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Original Research Article

SOCIO-DEMOGRAPHIC ASSOCIATION WITH PREVALENCE OF ANEMIA AMONG SCHOOL GOING CHILDREN IN BHOPAL, MADHYA PRADESH

Dr. Prachi Kori[1] (Senior Resident), Dr. Preeti Kori[2] (Associate Professor), Dr. Amrita Vamne[3] (Assistant Professor) & Dr. Sohan Mandloi[4] (Associate Professor)

Department of Community Medicine, Index Medical College Hospital and Research centre, Indore (MP)[1]

Department of Medicine, Dr LN Pandey Govt. Medical College Ratlam (MP)[2]

Department of Biochemistry, Dr. LN Pandey Government Medical College, Ratlam (MP)[3]

Department of Medicine, Dr LN Pandey Govt. Medical College, Ratlam (MP)[4]

Corresponding Author: Dr. Sohan Mandloi

ABSTRACT

Background: Amongst various causes of anemia, iron deficiency is responsible for about 50 percent of anemia in school going children and in women of reproductive age-group, and 80 percent in children 2–5 years of age-groups[4]. Several factors affect the nutritional status of adolescents. Among these, socio-economic and demographic factors are associated with worldwide patterns of nutritional anaemia. So this study was planned to assess prevalence of anemia and its association with socio-demographic factors among school going adolescents of Bhopal district.

Materials and Methods: This is a cross sectional study done after ethical committee approval, carried out in randomly selected government schools of Bhopal (M.P.), India.

Results: Out of 257 study participants, 49.8% (128) were boys and 50.2% (129) were girls. 32.8 % boys and 57.4% girls had anemia. Out of all 64 anemic adolescents taking vegetarian diet, 23.4% were boys and 76.6% were girls and out of all 52 anemic adolescents taking mixed diet, 51.9% were boys and 48.1% were girls. Out of 93 menstruating girls, 54.4% girls were anemic with normal blood loss during menstruation, however 100% girls were anemic with excessive blood loss. Anemia was more prevalent in lower socioeconomic class, i.e. class IV and V (71.7% and 71.1% respectively) than in higher classes (Modified Kuppuswamy Classification). All these findings were found to be statistically significant.

Conclusion: Higher prevalence of anemia among adolescents suggests that it is very essential to attend this problem. There is significant association of anemia with type of diet, menstruation and socio-economic status. Promoting awareness regarding consumption of iron rich foods, educating about menstrual hygiene and screening target groups for anaemia should be done periodically. Prophylaxis and treatment of anemia should also be taken care of.

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Keywords: Anemia, Socio-demographic, School going, Menstruation.

1. INTRODUCTION

Low level of haemoglobin (Hb<11g/dl) in blood is defined as anemia. It is a most common nutritional problem worldwide in all age groups including children, adolescents and pregnant women [1]. The adolescent has been defined by the WHO as the period of life spanning the ages between 10 to 19 years[2].The physiological growth spurt, psychological and behavioural change with menarche cause an increase in daily iron requirement, which, if not met, can rapidly result in anemia[3]. Iron deficiency is responsible for about 50 percent of anemia in school children and in women of reproductive age-group, and 80 percent in children 2–5 years of age, among a lot of causes of anemia[4]. Iron is an essential element for the function of various organs, its deficiency may lead to impaired perception and learning difficulties ending up with declined school success[5].

According to WHO Iron deficiency anaemia was the second leading cause of healthy years of life lost due to disability by adolescents aged 10–19 in 2019 and more than 1.1 million adolescents died in 2016 mostly from preventable or treatable causes [6].

Adolescents are the future generation of any country and their nutritional needs are critical for the well-being of the society. Several factors affect the nutritional status of adolescents. Among these, socio-economic and demographic factors are associated with worldwide patterns of nutritional anaemia.

Studies showing prevalence of anemia among adolescents and its association with socio-demographic factors were done previously in other states but not identified in Bhopal or MP. So, this study was planned to assess prevalence of anaemia its association with socio-demographic factors among school going adolescents of Bhopal district.

2. METHODS

It is a cross sectional community based study.

Study Area: 4 Government schools of Bhopal

Study Population: Adolescents from 4 Government schools of Bhopal

Study Duration: From May 2019 to July 2019

Inclusion Criteria:

- Adolescents (10-19 years) whose parents given consent were selected as per sample size.

Exclusion Criteria:

- Adolescents suffering from any type of hemoglobinopathies like sickle cell anemia, thalassemia etc. or having chronic disease affecting hemoglobin level.

Sample Size: In Madhya Pradesh, prevalence of anemia is 53.2% among adolescent girls and 36.5% among adolescent boys [47]. Therefore, mean prevalence among adolescents is 44.85%.

On applying formula

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$n = Z^2pq/l^2$

Where n = sample size

Z = 1.96 at 95% Confidence Interval

p = Mean Prevalence i.e. 44.85

q = 1- p i.e. 55.15

l = absolute error, which is p times allowable error. Here allowable error is taken as 15%, so p X 15% i.e. 44.85 X 15/100

= 6.73

So,

n = 1.96 X 1.96 X 44.85 X 55.15 ÷ 6.73 X 6.73

= 209.8 ≈ 210

To maintain homogeneity among number of boys and girls and to cover loss to follow up (20%) we took 280 as sample size i.e. 280 adolescents of 10-19 years of age.

Sampling: The list of all schools was initially obtained from district education office. Later 4 schools were selected randomly by lottery method. 70 adolescents meeting the criteria were selected by random selection without replacement method from each school in which 35 boys and 35 girls were of age group 10-19 years and likewise required sample size of 280 adolescents were selected from 4 Government schools.

Consent: Verbal consent was obtained from the study participants and then written consent from their parents was obtained after explaining them the nature and purpose of the study. They were assured that privacy would be stringently maintained. The option to withdraw from the study was always open.

METHODOLOGY

Permission from District Education Officer of Bhopal (M.P.) was taken after obtaining clearance from the Institutional Ethical Committee. Desired schools were selected as per requirement from the list of schools obtained. After permission from respective school's Principals, we visited the respective schools and approached the eligible participants. Informed consent obtained from parents of participants and then they were interviewed using a Pre designed Pretested Semi structured questionnaire. The questionnaire included socio-demographic variables such as age, education and occupation of parents, monthly income, number of family member, religion, type of family, dietary practices etc. Using a digital hemoglobinometer hemoglobin level was also estimated. We were able to study 257 adolescents as rest denied to participate.

STATISTICAL ANALYSIS: Data was entered MS excel 2007, analysis was done with the help of Epi-Info 7 software. Frequency and percentage were calculated & statistical test (Chi Square) was applied wherever applicable; P value <0.05 was taken as statistically significant.

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3. RESULTS

Here 257 study participants were from ages 10-19 years. Among 257, there were 128(49.8%) males and 129 (50.2%) females.

Prevalence of anemia is 32.8% among boys and 57.4% among girls. The distribution is found statistically significant ($p < 0.05$).

Fathers of majority 18(42.9%) anemic boys were illiterate and least 1(2.4%) up to intermediate. However fathers of majority 21(28.4%) anemic girls were educated up to primary school and least 3(4.1%) were educated up to graduate (Table -1). The distribution is found not significant (p-value >0.05)

Table - 1 Distribution of anemia in adolescents according to Father's education

S No.	Education qualification	Male n (%)	Female n (%)
1	Illiterate	18(42.9)	15(20.3)
2	Primary	3(7.1)	21(28.4)
3	Middle School	14(33.3)	11(14.9)
4	High School	5(11.9)	15(20.3)
5	Intermediate	1(2.4)	4(5.4)
6	Graduate	0(0)	3(4.1)
7	Not Alive	1(2.4)	5(6.8)
Total		42(100)	74(100)
P-Value		**0.056**	

Mothers of majority 19(45.2%) anemic boys were illiterate and least 4(9.5%) up to middle school. Similarly mothers of majority 28(37.8%) anemic girls were illiterate and least 1(1.4%) was educated up to graduate (Table -2). The distribution is found not significant (p-value >0.05)

Table - 2 Distribution of anemia in adolescents according to Mother's education

S No.	Education qualification	Male n (%)	Female n (%)
1	Illiterate	19(45.2)	28(37.8)
2	Primary	12(28.6)	19(25.7)
3	Middle School	4(9.5)	18(24.3)
4	High School	6(14.3)	7(9.5)
5	Intermediate	0(0)	4(5.4)
6	Graduate	0(0)	1(1.4)
7	Not Alive	1(2.4)	0(0)
Total		42(100)	74(100)
P-Value		**0.732**	

Prevalence of anaemia was found to be maximum 23 (54.8%) in adolescent boys whose father's worked as unskilled worker while it was minimum 1(2.4%) in unemployed. Neither sons of semi-professionals nor children of professionals were anemic. Similarly it was

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maximum 30(40.5%) in adolescent girls whose father's worked as unskilled worker while it was minimum 3(4.1%) in semi-professionals (Table -3). The distribution is found not significant (p-value >0.05)

Table -3 Distribution of anemia in adolescents according to Father's occupation

S No.	Occupation	Male n (%)	Female n (%)
1	Unemployed	1(2.4)	0(0)
2	Unskilled worker	23(54.8)	30(40.5)
3	Semi-skilled worker	2(4.8)	5(6.8)
4	Skilled worker	5(11.9)	12(16.2)
5	Arithmetic Skilled jobs	10(23.8)	19(25.7)
6	Semi-professional	0(0)	3(4.1)
7	Professional	0(0)	0(0)
8	Not Alive	1(2.4)	5(6.8)
Total		42(100)	74(100)
P-Value		**0.173**	

Prevalence of anaemia was found to be maximum 29(69%) in adolescent boys whose mother's were unemployed while it was minimum 1(2.4%) in semi-skilled workers and skilled workers both. Similarly it was maximum 47(63.5%) in adolescent girls whose mother's were unemployed while it was minimum 2(2.7%) in skilled workers and arithmetic skilled workers both. None of the mothers worked as semi professionals and professionals (Table -4). The distribution is found not significant (p-value >0.05).

Table - 4 Distribution of anemia in adolescents according to Mother's occupation

S No.	Occupation	Male n (%)	Female n (%)
1	Unemployed	29(69)	47(63.5)
2	Unskilled worker	10(23.8)	18(24.3)
3	Semi-skilled worker	1(2.4)	5(6.8)
4	Skilled worker	1(2.4)	2(2.7)
5	Arithmetic Skilled jobs	0(0)	2(2.7)
6	Semi-professional	0(0)	0(0)
7	Professional	0(0)	0(0)
8	Not Alive	1(2.4)	0(0)
Total		42(100)	74(100)
P-Value		**0.507**	

According to modified Kuppuswamy socio-economic status in majority anemic boys i.e. 38(90.5%) belong to upper lower class (IV) followed by lower middle class (III) 3(7.1%) and least 1(2.4%) belong to lower class (V), similarly majority anemic girls i.e. 54(73%) belong to upper lower class (IV) followed by lower middle class (III) 19(25.7%) and least 1(1.4%)

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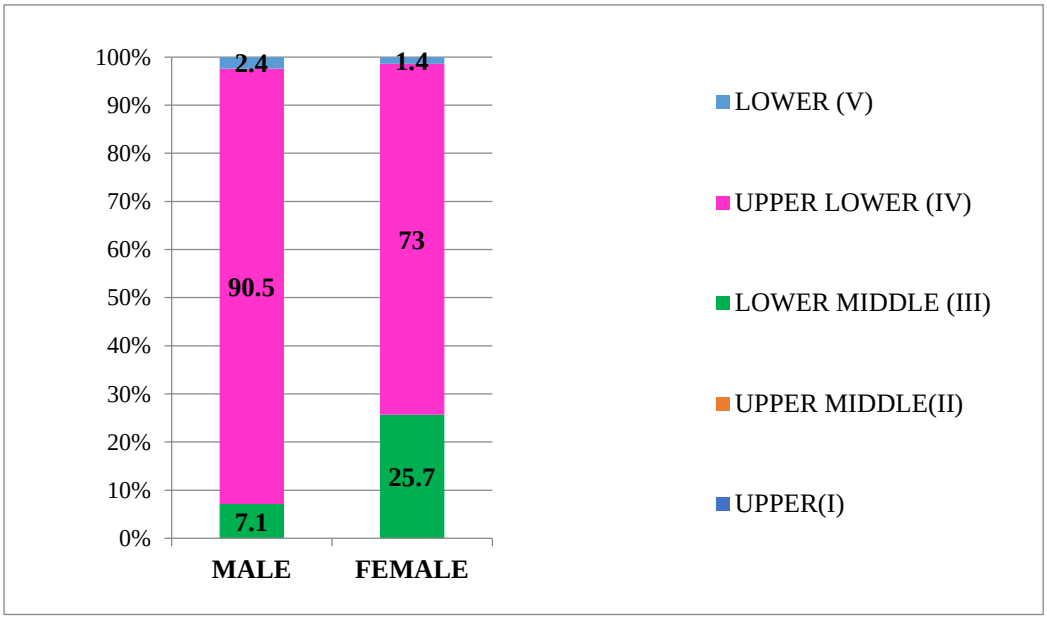
belong to lower class (V). No anemic study participants belong to Upper middle class (II) and how ever no study participants in our study belong to Upper class (I) (Fig -1). The distribution was found significant (p-value < 0.05)

Figure- 1 Gender wise distribution of anemia in adolescents according to Socio-economic status



Out of all **109** anemic Hindu adolescents, boys were 39(35.8%) and girls were 70(64.2%) and out of all **7** anemic Muslim adolescents, boys were 3(42.9%) and girls were 4(57.1%).
Followers of any other religions were not found among study participants. This distribution is found not statistically significant (p > 0.05).
Out of all **94** anemic adolescents belonging to nuclear family, 35(37.2%) were boys and 59(62.8%) were girls and out of all **22** anemic adolescents belonging to joint family, 7(31.8%) were boys and 15(68.1%) were girls (Table -7). This distribution was found statistically not significant (p > 0.05)
Out of all **64** anemic adolescents taking vegetarian diet, 15(23.4%) were boys and 49(76.6%) were girls and out of all **52** anemic adolescents taking mixed diet, 27(51.9%) were boys and 25(48.1%) were girls. It was found statistically significant (p < 0.05).
Out of 93 menstruating girls, 49(54.4%) girls were anemic with normal blood loss during menstruation, however 3(100%) girls were anemic with excessive blood loss. It was found statistically significant (p < 0.05)

4. DISCUSSION

In India the prevalence of anemia among adolescent girls is 54% and in boys 29% whereas in Madhya Pradesh it is 53.2% among adolescent girls and 36.5% in adolescent boys [7].
In the present study, prevalence of anemia is 32.8 % among boys (n=128) and 57.4% among girls (n=129). In a study Sajith Kumar Soman et.al [8] (2016), reported that out of girls 1300 and boys 1489, 62% girls and 46.1% boys were anemic In a study conducted by Shobha P

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Shah et.al [9] (2013), reported that out of girls 117 and boys 127, 79.5% girls and 64% boys were anemic.

In the present study, fathers of majority 18(42.9%) anemic boys were illiterate and least 1(2.4%) up to intermediate. However fathers of majority 21(28.4%) anemic girls were educated up to primary school and least 3(4.1%) were educated up to graduate. (p-value >0.05).

In the study by Jayant V et.al [10] (2017), where 46.67% fathers had education till middle school 98.57% girls were anaemic, 33.3% fathers had education till 10th standard or more where 75% girls were anaemic, 16.67% fathers had education till primary school where 96% girls were anaemic, 3.33% fathers were illiterate where 90% girls were anaemic A statistically highly significant association of anemia was found with the father's educational status, unlike our study. Study by Anurag Srivastava et.al [11] (Aug- Dec 2014) depicts that fathers of about 74.1% anemic girls had education till primary level whereas 66.2% have above primary level education.

In the present study, mothers of majority 19(45.2%) anemic boys were illiterate and least 4(9.5%) up to middle school. Similarly mothers of majority 28(37.8%) anemic girls were illiterate and least 1(1.4%) was educated up to graduate. (p-value >0.05).

In the study by by Jayant V et.al [10] (2017), 56.67% mothers had primary education where anemia was seen in 95.88% girls. 26.67% mothers had education till middle school where anemia was seen in 91.25% girls. 10% mothers had education till 10th standard or more where anemia was seen in 53.33% girls. 6.67% mothers were illiterate where anemia was seen in 90% girls. A statistically highly significant association of anemia was found with the mother's educational status, unlike our study. A study by Anurag Srivastava et.al [11] (Aug-Dec 2014) depicts that that 72.9% girls of mothers had education till primary level were anemic whereas 62.1% girls anemic had above primary level education.

In our study, prevalence of anaemia was found to be maximum 23 (54.8%) in adolescent boys whose father's worked as unskilled worker while it was minimum 1(2.4%) in unemployed. Neither sons of semi-professionals nor children of professionals were anemic. Similarly it was maximum 30(40.5%) in adolescent girls whose father's worked as unskilled worker while it was minimum 3(4.1%) in semi-professionals. (p >0.05)

Study by Prasad Tukaram Dhikale et.al [12] (Sep 2013- 2014) reported similar findings where majority 78.55%, of the participants reported their fathers' employment as unskilled workers, whereas 11.01% as semiskilled, skilled, clerk, shop owner. Rita Singh et.al [13] (2008) reported that the prevalence of anemia was found to be maximum 48.1 per cent in adolescent girls whose father's worked as labourers while it was 41.8 per cent in private service, 27.5 per cent in business, 38.4 per cent in government service and minimum 17.8 per cent in professionals (p< 0.005).

In our study, prevalence of anemia was found to be maximum 29(69%) in adolescent boys whose mother's were unemployed while it was minimum 1(2.4%) in semi-skilled workers and skilled workers both. Similarly it was maximum 47(63.5%) in adolescent girls whose mother's were unemployed while it was minimum 2(2.7%) in skilled workers and arithmetic

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skilled workers both. None of the mothers worked as semi professionals and professionals (p >0.05).

Study by Anurag Srivastava et.al [11] (Aug - Dec 2014) reported that if mothers are working about 70.6% girls are anemic, whereas in case of non working mothers 67.9% girls are anemic. Dheeraj Gupta et.al [14] (Sep 2010 - Sep 2011) also reported if mothers are working about 50.9% girls are anemic, whereas in case of non working mothers 30.6% girls are anemic.

In the present study, according to modified Kuppuswamy socio-economic status in majority anemic boys i.e. 38(90.5%) belong to upper lower class (IV) followed by lower middle class (III) 3(7.1%) and least 1(2.4%) belong to lower class (V), similarly majority anemic girls i.e. 54(73%) belong to upper lower class (IV) followed by lower middle class (III) 19(25.7%) and least 1(1.4%) belong to lower class (V). No anemic study participants belong to Upper middle class (II) and how ever no study participants in our study belong to Upper class (I). The distribution was found significant (p-value < 0.05). In the study by Anurag Srivastava et.al [11] (Aug - Dec 2014),there was significant association of anaemia with socio-economic status similar to our study, whereas anemia was more prevalent in lower socioeconomic class in class IV and V (71.7% and 71.1% respectively) than in higher classes. In another study by T. Jain et.al [15] (2010) reported that majority of upper lower class students (55.6%) were anemic and the prevalence of anemia decreased with increase in socio-economic status but the difference was not statistically significant.

In our study, out of all 109 anemic Hindu adolescents, boys were 39(35.8%) and girls were 70(64.2%) and out of all 7 anemic Muslim adolescents, boys were 3(42.9%) and girls were 4(57.1%) (p > 0.05).

In a study conducted by A. K. Arya et.al [16] (2015) reported that 68.5% hindu and 31.5% muslim participants were anemic, while in another study carried out by Sajith Kumar Soman et.al [8] (2016) majority were christians 53.6% followed by 45.4% hindu and muslims 1%.

In this study, out of all 94 anemic adolescents belonging to nuclear family, 35(37.2%) were boys and 59(62.8%) were girls and out of all 22 anemic adolescents belonging to joint family, 7(31.8%) were boys and 15(68.1%) were girls (p > 0.05).

It was reported by Anurag Srivastava et.al [11] (Aug- Dec 2014), that 69.6% anemic girls belonged to joint family and 68.2% belonged to nuclear family**.** Hema Priya S et.al [17] (July-Dec 2013) reported that 75.8% belonged to nuclear family and 24.2% children were from joint families.

In this study, out of all 64 anemic adolescents taking vegetarian diet, 15(23.4%) were boys and 49(76.6%) were girls and out of all 52 anemic adolescents taking mixed diet, 27(51.9%) were boys and 25(48.1%) were girls. It was found statistically significant (p < 0.05).

Anurag Srivastava et.al [11] (Aug - Dec 2014) reported that majority anemic 72.2% were on vegetarian diet and 27.8% anemic were on mixed diet**.** P. M. Siva et. al [18] (April 2013- May 2014), reported that majority anemic 94.4% were on mixed diet and 5.6% anemic were on vegetarian.

In this study, out of 93 menstruating girls, 49(54.4%) girls were anemic with normal blood loss during menstruation, however 3(100%) girls were anemic with excessive blood loss. At

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follow up 48(53.3%) girls were anemic with normal blood loss during menstruation, however 3(100%) girls were anemic with excessive blood loss. It was found statistically significant ($p < 0.05$)

In a study by Anil Kumar et.al [19] (2018) found that 6.8% girls had history of excessive menstrual bleeding out of which 87% were anemic. It was also found statistically significant ($p < 0.05$) like our study.

5. CONCLUSION

In the present study prevalence of anemia is 32.8 % among boys and 57.4% among girls. There is significant association of anemia with socio-economic status, type of diet and menstruation. This study indicates that adolescent is a vulnerable group for nutritional anaemia. It is quite important to strengthen health education and spread awareness on the consumption of iron rich foods and menstrual hygiene. Screening of target groups for anaemia should be done periodically. Emphasis should be given on proper implementation of intervention programs to raise the haemoglobin levels among the adolescents age group through prophylaxis, treatment, dietary modification and helminthic control.

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