IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 10 Ver. VI (October. 2016), PP 24-28
www.iosrjournals.org

Prevalence of Anaemia among Adolescent Patients of Rural Mathura, U.P., India.

Dr. Akshaykumar Parikh[1], Dr. Shalini Gandhi[2], Dr. Jayshree Parikh[3].
[1](*Professor In Pharmacology, K. D. Medical College Hospital & Research Center (Kdmchrc), Mathura, U.P., India)*
[2](*Assistant Professor In Physiology, Kdmchrc,Mathura.)*
[3](*Professor In Chemistry, J.J.T. University, Jhunjhunu, Rajasthan, India.*

Abstract: Objective: *To assess the prevalence of anaemia among adolescent out patients of rural Mathura*
Design: *Retrospective analysis of haemogram reports of adolescents of out patient department, investigated at laboratory of Pathology department of KDMCHRC, Mathura, of 759 patients during months of June & July 2016.*
Materials & Method: *Hb and CBC was done on automated haematology analyzer XP series: XP-100, manufactured by Sysmex Corpoation, Kobe, Japan and print out of reports done by internal printer of the analyzer. Anaemia was diagnosed based on Hb, MCV, MCH, MCHC findings.*
Observation and Results: *Total adolescent patients were85 (50 boys & 35 girls)/759 (11.20%). Based on Hb estimation, prevalence of anaemia was 60/85 (70.50%). Maximum number of anaemic adolescents were 12/14 (Boys:7 & Girls:5) in age group of 14 years. Abnormal PCV noted among 76/85 (89.41%). Based on MCH and MCHC 32/85 (37.65%) and 10/85 (11.76%) respectively.*
Conclusion: *The present study on the basis of Hb level showed 70.50% prevalence of IDA among adolescent OPD patients investigated at pathology laboratory of KDMCH&RC, Mathura. Distribution of IDA was slightly more in adolescent girls 25/35 (71.43%) than adolescent boys 35/50 (70.0%).*
Keywords: *Anaemia, adolescents, Iron Deficiency Anaemia (IDA), Haemoglobin (Hb), Packed Cell Volume (PCV), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH), Mean Cell Haemoglobin Concentration (MCHC).*

I. Introduction

Anaemia is very common in Indian subcontinent. The National Family Health Survey-3 (NFHS-3) data suggests that anaemia is widely prevalent among all age groups and its prevalence is particularly high among the most vulnerable – nearly 58% among pregnant women; 50% among non-pregnant, non-lactating women; 56% among adolescent girls (15 – 19 years of age); 30% among adolescent boys (15 – 19 years of age) and around 80% among children under 3 years of age [1]. Adolescence has been defined by World Health Organization as the period of life spanning the ages between 10 to 19 years [2]**.** In India, adolescents above age of 18 years are considered adults, so we have not included them in Adolescent group.

Malnourishment is a common problem in Indian population. Anaemia that also **'Iron Deficiency Anaemia' (IDA)** is very common. Prevalence of anaemia in India is higher than that in many countries of the world. Nutritional anaemia is a major public health problem in India, and is primarily due to iron deficiency [3]. Incidence of anaemia is considerably higher in rural areas. Although state differentials in the prevalence of anaemia are marked, a high prevalence of anaemia is found in every state. IDA is a formidable health challenge in developing countries and remains persistently hgh despite national programs to control this deficiency [1, 4]. To detect IDA among adolescents of rural population of Mathura, U.P., India, we decided to retrospectively analyze haemogram reports of June and July 2016. The O.P.D. patients in said duration were investigated for Complete Blood Count (CBC) at Pathology department of K. D. Medical College, Hospital and Research Center, Mathura by Haematology analyzer with inbuilt automatic cell counter with internal printer (XP-100). Reports' print outs were taken and analyzed.

Trends in Prevalence of Iron Deficiency Anaemia among Adolescent Boys and Girls: Prevalence of anaemia among adolescent boys (Hb < 13 gm/dL) and girls (Hb < 12 gm/dL) is alarmingly high, as per NFHS-3 and National Nutrition Monitoring Bureau Survey [NNMBS]. Over 55% adolescent girls are reported to be anaemic . Prevalence of anaemia among girls between 15 to 19 years remains 55.8%, whereas prevalence of anaemia among adolescent boys of 15 to 19 years is 30.2% **[3].**

II. Material and Methods

This retrospective analytical study was carried out at KDMCHRC, Mathura. The instituitional approval was taken. **Study Design:** The retrospective analysis of haemogram reports of 85 adolescents (50 Boys and 35 Girls) out of 759 O.P.D. patients investigated at laboratory of Pathology department of K.D. Medical College, Hospital & Research Center, Mathura, from 1.06.2016 to 31.07.2016. Venous blood specimens were examined for Hb and CBC. Name, age, sex etc. needed were recorded by laboratory technicians. IDA was defined as per NFHS-3 and National Nutrition Monitoring Bureau Survey based on Hb levels in adolescents. The cut off value for determination of IDA is:

- Blood Hb concentration: < 13 gm/dL in Boys and < 12 gm/dL in Girls[1, 3].
- Blood MCH: < 27 pg [Normal MCH= 27 to 33 (30 ± 3) pg] [5].
- Blood MCHC: < 31% [Normal MCHC= 31 to 35 (33 ± 2) %] [5].
- Blood MCV: < 82 fL [Normal MCV = 82 to 98 (90 ± 8) fL] [5].

Iron deficiency is the commonest cause of anaemia in India. In IDA, RBCs are microcytic (low MCV) and hypochromic (low MCHC) due to deficient Hb synthesis. **Blood sample Collection and Examination:** Blood sample of 5 mL was collected from each patient in OPD by vein puncture into Ethylene diamine tetra-acetic acid (EDTA) sterile bulb for HB and CBC. The blood samples were analyzed for HB, RBC count, Total and differential WBC count, Platelet count & Haematocrit. The EDTA blood sample was tested and analyzed by pathologist using automated haematology analyzer (XP Series: XP-100, manufactured by Sysmex Corporation, Kobe, Japan) and print out of reports done by internal printer of the analyzer.

Statistical Analysis: The data was obtained from instrumental analysis for all blood samples. It was tabulated as shown in Tables 1 to 8 and analyzed statistically.

Table 1: Total Adolescent Hemogram Patients

Patients (n)	Male (n_M)	%	Female (n_F)	%	Total	%
759	375	49.40%	384	50.60%	759	
Adolescents (n_1) =85	50	58.82%	35	41.18%	85	11.20%
	50/375	13.33%	35/384	9.12%		

Table 2: Haemoglobin [Hb (Gm/dL)]* Of Adolescents

Patient	Boys n_{1B} = 50				Girls n_{1G} = 35				Total (B+G) n_1= 85			
n_1	Normal	%	<13	%	Normal	%	<12	%	Normal	%	Anemic	%
85	15	30.0	35	70.0	10	28.5	25	71.43	25	29.41	60	70.5

*Haemoglobin (gm/dL): (a) Normal : Boys ≥ 13 Girls ≥ 12

(b) In Iron deficiency anaemia : Boys < 13 Girls < 12

Table 3: Agewise Distribution Of Anemic Adolescents

Age: yrs	Total (n_1)	Average Hb(gm/dL)	Average %	Normal	Maximum Hb(gm/dL)	Anemic Minimum Hb(gm/dL)	Boys	Girls
10	12	n_1 = 11	10.25	1	13.4	3.7	9	2
11	8	n_1 = 07	10.07	1	13.1	5.7	6	1
12	11	n_1 = 09	10.57	2	13.2	9.6	7	2
13	3	n_1 = 02	06.50	1	12.3	2.1	1	1
14	14	n_1 = 12	11.12	2	13.0	8.6	7	5
15	15	n_1 = 09	10.93	6	14.4	7.7	2	7
16	12	n_1 = 06	10.95	6	13.5	7.2	2	4
17	10	n_1 = 05	11.66	5	16.7	10.5	2	3
Total	85	61		24			36	25

Table 4: Packed Cell Volume (PCV)* Of Adolescents

Patients	Boys n_{1B} = 50				Girls n_{1G} = 35				Total (B+G) n_1 = 85			
n_1	Normal	%	<40%	%	Normal	%	<40%	%	n_1	%	<40%	%
85	9	18.0	41	82.0	Zero	0.0	35	100	9	10.59	76	89.41

*PCV reading: (a) Normal= 40% (b) Abnormal < 40%. Highest PCV: Boys: 47.3% Girls: 39.7%

Lowest PCV : Boys: 17.4% Girls:5.8%

Table 5: Mean Cell Volume [(MCV)*fL] Of Adolescents

Patients	Boys n_{1B} = 50				Girls n_{1F} = 35				Total (B+G) n_1 = 85			
n_1	Normal	%	<82 fL	%	Normal	%	<82 fL	%	Normal	%	<82f L	%
85	24	48.0	26	52.0	20	57.14	15	42.88	44	51.76	41	48.24

*MCV (fL): (a) Normal = 82 – 98 (90 ± 8) fL. (b) Abnormal < 82 fL.

Table: 6: Mean Cell Haemoglobin Concentration [(MCH)* pg] Of Adolescents:

Patients	Boys n_{1B} = 50				Girls n_{1G} = 35				Total (B+G) = 85			
n_1	Normal	%	<27 pg	%	Normal	%	<27 pg	%	Normal	%	<27 pg	%
85	31	62.0	19	38.0	22	62.86	13	37.14	53	62.35	32	37.65

*MCH: (a) Normal= 27 – 33 (30 ± 3) pg. (b) Abnormal <27 pg.

Highest MCH: Boys= 33.2 pg Girls = 33.9 pg. Lowest reading: Boys = 13.4 pg Girls = 18.2 pg.

Table 7: Mean Cell Haemoglobin Concentration [(MCHC) %]* Of Adolescents

Patients	Boys n_{1B} = 50				Girls n_{1G} = 35				Total (B+G) = 85			
n_1	Normal	%	<31%	%	Normal	%	<31%	%	Normal	%	<31%	%
85	43	86.0	7	14.0	32	91.43	3	08.5	75	88.24	10	11.76

*MCHC reading: (a) Normal= 31 -35 (33 ± 2) % (b) Abnormal = <31%

Highest MCHC: Boys = 36.5% Girls = 36.2% Lowest MCHC: Boys = 21.3% Girls = 27.6%

Table 8: Prevalence Of Iron Deficincy Anaemia In Adolescents

Parameter	n	Normal n	%	Anemic/ < Normal n	%	Highest value	Lowest value
Hb gm/dL	85	25	29.41	60	70.59	16.7	3.7
PCV %	85	9	10.59	76	89.41	47.3	5.8
MCV fL	85	44	51.76	41	48.24	99.5	56.2
MCH pg	85	53	82.35	32	37.65	33.2	13.4
MCHC %	85	75	88.24	10	11.76	36.5	21.3

III. Results In our present study

Table 1 shows total male patients were 375/759 (49.40%) and Total female patients were 384/758 (50.60%). Total adolescent Boys were 50/375 (13.33%) and Girls were 35/384 (9.11%). Total adolescent patients (boys + girls) were 85/759 (11.20%). Total adolescent boys were 50/85 (58.82%) and Total adolescent girls were 35/85 (41.18%).

On the basis of Hb estimation: 35/50 (70.0%) adolescent boys were anaemic (< 13 gm/dL) and 25/35 (71.43%) adolescent girls were anaemic and average 60/85 (70.50%) adolescent boys + girls were anaemic which is on the higher side when compared to other studies [Table 2]. Our study further shows:

PCV Readings: 41/85 (82.0%) adolescent boys and 35/35 (100.0%) adolescent girls; and combined result shows 76/85 (89.41%) having abnormal PCV (< 41%) [Table 4].

MCV Readings: show that 26/50 (52%) adolescent boys and 15/35 (42.86%) adolescent girls and Combined result shows 41/85 (48.24%) adolescent boys + girls having abnormal MCV (< 82 fL)[Table 5].

MCH Readings: show that 19/50 (38.0%) adolescent boys and 13/35 (37.14%) adolescent girls and 32/85 (37.65%) adolescent boys + girls having abnormal MCV (<27 pg)[Table 6].

MCHC Readings: show 7/50 (14.0%) adolescent boys and 3/35 (8.5%) adolescent girls and combined result shows 10/85 (11.76%) adolescent boys + girls having abnormal MCHC level (< 31%)[Table 7]

Age wise distribution: shows, Maximum number of anemic adolescents were 12/14 (Boys: 7 and Girls:5) in age group of 14 years. Average Hb was lowest 6.9 gm/dL and also lowest Hb: 2.1 gm/dL in girl, both in Age group of 13 years[Table 3]. Table 8 shows the summarized results of our study.

IV. Discussion

IDA is the commonest type of anaemia throughout the world and in one study it has been reported to affect about 50 – 60% of young children and pregnant females and 20- 30% non-pregnant females in the developing countries. Girls are more likely to be a victim due to various reasons. In a family with limited resources, the female child is more likely to be neglected. She is deprived off good food and education, and is utilized as an extra working hand to carry out the household chores. The added burden of menstrual blood loss, normal or abnormal, precipitates the crises too often [6, 7]. This study was planned to analyze retrospectively, incidence of IDA in adolescent boys and girls of rural areas of Mathura, U.P.. Anaemia is estimated to affect about 2000 million people mostly in developing countries [8]**.** Most of the earlier research on anaemia in different parts of the world including India was mainly focused upon females[9]**.** In this study, we have tried to find out prevalence of IDA in adolescent boys and girls of rural areas of Mathura.

V. Conclusion

Occurrence of anemia in undernourished children and those belonging to poor socio-economic status is a well documented fact [10- 14]. Normally IDA is diagnosed and treated on the basis of Hb level. In IDA, RBCs are microcytic (low MCV, normal MCV= 90 ± 8 fL) and hypochromic (low MCHC, normal MCHC= 33± 2%) due to deficient Hb synthesis. The National Family Health Survey-3 (NFHS-3) data suggests that prevalence of anaemia is 30% among adolescent boys and 56% among adolescent girls (15 – 19 years), whereas our findings suggest that prevalence of anaemia (hypochromic and microcytic) among OPD adolescent (boys + girls of 15 to 18 years) patients based on Hb, MCV and MCH findings was 70.50%, 48.24%and 37.65% respectively; but based on MCHC 10/85 (11.76%) adolescent boys + girls were anaemic! Our previous study also showed that prevalence of anaemia (hypochromic and hypovolemic) among students (adolescent boys and girls), based on Hb, MCH and MCV findings was 61.54%, 28.21% and 34.62% respectively, but based on MCHC, only 2 (1.28%) students were anaemic [15]. We feel that based on our these findings, time has come to review definition and treatment of Iron Deficiency Anaemia based solely on haemoglobin level. More research and data are needed to redefine traditional definition of IDA.

Acknowledgements

The authors are thankful to Trustees and Dean of K.D. Medical College, Hospital & Research Center, Mathura.

References

[1]. International Institute for Population Science (IIPS) and Macro International, 2007. National Family Health Survey – 3 (NFHS-3), 2005-06, Volume I, Mumbai: IIPS; 2007. (Cross reference).

[2]. World Health Organization. Programming for adolescent health and development. WHO Tech Rep Ser No. 1996:2.

[3]. U. Kapil, A. S. Bhadoria: National Iron-plus Initiative Guidelnes for control of iron deficiency anaemia in India, 2013. The National Medical Journal of India, Vol. 27, No. 1, 2014, pp: 27 – 29.

[4]. Poskett, M.E.Elizabeth. Early history of iron deficiency anemia. British Journal of Haematology, 122 (4), 2003: 554- 562.

[5]. Dennis L., Kasper, Anthony S. Fauci et al., Harrison's Principles of Internal Medicine, (McGraw Hill education 19th Edition2015) Vol. I, Part 2, Section 10; Chapter 77: Anemia and Polycythemia, Table: 77-2 & 77-3, pp394.

[6]. S. M. Chaudhary and V. R. Dhage; A study of Anemia Among Adolescent Females in the Urban Area of Nagpur; Indian journal of Community Medicine, 33 (4): Oct 2003 243 – 245. [7] Iron deficiency: Bulletin of World Health Organization, 76 (Supl 2),1998 121 -123.

[7]. V.Fe.; A new concept in the control of iron deficiency: Community based preventive supplementation of at risk group by weekly intake of iron supplements: Biomed Environ Sci., 1998.11(1); 46 – 60.

[8]. S. Patel, M. Shah, J. Patel, N. Kumar; Iron Deficiency Anemia in moderate to severely Anemic Patients. Gujarat Medical Journal; Vol. 64; No. 2; August 2009, pp: 15 – 18.
[9]. V. M. Gupta, K. K. Shukla. Epidemiology of anemia in preschool children from a rural and a slum community, Varanasi. Indian J Prev Soc Med,15, 1985, 85 – 89.
[10]. G. S. Mann, R. W. Stones. Nutritional anemia in the urban poor; A community based study of under fives in an Indian slum. J Trop Pediatr, 34,1988: 257 – 259..
[11]. D. K. Aggarwal, B. Bhardwaj,P.N. Singla, A.M.Tripathi , K. N. Aggarwal. Etiology of maternal and early childhood deficiency anemia. Indian J Pediatr 53, 1986,389 – 396.
[12]. A. Sharma, S. K. Sharma, A.K. Grover, A. D. Tewari, P. Abrol. Anemia in protein energy malnutrition. Indian Pediatr, 22, 1985, 841 – 843.
[13]. N. Desai, V. P. Chaudhry. Nutritional anemia in protein energy malnutrition. Indian Pediatr, 30, 1993, 1471 – 1483.
[14]. P. A. Dahyabhai, P.J. Akshaykumar. A study on the prevalence of iron deficiency anaemia project in one slum school in Mumbai. Int J Health Sci Res.5(8), 2015, 303-308.