni (Dt)

Devashanthi. S and Delphine Rose M.R.
Post Graduate and Research Centre of Zoology,
araj Annapackiam College for Women (Autonomous) Periyakulam-625 601, India.

stract

Studies on anaemia are more, globally, and nationally. However, a pilot dy was undertaken to study the local needs on the haematological status of ool students of T. Sindalaicherry, Theni District. To make this work more mmunity centered and to reach the unreached and to fill some lacunae in this d, the current investigation was aimed at dealing with the haematological tus of school students in T. Sindalaicherry, Theni District.

ywords: Anaemia, Blood, School Students and Haematological studies.

Introduction

Blood is a fluid tissue that circulates through heart, arteries, capillaries d veins (Edison Samaraj, 1998). It is vital in our body system because it carries rishment to all the tissues and organs of the body. Blood cells are produced by cial tissues and organs (Edison Samaraj, 2002).The adult human body tains 5 to 6 liters of blood and accounts of our total body weight.

Anemia is defined as a decrease in the amount of red blood cells or moglobin in the blood and results in a decline of oxygen-carrying capacity and amount of oxygen that reaches the body's tissues. Normal hemoglobin, matocrit and average erythrocyte volume values are different according to age l gender. Therefore, a separate assessment of each patient is made to diagnose mia. Levels two standard deviations below the normal value are considered to anemia (Lanzkowsky, 2010 and Kalinyak, 2005).

The term anaemia derived from Ancient Greek word for "blood lossness" rtune city copyright, 2007). Anaemia is a condition in which the blood cannot ry enough oxygen to meet the needs of the body (Schier and Stanbeyl, 2006). aemia may be described in biochemical terms as lowered hemoglobin levels,

number of blood cells and packed cell volume. Anaemia caused not only by deficiency of iron but also many other nutrients like amino acid, vitaminB_{12}, folic acid, phyrodoxine, copper and vitamin E (Radha Gupta, 2003). The hematological investigations carried out on each subject were haemoglobin estimation, total red blood cell count, total leucocyte count, packed cell volume etc.

Anemia is a global public health problem affecting both developing and developed countries. It occurs at all stages of the life cycle, but it is most prevalent in pregnant women and young children. Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population. The highest prevalence is in preschool children (47.4%) and the lowest is in men (12.7%) (Benoist, 2017).

Anemia in adolescence is dangerous because it affects the physical as well as mental wellbeing. It weakens the behavioral, cognitive development and decreases immunocompetence thereby adversely affecting the productivity. The country has experienced an alarming increase in obesity-related chronic diseases over the past decade (NFHS, 2016) and obesity could possibly add to the burden of anemia in India. The prevalence of anemia is marginally higher in rural areas but recently studies have highlighted the increasing prevalence of anemia among adolescents living in urban settlements.

The prevalence of overweight and obesity has increased across all age groups in the last decades, including the pediatric population (De Onis et al., 2010). Obesity and anemia are the markers of imminent health issues in adults. Obesity is multifactorial in origin, with important genetic and environmental etiological factors. Significant changes in life style, stressful working conditions, consumption of quick preserved foods, snacks and soft drinks of low nutritional value, has led to the increasing trend of obesity and nutritional disorders including anemia even among the literate affluent young adults (WHO, 2011).

Anthropometry is an important tool in the study and understanding of human biological variability. Anthropometric measures include obesity, height, weight and body mass index. Obesity is associated with several health outcomes including coronary heart disease, the biggest single cause of death in England (WHO, 1995).

Most of the village school children were categorized under the middle ass and below poverty line. Hence anaemia was the major health problem in the iolescent age group. Due to this present study was focused on 15 to 19 years age roup students.

Materials and Methods

1 Sample Population

The investigation was carried out to study the blood parameters in relation anaemia in young boys and girls with reference to age. 200 individuals of age anging from 15 to 19 years were considered and they were classified as 5 age groups.

Group 1	15yrs
Group 2	16yrs
Group 3	17yrs
Group 4	18yrs
Group 5	19yrs

These 200 individuals were selected from the Amala Annai Higher Secondary School, T.Sindalaicherry. Haemoglobin concentration, packed cell volume, total count, body mass index was considered and the investigations were carried out. Mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentrations were derived.

2.2 Samples

For haematological investigation venous blood was favourable which can be obtained from anticubital vein. A tourniquet was applied on the upper arm, the vein was sterilized with 70% alcohol, and then the sterilized needle and syringe were used for the collection of blood. After the sterilization of vein, the needle and syringe were placed at the angle of 23 degree, then the blood was withdrawn from vein and transferred to the specific container with anticoagulant. Then the tourniquet was removed.

2.3 Methodology

Hemoglobin concentration

Haemoglobin concentration was estimated by the acid haematin method (John King, 2004).

Packed Cell Volume

Haematocrit or Packed cell volume was estimated by Wintrobe method.

Total Count

Total count was estimated by haemocytometer (Newbaur chamber) method.

$$\text{RBC count} = \frac{\text{No. of cell counted} \times \text{Dilution factor} \times \text{Depth factor}}{\text{Area counted}}$$

Mean Corpuscular Volume (MCV)

This is the average volume of red cells because the size of the cell is very small.

$$\text{MCV} = \frac{\text{Packed cell volume (\%)}}{\text{Red blood cell count in millions/cu.mm}} \times 10\ \mu m^3$$

Mean Corpuscular Haemoglobin (MCH)

It is the average haemoglobin content (by weight) of red blood cell. Because the amount is very small, MCH is calculated by the following formula.

$$\text{MCH} = \frac{\text{Haemoglobin (g/dl)}}{\text{Red blood cell count in millions/cu.mm}} \times 10\ \text{pg}$$

Mean Corpuscular Haemoglobin Concentration (MCHC)

It is an expression of the average haemoglobin concentration per unit volume (100) of packed red cells. It is expressed in g/dl which is the same as %.There is two formulae used in the calculation of MCHC.

$$\text{MCHC=MCH/MCV} \times 100$$

$$\text{MCHC} = \frac{\text{Haemoglobin (g/dl)}}{\text{Packed cell volume (\%)}} \times 100\%$$

Body Mass Index

Height

For measuring standard height vertical anthropometrics rod used.

ght

Weight was measured using standardised ATCO digital weighting balance.

y Mass Index

The value of body mass index was calculated for each by following methods,

y mass index calculation

$$BMI = \frac{\text{Weight (Kg)}}{\text{Height (m}^2\text{)}}$$

Classification	BMI
Under weight	> 18.5
Normal	> 18.5 - 24.9
Over weight	> 25.0 - 29.9
Obese (grade I)	> 30.0 - 34.9
Obese (grade II)	> 35.0 - 39.9
Obese(grade III)	> 40

Results and Discussion

The present study was undertaken to analyse the anaemia of selected ool children, Theni Dt. Totally 112 boys and 88 girls were chosen. They were ded into 5 age groups. They were 15, 16, 17, 18, & 19. The study showed that overall prevalence of anaemia among children was in the age group between to 19 years.

Table 1 shows the population of children. Table 2 and 3 shows the valence of anaemia in school children. The highest prevalence of anaemia was he boys with age group of the 15 of and in the girls with the age group of.

The mean hemoglobin values according to the age in both sexes are shown able 2 and 3. The mean value of girls aged between 15 to 19 was highly ificant.

Table 4 and 5 shows the prevalence of anaemia in the school children. The valence of anaemia was very much higher in girls when compared to boys.

The mean value of RBC of both boys and girls were shown in table 6 and Highest abnormalities occur in all the age group of girls.

Table 8, 9 and 10 shows the mean value of RBC indices that express the highest values in girls.

Table 11 and 12 exhibits the relationship between BMI of school children. BMI as criteria to classify under weight, normal, over weight. The study result under weight of the girls were anaemic.

Table 1. Population Size

Age (years)	Population Size	
	Boys	Girls
15	33	20
16	36	34
17	28	14
18	7	14
19	8	6

Table 2. Haemoglobin (Hb) Levels in Boys

Age (years)	Mean	
	Boys	
	Healthy	Anemic
15	12.58	9.4
16	11.26	9.85
17	11.7	10.7
18	11.5	10.3
19	11.81	10.7

Table 3. Haemoglobin (Hb) Levels in Girls

Age (years)	Mean	
	Girls	
	Healthy	Anemic
15	11.4	8.75
16	11.20	8.62
17	10.96	8.56
18	12.77	9.30
19	10.85	8.75

Table 4. Packed Cell Volume (PCV) Levels in Boys

Age (years)	Mean	
	Boys	
	Healthy	Anemic
15	37.76	28.33
16	34.93	29.55
17	35.11	29.53
18	35.47	30.90
19	35.43	32.10

Table 5. Packed Cell Volume (PCV) Levels in Girls

Age (years)	Mean	
	Girls	
	Healthy	Anemic
15	34.3	26.26
16	33.7	25.87
17	32.89	24.88
18	38.31	27.90
19	32.55	26.25

Table 6. Total Count: RBC in Boys

Age (years)	Mean	
	Boys	
	Healthy	Anemic
15	3.67	3.14
16	3.88	3.28
17	3.90	3.28
18	3.83	3.43
19	3.93	3.56

Table 7. Total Count: RBC in Girls

Age (years)	Mean	
	Girls	
	Healthy	Anemic
15	3.80	2.91
16	3.73	2.87
17	3.65	2.76
18	4.25	3.10
19	3.61	2.91

Table 8. Erythrocyte constants (MCV) in Boys and Girls

Age (years)	Mean			
	Boys		Girls	
	Healthy	Anemic	Healthy	Anemic
15	30.43	30.00	30.52	30.00
16	30.35	30.00	30.57	30.04
17	30.37	30.00	30.57	30.00
18	30.47	30.13	30.54	30.06
19	30.32	30.00	30.37	30.00

Table 9. Erythrocyte Constants (MCH) in Boys and Girls

Age (years)	Mean			
	Boys		Girls	
	Healthy	Anemic	Healthy	Anemic
15	89.03	88.00	94.00	90.84
16	92.72	89.55	92.80	89.42
17	93.10	89.61	93.94	89.81
18	93.94	90.65	93.86	90.12
19	93.60	91.10	93.17	91.10

Table 10. Erythrocyte Constants (MCHC) in Boys and Girls

Age (years)	Mean			
	Boys		Girls	
	Healthy	Anemic	Healthy	Anemic
15	33.20	32.50	33.17	32.50
16	33.10	31.55	33.57	32.50
17	33.40	32.25	33.71	32.50
18	33.00	32.50	33.50	32.46
19	33.00	32.50	32.83	32.40

Table 11.Body Mass Index in Boys

Age (years)	BMI		
	Under weight	Normal	Over weight
15	0	23.3	0
16	0	24.0	0
17	0	21.8	0
18	0	23.5	0
19	0	24.0	0

Table 12. Body Mass Index in Girls

Age (years)	BMI		
	Under weight	Normal	Over weight
15	18.0	20.5	0
16	17.3	22.3	0
17	18.0	21.9	0
18	17.6	21.3	0
19	17.5	20.8	0

It is evident from our results that a significant proportion of apparently lthy children suffer from anemia. The rising trend of consuming snack and k food which supply empty calories is also responsible for healthy children

being anemic. The higher prevalence of anemia in adolescent age could be because of hormonal changes which occur at the time of onset of menarche. The prevalence of anemia is disproportionately high in developing countries due to poverty, inadequate diet, certain diseases, pregnancy/lactation and poor access to health services. This further emphasizes the need for corrective measures for anemia in girls before they enter adolescence so as to compensate the additional requirement for growth and development during puberty and combat the extra losses during menstruation. According to WHO if the prevalence of anemia at community level is more than 40%, it is considered as a problem of high magnitude. The prevalence of various parasitic infestations and other chronic illnesses were not studied in this survey so it is difficult to comment on the causes of high prevalence among school children. Results of the study also highlight the fact that the prevalence of anemia was more in individuals having low BMI. Continued anemic situation during adolescence especially among girls reduces their BMI resulting in growth retardation. Although the present study was not designed specifically to study all the risk factors for anemia in this population, we stipulate that the higher prevalence could be due to the poor diets with low bioavailable iron combined with worm infestation (Kaur *et al.*,2006). From our study population, most of the anemic children were underweight because in developing countries like India, poor bioavailability of dietary iron coupled with low intake of heam iron derived from animal foods is a major etiological factor for anemia. Our study recommended that the high prevalence of mild and moderate anemia demands due emphasis so as to bring down the total prevalence of anemia in adolescent girls and school children. They should be screened periodically and appropriate measures should be taken.

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