ISSN: 0976-822X

Available online on www.ijcpr.com

International Journal of Current Pharmaceutical Review and Research 2022; 14(3); 22-26

Original Research Article

ESTIMATION OF FERRITIN IN DIFFERENTIAL URBAN–RURAL FEMALE ASSOCIATION- A CROSS-SECTIONAL STUDY

B. Maheswari Reddy[1], Saba Shafeen[1], Chinmaya Keshari Sahoo[2]

[1]Department of Pharmacology, Joginpally B.R. College of Pharmacy, Yenkapally (V), Moinabad (M), Hyderabad-500075

[2]Associate Professor, Department of Pharmaceutics,College of Pharmaceutical Sciences, (Affiliated to BijuPatnaik University of Technology), Puri, Odisha, India-752002

Received: 30-07-2022 / Revised: 12-08-2022 / Accepted: 20-08-2022
Corresponding author: Chinmay Keshari Sahoo
Conflict of interest: Nil

Abstract

Iron stores in the body exist primarily in the form of ferritin. Iron deficiency Anaemia is the state where iron level is below normal, low transferrin saturation and ferritin as well as high iron binding capacity. The aim of this study is to find out pervasiveness of iron deficiency anaemia in teenage (10-16 years) female students living in Rural and Urban areas Moinabad village, Ranga Reddy District, India. A Total 150 teenage female students were randomly chosen from different Government Schools. The evaluation of Body Mass Index (BMI), haemoglobin (Hb) and serum ferritin (SF) levels by using BMI standard formula Hemo-Cue Hb 201+ analyzer and ELISA method respectively. The mean of BMI, Hb and SF levels were observed at 17.21± 0.71, 10.93±0.91 and 36.86 ± 23.11 respectively from all female students. Iron Deficiency Anaemia was observed in 67.3% of students. Nutritious deficiency is the common cause of iron deficiency anaemia in female students.

Keywords: Female students, Body mass index, Haemoglobin, Iron deficiency Anaemia, Serum ferritin.

INTRODUCTION

Anaemia is a health condition characterized by a low level of haemoglobin (HGB) in which blood has fewer red blood cells (RBC). A low HGB level impairs blood from delivering oxygen to the body tissues [1]. The causes of anaemia are a genetic defect, infections (malaria, hookworm, and bone marrow disease), deficiency of iron, vitamins, folate, copper, and total nutritional deficiencies. Nutritional deficiency anaemia [2] is the most common type. The symptoms of anaemia are strongly associated with the quality of life, a poor-quality diet due to poverty, socioeconomic status, residence, education, and pregnancy status. The lower level of Hb (< 12 g/dl) in adult non-pregnant women is diagnosed as anaemia as well as (< 11 g/dl) during pregnancy. Anaemia occurs due to deficiency of micronutrient, physiological adaptations during pregnancy, and infections [3, 4]. The other distal factors are maternal age, education status, marital status, occupation [5], rural/urban residence, household wealth index [6], use of hormonal contraceptives, and BMI [7].

Former studies in India reported on children, pregnant and lactating women's nutrition, and associated factors and identified factors linked to anaemia. But these studies limited to specific areas [8]. Iron deficiency anaemia is the state where iron content of the body is below normal, low transferrin saturation and ferritin as well as high iron binding capacity. National Family Health Survey-3 shows the prevalence of anaemia in 56.2% of women of 15–49 year, 79.2% among children aged 6–35 months, 57.9% in pregnant women. They are susceptible due to menstrual loss, adolescent pregnancies, and less intake and absorption. Iron stores in the body exist primarily in the form of ferritin. A low serum ferritin value reflects depleted iron stores, but not necessarily the severity of the depletion as it progresses[9].

Material and Methods

Materials

Ethylene diamine tetra acetic acid (EDTA) was obtained from SN Chemicals, Thane.

Experimental design

This descriptive cross-sectional study [10] was conducted during the period of 15th July 2017 to 26th July 2018 on the female students at Government High Schools, belonged to rural and urban areas of Moinabad village, Ranga Reddy District, India. Total of 150 female students (10-16 years) were selected by visiting different High schools. Socio-demographic, Socioeconomic and other relevant data were collected by questionnaire and consent was obtained from participants. Female students of age between 10-16 years from Govt. High Schools were included in the study who were belonged to rural and urban areas of Moinabad town. The questions include educational, social status, age, sexual, and lifestyle of diet. Three classes were made taking participated students basing on their parents monthly income.

Lower income class's monthly income is of <14,000 INR. Middle income class's is monthly income is of range of 16,000-25,000 INR. Upper middle-income class's income was >28,000 INR. After questionnaire, those satisfied all criteria. They were observed for BMI, Hb and SF levels.

BMI

BMI [11] was calculated by dividing the weight in kg by the square of height in meters. Serum Ferritin and Haemoglobin determination [12, 13] 5 ml of blood sample was taken from each of the female students. It was poured into the tube containing EDTA. For the determination of SF, 3 ml of blood was transferred into a test tube. It was centrifuged for 15 minutes at 3500 r.p.m by keeping it at room temperature for about 30 minutes. Haemoglobin was estimated from 2 ml of blood sample in Diagnostic & Research Laboratory located nearby and simultaneously remaining serum samples were stored at 20C for future use. Haemoglobin concentration was determined by Hemo Cue HB 201+ analyzer and Serum Ferritin concentration was estimated by using ELISA method (Enzyme linked immunosorbent assay).

Data Analysis [14]

The SPSS version-(22) was used to code check and analyze data required for statistical parameters which include simple mean, frequency distribution, standard deviation, Correlation and Co-efficient for the interpretation of observed results.

Results and discussion

The data of the volunteers BMI, Hb, and SF were obtained. This is shown in Table 1.Total 48.3% (n=70) volunteers belonged to urban areas and 54.7% (n=80) volunteers belong to rural areas. Our findings also revealed that mean of BMI=17.21±0.71, Hb=10.93±0.91 and S.F= 36.86±23.11 respectively was observed in all female students. For urban

volunteers, means of BMI (17.40±0.63), Hb (11.52±0.53) and S.F (44.33±24.6)

Variable	Frequency		BMI Mean±S.D	Hb (g/dl) Mean±S.D	S.F(µg/l) Mean±S.D	P value
	N	%				
Urban	70	46.3	17.40±0.63	11.52±0.53	44.33±24.69	0.482
Rural	80	53.7	17.04±0.73	10.04±0.86	30.15±19.42	
Total	150	100.0	17.21±0.71	10.93±0.91	36.86±23.11	

*P < 0.05 show the significant results, $\chi 2$ = 2.42 Hb=Haemoglobin, S.F=Serum Ferritin, BMI=Body mass index, S.D =Standard deviation

The illustration made in this table clarifies that amongst all volunteers participated in present study 34.6% (n=49) had normal level of Hb, 52% (n=75) endure mild anaemia (10-< 11.9%g/dl) and 17.93% (n=26) endure moderate anaemia (7-<9.9 g/dl). Thus, about 65.6% (n=101) endured mild and moderate iron deficiencies taking the Cut-off points of haemoglobin as less than 12g/dl. Comparatively, low percentage of volunteers found affected from mild and moderate anaemia belonged to the younger aged group 10 to 12 years. Meanwhile high percentage of volunteers suffering from mild and moderate iron deficiency anaemia belonged to the older age groups of 13 to 14 years and 15 to 16 years. Therefore, the mean of haemoglobin levels for the older age groups remained lowest amongst all. This might have associated with the onset of menstruation after reaching age of menarche, i.e. 14 years of the age. Blood test for serum ferritin is the preferred biochemical test and it shows significant correlation with total body iron stores. Keeping in view the established cut off level Serum ferritin.

Poor socioeconomic status and malnutrition are the chief causes behind the prevalence of anaemia in India. Lack of health education, inappropriate health facilities particularly in remote and neglected areas of developing countries are of great significance behind anaemia. It is recognized in a study that there are variations in stored levels of iron.

In present comprehensive study, the prevalence of Iron deficiency anaemia amongst female students was 67.3%, i-e quite high in female students of Moinabad Village. Plenty of 18 anaemic girls, i-e. 85.7% were falling in mild Anaemia, whereas three of all had moderate Anaemia and none of them was reported having severe Anaemia. In our study findings revealed that out of 100% subjects, about 32.7% female students had normal level of haemoglobin, 50% suffered from mild deficiency and 17.33% suffered from moderate deficiency and severe Anaemia was not seen. Thus, about 67.3% suffered from mild and moderate iron deficiencies taking the Cut-off point of haemoglobin as less than 12g/dl, majority of the students who endured mild degree Anaemia were (10-< 11.9 g/dl) and 35.3% girls had serum ferritin<12 g/dl. Therefore, the mean value of haemoglobin levels was the lowest for the older age groups. This can be identified with the onset of menstruation after 14 years of the age. Majority of volunteers below the cut-off level of 12g/dl belonged to rural areas as shown in Table 2.

Table 2: Frequency distribution of Female Students According to the severity of Anaemia (N =150)

Variable (Age groups)	Normal (Hb>12 g/dl)		Mild (10-< 11.9 g/dl)		Moderate (7-<9.9 g/dl)		S.F >12µg/l		S.F <12µg/l		P value
	n	%	n	%	N	%	N	%	n	%	
10-12 years	22	14.0	19	13.0	6	3.32	42	26.46	10	6.66	0.112
13-14 years	18	12.33	24	16.33	10	6.2	32	22.03	17	11.33	0.234
15-16 years	12	8.33	35	23.66	13	8.5	24	15.0	26	17.33	0.115
Urban	33	22.33	34	23.0	7	4.7	56	39.0	16	10.66	0.374
Rural	19	12.33	43	29.0	21	13.23	42	26.66	37	24.66	0.216
Total	52	34.66	77	52.0	28	17.93	98	65.66	53	35.32	0.484

*p< 0.05 show the significant results, $\chi 2 = 0.638$

Conclusion

The most common reason of Fe deficiency anaemia in female students is due to nutrition deficiency. Current research reports that Hb level is quite less in female students of both urban and rural areas. To avoid iron deficiency good diet and lifestyle is recommended.

References

1. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization,2011
2. WHO. Global nutrition targets 2025 anaemia policy brief (WHO/NMH/ NHD/14.4). Geneva: World Health Organization; 2014.
3. Clara Camaschella. Disability during pregnancy.The New England Journal of Medicine. 2015;1832–43.
4. WHO. World malaria report 2018. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.
5. Kibret KT, Chojenta C, Arcy ED, Loxton D. Spatial distribution and determinant factors of anaemia among women of reproductive age in Ethiopia: a multilevel and spatial analysis. British Medical Journal. 2019;9(4):e027276
6. Hossain M, Islam Z, Sultana S, Rahman AS, Hotz C, Haque A, et al. Nutrients efectiveness of workplace nutrition programs on anaemia status among female readymade garment workers in Bangladesh: a program evaluation. Nutrients. 2019; 11:1–23
7. Addis Alene K, Mohamed Dohe A. Prevalence of anaemia and associated factors among pregnant women in an urban area of Eastern Ethiopia, vol. 2014, Anaemia. Hindawi; 2014
8. Hakizimana D, Nisingizwe MP, Logan J, Wong R. Identifying risk

factors of anaemia among women of reproductive age in Rwanda: a cross-sectional study using secondary data from the Rwanda demographic and health survey 2014/2015. Bio Med Central Public Health. 2019;19(1):1–11

9. Kawo KN, Asfaw ZG, Yohannes N. Multilevel analysis of determinants of anaemia prevalence among children aged 6–59 months in Ethiopia: classical and Bayesian approaches , vol. 2018, Anaemia. Hindawi; 2018
10. Gibson R. Principles of nutritional assessment, 2nd ed. Oxford, UK, Oxford University Press, 2005:908.
11. Uberoi Is, De Sweemer C, Taylor CE. A study of anaemia among rural preschool children. Indian Journal of Research. 1972;60(5):793-799
12. World Health Organization, WHO Global Database on Anaemia.World wide prevalence of anaemia (1993-2005).
13. World Health Organization. Nutrition in adolescence-Issues and Challenges for the Health Sector. Issues in Adolescents Health and Development. 2005.
14. Sharma A, Prasad K, Rao KV. Identification of an appropriate strategy to control anaemia in adolescent girls of poor communities. Indian Pediatrics. 2000;37(3):261-267