

To Study the Serum Iron and Vitamin B12 Deficiency in Children in Different Communities in the South Indian State of Telangana: A Cross Sectional Study

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ABSTRACT

Background: National Family Health Survey (NFHS-4 2015-2016) documented the prevalence of anaemia as overall more than three-quarters (76 percent) of children. Anaemia is the most common Haematological disease of the paediatric age group. Anaemia is the highest prevalence in developing countries. The population differences in the prevalence of anaemia are explained by environmental factors affecting nutrition, chief among these are economic status, ethnic customs & geographic considerations. Furthermore, there is very limited information on prevalence of Iron and B12 deficiencies among children belonging to different communities with culturally defined eating habits. In the present study carried out to compare the Serum Iron & Vitamin B12 in children of different communities in the South Indian state of Telangana.

Material & Methods: In this population based cross sectional observational study was conducted on the department of paediatrics in the Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, Telangana, during the period from 1st January 2020 to till reached the sample size. The study was conducted with the approval from the institutional review and ethical committees. In this study includes children were of the age between 5 to 18 years with the 3 different communities like, Hindu, Muslim & others community.

Results: In the above table we shows that the Others community of age is 12.85 ± 2.65 years, Hindu community of age is 12.76 ± 3.46 years

& Muslim community of age is 14.96 ± 2.00 years. In our study, the prevalence of Serum Iron was found to be 21.7% (26 out of 120) & prevalence of Vitamin B12 was found to be 50.0% (60 out of 120).

Conclusion: The overall prevalence of anaemia (low Haemoglobin) was found to be 43.33%. There was no significant difference between the prevalence of anaemia in 3 different communities.

Keywords: Serum Iron, Vitamin B12, Anaemia, Deficiency.

INTRODUCTION

National Family Health Survey (NFHS-4 2015-2016) documented the prevalence of anaemia as overall more than three-quarters (76 percent) of children. This includes 24 percent who are mildly anaemic (10.0-10.9 g/dl), 47 percent who are moderately anaemic (7.0-9.9 g/dl), and 4 percent who are severely anaemic (less than 7.0 g/dl). Studies have documented iron, folate and vitamin B12 to be the causes of nutritional anaemia. However there is limited data on the prevalence of iron, folate and vitamin B12 deficiencies amongst children in India.¹

Anaemia is the most common Haematological disease of the paediatric age group. Anaemia is the highest prevalence in developing countries. It is defined as a reduction of red blood cell volume or

haemoglobin concentration below the range of values occurring in healthy children.² Among the anaemias, that due to iron deficiency is the commonest. Data of WHO shows that anaemia due to iron deficiency affects approximately 30% of world population and about 37% of school children.³ In Indian children high prevalence of anaemia varies from 27% to 90% has been reported in different studies.⁴ The population differences in the prevalence of anaemia are explained by environmental factors affecting nutrition, chief among these are economic status, ethnic customs & geographic considerations.⁵

Furthermore, there is very limited information on prevalence of Iron and B12 deficiencies among children belonging to different communities with culturally defined eating habits.

Iron deficiency anaemia is reported to affect 50 - 60% Of young children and pregnant females & 20 - 30% of non pregnant females in developing countries. Iron deficiency anaemia is the most common microcytic anaemia.⁶ Hence, it is a major public health problem with adverse consequences especially for women of reproductive age and for young children.⁷

The present study is carried out to compare the Serum Iron & Vitamin B12 in

children of different communities in the South Indian state of Telangana.

MATERIAL & METHODS

This is population based cross sectional observational study was conducted on the department of paediatrics in the Chalmeda Anandrao Institute of Medical Sciences, Karimnagar, Telangana, during the period from 1st January 2020 to till reached the sample size. The study was conducted with the approval from the institutional review and ethical committees. In this study includes children were of the age between 5 to 18 years with the 3 different communities like, Hindu, Muslim & others community. The sample size 120 was purposively select from the OPD registered patients, out of these 40 children (20 male & 20 female) between the ages of 5-18 years from each of the 3 communities. Children were excluded those who were below 5 years or above 18 years and those who were consuming iron or B12 supplements.

RESULTS

In this cross sectional observational study to collect the 120 samples (60 male & 60 female) between the ages of 5-18 years from each of the 3 communities.

Table No. 1: Descriptive statistics as per community wise for all laboratory examination.

Community	Others		Hindu		Muslim	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age	12.85	2.65	12.76	3.46	14.96	2.00
Haemoglobin	12.28	2.43	10.88	2.87	12.20	2.10
Haematocrit	37.80	6.78	33.85	7.96	41.46	3.88
Serum Iron	51.35	19.94	54.70	45.55	60.26	40.99
Vitamin B12	227.73	122.12	252.42	135.71	272.79	80.80
MCV	77.83	9.95	75.95	11.36	81.36	6.98
Red Blood Cell	4.88	0.78	4.47	0.90	5.09	0.39
Serum Ferritin	14.96	10.08	13.31	3.80	18.64	12.66
Serum Transferrin	16.96	8.99	19.41	16.97	17.16	9.19
TIBC	334.04	68.08	310.22	73.13	309.39	75.50

In the above table shows that the Others community of age is 12.85 ± 2.65 years, Haemoglobin is 12.28 ± 2.43 g/dL, Haematocrit is 37.80 ± 6.78 %, Serum Iron is 51.35 ± 19.94 µg/dL, Vitamin B12 is 227.73 ± 122.12 pmol/L, Mean Corpuscular Volume (MCV) is 77.83 ± 9.95 fL, Red Blood Cell (RBC) is 4.88 ± 0.78 *10¹²/L,

Serum Ferritin is 14.96 ± 10.08 ng/mL, Serum Transferrin is 16.96 ± 8.99 % & Total Iron Binding Capacity (TIBC) is 334.04 ± 68.08 µg/dL.

In the above table shows that the Hindu community of age is 12.76 ± 3.46 years, Haemoglobin is 10.88 ± 2.87 g/dL, Haematocrit is 33.85 ± 7.96 %, Serum Iron

is 54.70 ± 45.55 $\mu\text{g/dL}$, Vitamin B12 is 252.42 ± 135.71 pmol/L , Mean Corpuscular Volume (MCV) is 75.95 ± 11.36 fL , Red Blood Cell (RBC) is $4.47 \pm 0.90 \times 10^{12}/\text{L}$, Serum Ferritin is 13.31 ± 3.80 ng/mL , Serum Transferrin is 19.41 ± 16.97 % & Total Iron Binding Capacity (TIBC) is 310.22 ± 73.13 $\mu\text{g/dL}$.

In the above table shows that the Muslim community of age is 14.96 ± 2.00

years, Haemoglobin is 12.20 ± 2.10 g/dL , Haematocrit is 41.46 ± 3.88 %, Serum Iron is 60.26 ± 40.99 $\mu\text{g/dL}$, Vitamin B12 is 272.79 ± 80.80 pmol/L , Mean Corpuscular Volume (MCV) is 81.36 ± 6.98 fL , Red Blood Cell (RBC) is $5.09 \pm 0.39 \times 10^{12}/\text{L}$, Serum Ferritin is 18.64 ± 12.66 ng/mL , Serum Transferrin is 17.16 ± 9.19 % & Total Iron Binding Capacity (TIBC) is 309.39 ± 75.50 $\mu\text{g/dL}$.

Table No. 2: Association between Community and Age based on Sex.

Age	Sex		P Value
	Male	Female	
Hindu	12.00 ± 3.55	13.53 ± 3.27	Community P Value = 0.232 Sex P Value = 0.967
Others	13.34 ± 1.54	12.36 ± 3.40	
Muslim	15.29 ± 1.24	14.63 ± 2.55	

In the above table No. 2 shows that the Male of Average Age is 12.00 ± 3.55 years in Hindu Community, 13.34 ± 1.54 years in Others Community & 15.29 ± 1.24 years in Muslim Community. Female of Average Age is 13.53 ± 3.27 years in Hindu Community, 12.36 ± 3.40 years in Others Community & 14.63 ± 2.55 years in Muslim Community. Also shows that Association between Gender and Community with Average Age of P Value is greater than 0.05 that means there is not statistically significant of Community based on Gender as per Average Age the P value is 0.232 which is > 0.05 as well as there is not statistically significant of Gender based on

community as per Average Age the P value is 0.967 which is > 0.05 .

In the below table no. 3 shows that 120 cases were associated between Community and Serum Iron. The overall incidence in the community with Anaemic was 21.7%. The incidence was 25.0% (10 out of 40) in Hindu Community, 25.0% (10 out of 40) in Muslim Community and 15.0% (6 out of 40) in Others Community. The difference of incidence was not significant as p-value was 0.826 which is > 0.05 . Thus there was no significant difference in incidence of Iron Deficiency Anaemia among Communities in study.

Table No. 3: Association between community and Serum Iron level.

Community * Serum Iron	Serum Iron		Total
	Low	Normal	
Others	6 (15.0%) 17.30 ± 3.88	34 (85.0%) 57.36 ± 14.81	40 (100.0%)
Muslim	10 (25.0%) 24.52 ± 4.42	30 (75.0%) 72.17 ± 40.80	40 (100.0%)
Hindu	10 (25.0%) 18.30 ± 6.31	30 (75.0%) 66.84 ± 46.57	40 (100.0%)
Total	26 (21.7%)	94 (78.3%)	120 (100.0%)
Chi Square Value = 0.38, DF = 2, P Value is 0.826			

Table No. 4: Association between Community and Vitamin B 12 level.

Community * Vitamin B12	Vitamin B12		Total
	Low	Normal	
Others	23 (57.5%) 139.45 ± 49.75	17 (42.5%) 347.16 ± 81.17	40 (100.0%)
Muslim	14 (35.0%) 179.55 ± 34.39	26 (65.0%) 322.99 ± 45.60	40 (100.0%)
Hindu	23 (57.5%) 150.73 ± 45.95	17 (42.5%) 389.98 ± 83.79	40 (100.0%)
Total	60 (50.0%)	60 (50.0%)	120 (100.0%)
Chi Square Value = 8.95, DF = 2, P Value is 0.011			

In the above table no. 4 shows that 120 cases were associated between Community and Vitamin B12. The overall incidence in the community with Anaemic

was 50.0%. The incidence was 57.5% (23 out of 40) in Hindu Community, 35.0% (14 out of 40) in Muslim Community and 57.5% (23 out of 40) in Others Community. The

difference of incidence was a significant as p- value was 0.011 which is < 0.05. Thus there was a significant difference in incidence of Low value of Vitamin B12 among Communities in study.

DISCUSSION

This study was conducted in Outpatient department of paediatrics at Chalmeda Anandrao Institute of Medical Sciences, Karimnagar, Telangana. In this study was compare to know the status of Serum Iron and B12 among children in 3 different communities in South Indian state of Telangana and to know the influence of factors like Age, Sex and Diet in case of Serum Iron & Vitamin B12 Deficiency. This is a cross sectional observational study conducted from 1st January 2020 to till reach the sample size.

In this study divide the 120 cases in three communities, community one is Hindu with 40 children (20 male & 20 female), Community second is Muslim with 40 children (20 male & 20 female) & Community third is Others with 40 children (20 male & 20 female) between the ages of 5-18 years. All the Laboratory tests, Haemoglobin, Haematocrit, Serum Iron, Vitamin B12, Mean Corpuscular Volume, Red Blood Cell, Serum Ferritin, Serum Transferrin & Total Iron Binding Capacity were recorded in every case & each test was compared with communities.

In our study, The overall mean values of Age were 13.52 ± 2.93 years, Haemoglobin were 11.79 ± 2.55 g/dL, Haematocrit were 37.70 ± 7.11 %, Serum Iron were 55.44 ± 37.07 µg/dL, Vitamin B12 were 250.98 ± 115.78 pmol/L, Mean Corpuscular Volume (MCV) were 78.38 ± 9.79 fL, Red Blood Cell (RBC) were $4.81 \pm 0.76 \times 10^{12}/L$, Serum Ferritin were 15.64 ± 9.78 ng/mL, Serum Transferrin were 17.84 ± 12.24 % & Total Iron Binding Capacity (TIBC) were 317.89 ± 72.60 µg/dL.

In our study, in three communities, the mean values of Age, Serum Iron & Vitamin B12 were in the range of others community is 12.85 ± 2.65 years, $51.35 \pm$

19.94 µg/dL & 227.73 ± 122.12 pmol/L. In the Hindu community is 12.76 ± 3.46 years, 54.70 ± 45.55 µg/dL & 252.42 ± 135.71 pmol/L. In the Muslim community is 14.96 ± 2.00 years, 60.26 ± 40.99 µg/dL & 272.79 ± 80.80 pmol/L.

In our study, the prevalence of Serum Iron was found to be 21.7% (26 out of 120) & the difference in prevalence of Iron deficiency anaemia & Community based was not significant as P value was 0.826.

Similar, we compare to result obtained by Chithambaram NS⁸ However reported the Nutritional anaemia was seen in 63 children, out of which only iron deficiency was seen in 68.25% (43 out of 63) children.

Similarly, Rekha Kumari et. al.⁹ the overall prevalence of anaemia was found to be 50% which is less than the finding in Motihari town and more than the Rohtas district. This finding is slightly lower than UNICEF finding of 56% in India and similar to WHO worldwide finding.

Similar, Kundap R¹⁰ The prevalence of IDA in the study population was 66%. (rural=81%, urban=51%). IDA prevalence was 54% in primigra- vida and the prevalence increased as gravid status increased. Iron deficiency anaemia was seen statistically significantly associated with residence, illiteracy, type of diet, and grvida status of the pregnant women.

In our study, the prevalence of Vitamin B12 was found to be 50.0% (60 out of 120) & the difference in prevalence of Iron deficiency anaemia & Community based was a significant as P value was 0.011 which is comparable to the result obtained by Parischa SR et.al.¹¹ in 2011 However reported the overall prevalence of Vitamin B12 deficiency is 65.6% (254 out of 396) also they conclude that Micronutrient deficiencies are common in this population. Rural Indian children between 1 and 2 y of age who continue to breast-feed should be especially targeted during micronutrient-supplementation programs.

Similar, Bernadette N. Ng'eno¹² & Co Workers studied that, Vitamin B12 deficiency is prevalent among children six to 23 months old in two districts of Nepal, with a higher prevalence of deficiency among children aged six to 11 and 12 to 17 months. It may also be contributing to the high prevalence of anaemia found in these children, although there were no significant differences in vitamin B12 deficiency by anaemia status.

Similar, Suprava Patel¹³ in 2017 The prevalence of vitamin B12 deficiency in adolescent girls was found to be 58.58% which corroborated with the results published by Rajendra et al., who depicted prevalence of 50% in adolescent groups in Meeyannoor, Kerala.¹⁴ Similarly, Kapil et al. also reported prevalence of 68.3% in children of 12 to 18 years in New Delhi.¹

CONCLUSION

The overall prevalence of anaemia (low Haemoglobin) was found to be 43.33%. There was no significant difference between the prevalence of anaemia in 3 different communities. The overall prevalence of Low Serum Iron was found to be 21.7%. There was no significant difference between the prevalence of Serum Iron in 3 different communities. The overall prevalence of Vitamin B12 deficiency was found to be 50.0%. There was a significant difference between the prevalence of Vitamin B12 in 3 different communities.

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