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Research Article

To study the prevalence of anaemia among school going children in rural area of Faridkot district, India

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ABSTRACT

Background: Anaemia is a global public health problem which affects both the developing and the developed countries and it is an indicator of poor nutrition and poor health with major consequences for human health, as well as for the social and economic development of a population. Anemia is a common problem throughout the world and iron deficiency is the most prevalent nutritional deficiency in the world. It affects mainly the poorest segment of the population. The purpose of the study is to assess the prevalence of Anemia among school going children of rural area of schools of Faridkot district, India.
Methods: This study was conducted at the schools of rural area (Jand sahib) of Faridkot District, India. A cross-sectional household survey was conducted in rural Schools from January 2010 to December 2010 on 463 children, aged 5-16 years, selected through systematic random sampling method. Study subjects were school children (<16 years). The students and school authority were assured for their confidentiality of their response.
Results: The analysis of the obtained data was based on the objective of the study. Descriptive and inferential statistics was used for data analysis and data interpretation. Results of the study revealed that 57.2% of the samples are males and 42.8% of the samples are female. 56.8% of the samples are in the age group of less than 5 to 11 years, 31.7% of samples were in the group of 12-14 years and 11.4% of samples are more than 14 years of age. After analysis and interpretation of data, it was found that out of boys 91.69% males were anaemic and out of females 94.89% females were anaemic. Overall incidence of anaemia amongst girls and boys was found to be 85.74%.
Conclusions: The prevalence of anemia in the developing countries tends to be three to four times higher than in the developed countries. Hence, improvement in dietary habits related to consumption of green leafy vegetables should be included in diet plan. Health education, seminars on menstrual hygiene should be conducted at regular interval.

Keywords: Students, Anaemia, Prevalence, Haemoglobin

INTRODUCTION

Anaemia is a global public health problem which affects both the developing and the developed countries and it is an indicator of poor nutrition and poor health with major consequences for human health, as well as for the social and economic development of a population.[1] Globally, anaemia affects 1.62 billion people, which corresponds to 24.8% of the population.[2] Anaemia is one of the most common health problems in India which is much more prevalent in the rural than in the urban areas.[3,4] Anemia is a nutrition problem worldwide and its prevalence is higher in developing countries when compared to the developed countries.[5,6] Young children and pregnant women are the most affected, with an estimated global prevalence of 43% and 5l% respectively.[7] Anemia prevalence among children of school-going age is

37.70%, among non-pregnant women 35% and among adult males 18%.[8]

Anemia was defined according to World Health Organization (WHO) cut-offs as Hb level <11 g/dL for girls and <12 g/dL for boys under 15 years old. Mild anemia was defined as hemoglobin level of 10-12.9 g/dL in males and 10-11.9 g/dL in females, moderate anemia was defined as hemoglobin of less than 7-9.9 g/dL and severe anemia as hemoglobin less than 7 g/dL.[9]

Numerous studies among children have shown that the prevalence of anemia ranges from 52-96.50% in India. Iron Folic Acid supplementation remains the main strategy for combating anemia and improving hemoglobin status of adolescent girls and nutritional supplements is a complementary strategy to improve it. The most important way to prevent anaemia is to take good diet rich in iron. Adding vitamin-C or foods rich in vitamin C should also be provided for children, which can improve the absorption of iron. Numerous studies among children have shown that the prevalence of anemia ranges from 52 - 96.50% in India. Iron Folic Acid supplementation remains the main strategy for combating anemia and improving hemoglobin status of adolescent girls and nutritional supplements is a complementary strategy to improve it. The most important way to prevent anaemia is to take good diet rich in Iron. Adding vitamin-C or foods rich in vitamin C should also be provided for children, which can improve the absorption of iron.[10]

METHODS

The present study was conducted in a rural area of district of Faridkot (Jand sahib) with the aim to find out prevalence of anemia among school going children.

Study area

Government and private schools of village Jand Sahib block of district Faridkot, India.

Study population

School going children from class 1 to class 10th.

Design

A cross sectional study.

Sample size

In this cluster random sampling was used. A cross-sectional survey was conducted in Government rural Schools from January 2010 to December 2010 on 468 children, aged 5-16 years, selected through systematic random sampling method. Study subjects were school children (<16 years). The students and school authority were assured for their confidentiality of their response.

Methodology

A written permission from SMO has been taken. Permission from Principles of schools was taken. Willingness to participate was asked from students. Hb was tested by sahalii's method under aseptic conditions. A preliminary visit was made in schools and consent of parents was also obtained. School authorities were informed about the purpose of the study and then written informed consent of the parent and the student were taken for the study.

RESULTS

In our study total 463 students were included. The age group was between 5 to 16 years. The selected schools were within 12 km radius of our hospital. These students were from class first to Tenth. The distribution of the students according to their age is evident in Table 1. These were then grouped according to age as per WHO Classification. As per the age distribution of more students were enrolled in the age group of 5 to 11 years. There were 56.8% students in the age group of 5 to 11 years 31.7 % students were in the age group of 12 to 14 years. Only 11.4% students were in the age group of more than 14 years. Out of 463 students 265 (57.2%) were males and 198 (42.8%) were girls Table 2.

Table 1: Distribution of students according to age groups.

Age in years	Frequency	Percentage
5-11	263	56.8%
12-14	147	31.7%
Elder than 14	53	11.4%
Total	463	100%

Table 2: Distribution of students according to sex.

Gender	Frequency	Percentage
Male	265	57.2%
Female	198	42.8%
Total	463	100%

Depending upon their haemoglobin, they were grouped into mild, moderate and severe anemia. In age group of 5 to 11 years more students had moderate anemia i.e. 43.6% and 4.53% had normal haemoglobin. In age group of 12 to 14 years 4.3% students had mild anemia, 25.1% had moderate anemia and 0.6% had severe anemia. The students in age group of more than 14 years, more children had moderate anemia i.e. 7.6%. It was found that 13.2% subjects were having mild anemia, 76.2% had moderate anemia and 3.2% had severe anemia. Out of 463 students only 34 subjects were with normal hemoglobin Table 3.

On analyzing degree of anaemia evaluation as per sex distribution, it was found that out of 265 males, 196 (73.96%) had moderate anaemia and 6 (2.26%) boys had severe anaemia. Out of 196 females 157 (80.1%) were suffering from moderate anaemia and 9 (4.59%) girls were severely anaemic Table 4.

Table 3: Degree of anaemia levels according to age.

Age in years	Anaemia				Total
	Mild	Moderate	Severe	No	
5-11	30 (6.5 %)	202 (43.6%)	10 (2.2%)	21 (4.53%)	263
12-14	20 (4.3 %)	116 (25.1%)	03 (0.6 %)	08	147
>14	11 (2.4%)	35 (7.6%)	02 (0.4%)	05	53
Total	61 (13.2%)	353 (76.2%)	15 (3.2%)	34	463

Table 4: Degree of anaemia levels according to sex.

	No	Mild	Moderate	Severe
Male	22	41	196	6
Female	12	20	157	9

DISCUSSION

The exact figures for the prevalence of anaemia vary from study to study, but anaemia is an extremely serious public health problem in India .This study was conducted to assess the prevalence of anemia among school children of rural area of age 5 years to 16 years. The overall prevalence of anaemia was 85.74% in students of rural area of Punjab. In present study, as per the age distributions of more students were in the age group of 5 to 11 years. There were 56.8% students in the age group of 5 to 11 years. 31.7% students were in the age group of 12 to 14 years. Only 11.4% students were in the age group of more than 14 years Figure 1. This study showed that 57% of the samples were males /boys and 43% of the samples were females/girls as shown in Figure 2. In age group of 5 to 11 years more students had moderate anemia i.e. 43.6% (202) and only 4.53% (21) had normal haemoglobin. In age group of 12 to 14 years 4.3% (20) students had mild anemia, 25.1 % (116) had moderate anemia and 0.6% (3) had severe anemia. The students in age group of more than 14 years, more children had moderate anemia i.e. 7.6% (35). It was found that overall in the total sample 13.2% subjects were having mild anemia, 76.2% had moderate anemia and 3.2% had severe anemia. Out of 463 students only 34 (7.34%) subjects were with normal hemoglobin. In all age groups, moderate degree of anaemia was more common, whereas it was much more seen in the age group of 5 to 11 years. The prevalence of mild anaemia was also seen in all the age groups though the percentage was less as shown in Figure 3. Also it was found that out of total 463 students, 243 (52.48%) boys were anaemic and 154 (40.17%) girls were anaemic. Out of 265 males, 196 (73.96%) had moderate anaemia and 6 (2.26%) boys had severe anaemia. Out of 196 females, 157 (80.1%) were suffering from moderate anaemia and 9 (4.59%) girls were severely anaemic. Out of girls, 94.89% girls were anaemic and out of total no. of boys, 91.69% males were anaemic as in Figure 4. According to the WHO, if the prevalence of anemia at the community levels was more than 40%, it was considered as a problem of high magnitude.[11,12] In the study by Gupta VK et al , the overall prevalence of anaemia was 89.5% in females and 89.9% males.[13] Gupta VK et al study presented the prevalence of anaemia among the rural males (5-20 years) and females (5-30 years) in Punjab.

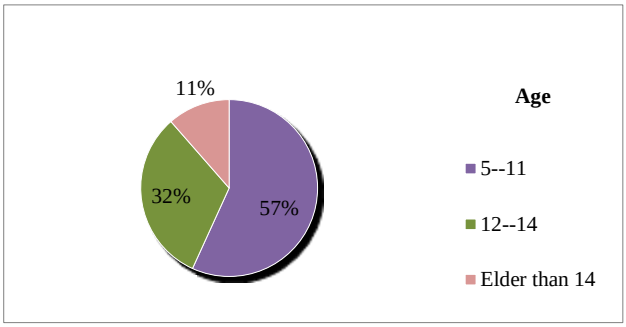

Figure 1: Distribution of students according to age groups.

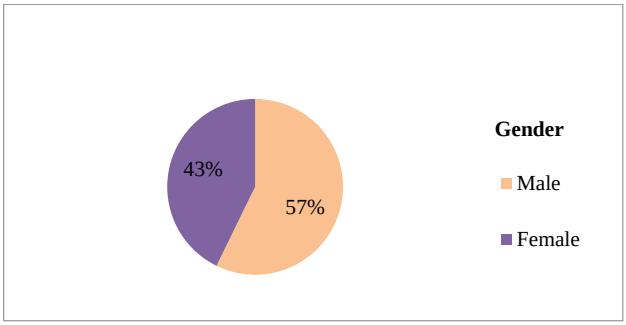

Figure 2: Distribution of students according to sex.

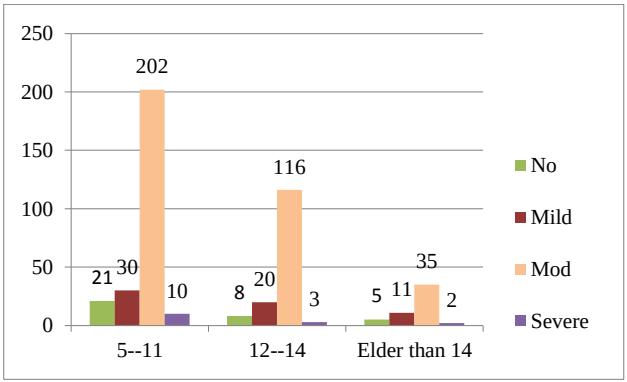

Figure 3: Degree of anaemia levels according to age (mild, moderate and severe).

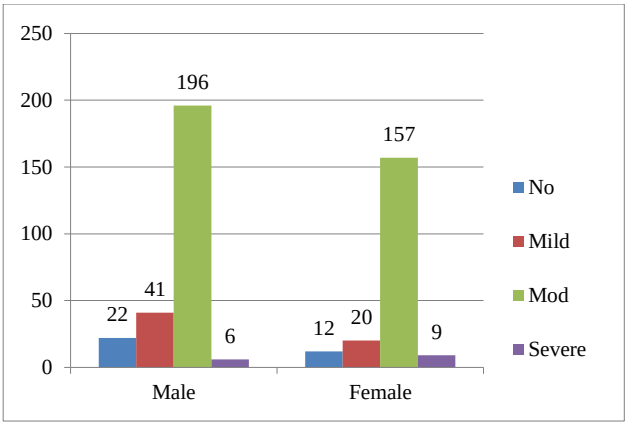

Figure 4: Degree of anaemia levels according to sex.

The present study thus brings out the fact that the problem of anaemia was prevalent in wider population rather than commonly considered group of the pregnant females and lactating females. The young male population was equally susceptible in Punjab. It is seen that anaemia was an indicator of poor nutrition and poor health, with major consequences on the human health and also on the social and economic development. Anaemia was linked to a depressed mental state and motor development during infancy and early childhood, which may be irreversible.[14] Anaemia during childhood also results in decreased physical activity and decreased interaction with the environment, with negative consequences on learning and school achievements.[15]

Statistical analysis

The t test was applied to compare the mean levels of haemoglobin in male and female students. To compare mean levels of Hb in different age groups, ANOVA was used followed by Benforreini test. In this study the mean± Standard deviation of Hb levels in different age groups was analysed. In age group of 5-11 years it came out to be 9.75± 1.16 and in age group 12 to 14 years it was 9.97±1.04 and in the age group of more than 14 years it was 10.05±1.2. There is no significant difference of mean level of haemoglobin in all the three age groups, (P value 0.066 >0.05) Figure 5. In this study the mean ±Standard deviation of haemoglobin levels according to sex distribution was also analysed and it was found that Hb levels in boys was 9.91± 1.1 whereas in females was 9.71±1.12. On statistical analysis there is significant difference of mean value of haemoglobin between male and female students, P value 0.028 as shown in Figure 6.

In a study in rural preschool children by Luxmi et al 99% children were found to be anaemic.[16] Another study by Chaturvedi S et al shows that 73.7% adolescents were anaemic.[17] In a study by Shah BK et al among the adolescent girls of Nepal, the prevalence of anaemia (68.8%) was found to be higher than that of the Indian females as in our study (41.62%).[18] Sudhagandhi B et al showed that the prevalence of anemia was 52.88% in the school children of Kattankulathur.[19] Also studies done by Verma et al, showed that the prevalence of anemia in the 5-15 years age group of urban school children in Punjab was 51.5%. [20] Similarly, a study by Gomber et al, stated that the prevalence of anemia in school children from urban slums, aged 5-10.9 years was 41.8%.[21] Another study of 393 children reported the prevalence of 66.4% anemia amongst primary school children (6-11 years) in the national capital territory of Delhi.[22]

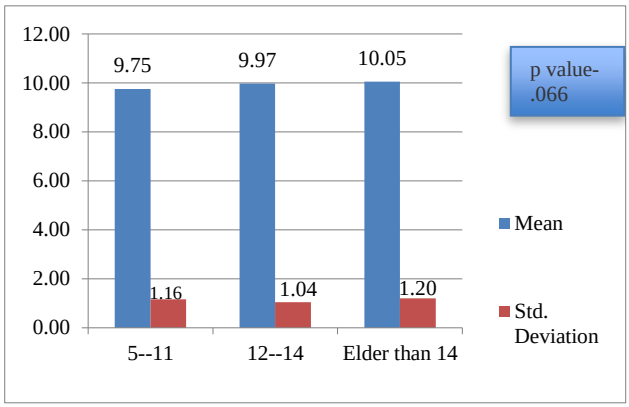

Figure 5: SD values and p value according to age.

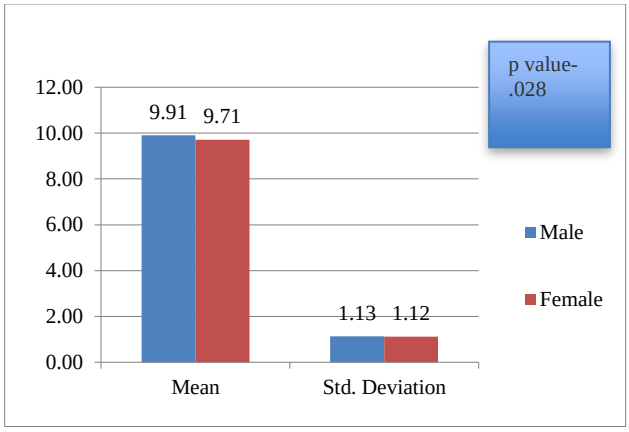

Figure 6: SD values and p value according to sex.

Within India, the highest prevalence of anaemia was found in the Jharkhand State, where almost all the adolescent girls were anaemic.[23] In our study, the prevalence of anaemia among males (5-16 years) was 58.38%, which was much more as compared to a 24% prevalence of anaemia among men in the NFHS 3 data.[24] In another study by Malhotra P et al , the prevalence of anaemia in the 16-70 years age group among males was 44.3%.[25] The prevalence of anaemia does not vary with the sex of the child and is considerably higher in the rural areas, the young male population was equally susceptible in Punjab (Table 5).[13]

The prevalence of anemia in the developing countries

tends to be three to four times higher than in the developed countries.[26] Recent studies on the prevalence of anemia have been on pre-schoolers only, so there is a need for more studies related to anemia in school children.[27,28] Anemia affects the physical and mental development of an individual leading to decreased working capacity, which in turn affects the development of the country.[29]

Table 5: Comparison chart of prevalence of anemia in various studies.

Studies	Characteristics	Prevalence of anemia
Present Study	5-16 years	85.74%
Luxmi et al, Rural preschool children[16]	1-5 years	99%
Chaturvedi S et al,Rural Rajasthan[17]	Adolescent girls	73.7%
Shah BK, Nepalese girls[18]	Adolescent girls	68.8%
Sudhagandhi B et al, Kattankulathur [19]	8-16 years	52.88 %
Verma et al ,Punjab (Urban Schools)[20]	5-15 years	51.5 %
Gomber et al, Urban Slums[21]	5-10.9 years	41.8 %
Sethi V et al, National capital territory of Delhi[22]	6-11 years	66.4 %
Mohapatra et al, Bhubaneshwar[10]	< 12years	79 %

CONCLUSION

Our study highlights the fact that the prevalence of anaemia is very high in school going children. We suggest that there is a need for well- planned, systematic and large-scale studies by using standardized methodologies to estimate the prevalence of anaemia as well as the causes of anaemia at the community level among males and females in all the age groups, and the representation of the different regions of India.

Recommendations

The following recommendations are made;

- Government should implement hemoglobin estimation in school.
- Health programme for all school children on a regular basis.
- School teachers should give advice to both children and parents regarding advantages of balanced diet.
- Monitoring and evaluation of government program like ICDS Supplementary Nutritional Program should be strengthened. Effectively monitoring of these programs is required.
- They should be advised for improvement in dietary habits regarding consumption of green leafy vegetables should be included in diet plan.
- Health education, seminars on menstrual hygiene should be conducted at regular interval.

Limitation of the study

This study has several limitations. We did a descriptive study that reports the prevalence and severity of anemia in general. The study lacks detailed investigation of the morphological appearance of red blood cells to differentiate anemia due to vitamin B12 and folic acid deficiencies from anemia due to iron deficiency.

Relevance of the study

To assess the prevalence of anaemia in rural population in schools so that we can treat this segment in time for proper growth of the society. It gives the ground reality and attention of the policy makers to review the gaps for correcting anaemia.

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