Original Research Article

ESTIMATION OF SERUM IRON AND SERUM FERRITIN AMONG WOMEN IN REPRODUCTIVE AGE GROUP

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Abstract

Background: Iron stores among women in reproductive age group has been consistently low in the last few decades with one third of the women being affected by anemia. Iron deficiency is one of the leading risk factors for disability and death worldwide affecting an estimated 2 billion women. **Objectives:** To estimate the levels of iron stores in reproductive age group women taking vegetarian and non-vegetarian diet. To compare the amount of iron stores among the study population **Materials and Methods:** Study Design Cross Sectional Study. SAMPLE SIZE 200 Women (100 Vegetarian, 100 Non vegetarian).The data is collected from a Gandhi Medical College and hospital, Hyderabad. **Results:** According to the study, Serum Iron and Serum Ferritin levels among women of non-vegetarian diet are high compared to women of vegetarian diet in reproductive age group. Serum Iron has Mean Rank 122.19 µg/dl and Serum Ferritin has Mean Rank114.02 ng/ml,p-value 0.000 < 0.05 (Significant) in non-vegetarian group. Serum Iron has Mean Rank 78.81µg/dl and Serum Ferritin has Mean Rank 86.98ng/ml, p-value 0.000 < 0.05 (Significant)in vegetarian group. **Conclusion:** The current study suggests that women who are taking non vegetarian diet have high Serum Iron and Serum Ferritin levels compared to women who are taking vegetarian diet though hemoglobin levels being normal. Thus every three months' serum iron and serum ferritin estimation is needed for women in reproductive age group.

INTRODUCTION

Iron stores among women in reproductive age group has been consistently low in the last few decades with one third of the women being affected by anemia.[1]Iron deficiency is one of the leading risk factors for disability and death worldwide affecting an estimated 2 billion women.[2]Ever since the inception of anemia monitoring in NFHS-2 survey (2005-06), a declining trend was observed for all groups in the successive NFHS surveys up to NFHS 4,but a sudden rise in anemia prevalence was observed during NFHS-5 (2019-2021).[9]The anemic adolescents (15-19 years) who were reported only in NFHS-4 and NFHS-5 showed an increase of 2% for male (29.2 to 31.1) and 5% (54.1 to 59.1) for female in a period of half decade.[9]

Table 1: Prevalence of anemia in India and World and targets to be achieved by India

	#Prevalence in World (2019)	Prevalence in India(NFHS-5)	(%difference)	Targets to Achieve by India	
				National target 2022 (of Poshan Abhiyan, India) [3]	Global Nutrition Target, 2025 (by WHO) [5]
Women of reproductive age	29.9%	57.0%	(-27.1)	35%	23%
Non-pregnant women of reproductive age	29.6%	57.2%	(-27.6)		
Pregnant women	36.5%	52.2%	(-15.7)	32%	
# WHO, Global Anaemia estimates, 2021 Edition[10]					

Objectives

1. To estimate the levels of iron stores in reproductive age group women taking vegetarian and non-vegetarian diet.
2. To compare the amount of iron stores among the study population.

MATERIALS AND METHODS

Study Design: Cross-Sectional Study.
Sample Size: 200 (100 - Women consuming **Vegetarian diet** [Group-1], 100 - Women consuming Non vegetarian diet [Group-2]).
The data is collected from a tertiary care hospital.

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International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN(O): 2687-5365; ISSN(P): 2753-6556

Statistical analysis was done using following tests: Mann Whitney Test, Kruskal-Wallis Test, Chi-square Test, Mean and Standard deviation.

Inclusion Criteria

Age group 15-49 yrs.

Non pregnant women.

Vegetarian diet women.

Non vegetarian diet women consuming egg, meat, poultry, fish,2 times per day,3 days in a week.

Exclusion Criteria

Age group below 15yrs and above 49 yrs.

Pregnant women.

Women on iron supplementation.

Any systemic illness and on any medication.

Alcoholics and smokers.

Protocol

The study protocol was approved by the institutional ethical committee.

Parameters: Hb, Count, Haematocrit, MCV, MCH, MCHC, Serum Iron and serum ferritin. A venous blood sample of 5ml is collected from the ante cubital vein in a disposable syringe from the subject for haematological investigations. All these tests were carried out with standard laboratory techniques. The participant's consent was taken prior to the study. Participants were given a questionnaire related to the study to fill out and submit. The tests were done in a quiet place with minimal distractions at a desk or table the participant can use to write on.

Statistical analysis was done using following tests: Mann Whitney Test,Kruskal-Wallis Test, Chi-square Test, Mean and Standard deviation.

RESULTS
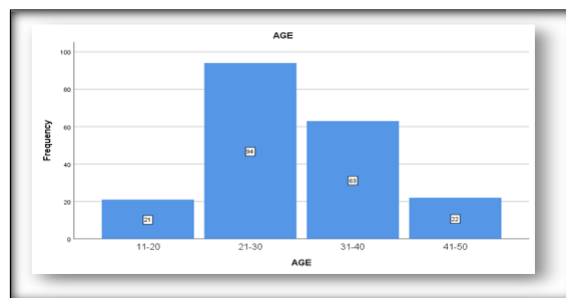
Figure 1: Total no. Of women in different age groups
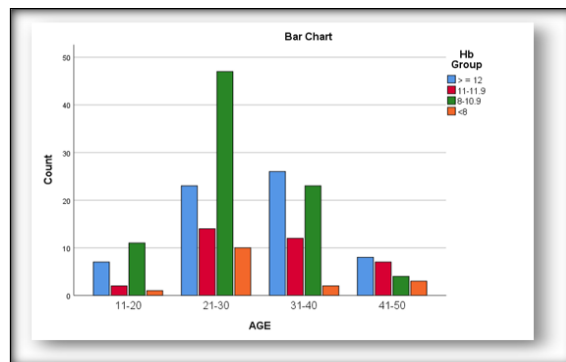
Figure 2: Hb levels in different age groups

According to the study, Figure: 2 shows Grading of anemia in the study subjects in different age groups. In the age group (11- 20) 7 belong to >12 g/dl Hb ,2 belong to 11-11.9 g/dl Hb ,11 belong to 8-10.9 g/dl Hb ,1 belong to < 8 g/dl Hb. (21-30) 23 belong to >12 g/dl Hb ,14 belong to 11-11.9 g/dl 60 Hb ,47 belong to 8-10.9 g/dl Hb ,10 belong to < 8 g/dl Hb. (31-40) 26 belong to >12 g/dl Hb ,12 belong to 11-11.9 g/dl Hb ,23 belong to 8-10.9 g/dl Hb ,2 belong to < 8 g/dl Hb.(41-50) 8 belong to >12 g/dl Hb ,7 belong to 11-11.9 g/dl Hb ,4 belong to 8-10.9 g/dl Hb ,3 belong to < 8 g/dl Hb.

Serum Iron and Serum Ferritin levels among women of non-vegetarian diet are high compared to women of vegetarian diet in reproductive age group.

Non Vegetarian

Serum Iron has Mean Rank 122.19 µg/dl.

Serum Ferritin has Mean Rank 114.02 ng/ml.

Vegetarian Group

Serum Iron has Mean Rank 78.81µg/dl.

Serum Ferritin has Mean Rank 86.98ng/ml.

Table 2: Kruskal-wallis test

Ranks				
	AGE	N	Mean Rank	p-value
SERUM IRON (µg/dl)	10-20	21	128.1	0.032 < 0.05 (Significant)
	21-30	94	89.97	
	31-40	63	103.29	
	41-50	22	111.16	
	Total	200		
	10-20	21	139.76	0.001 < 0.05 (Significant)
	21-30	94	93.22	
	31-40	63	90.99	

	41-50	22	121.36		
	Total	200			

Table 3: Mann-whitney test

Ranks

	DIET	N	Mean Rank	Sum of Ranks	
SERUM IRON (µg/dl)	VEG	100	78.81	0.000 < 0.05 (Significant)	
	NON VEG	100			
	Total	200			
SERUM FERRITIN (ng/ml)	VEG	100	86.98	8698.00	0.001 < 0.05 (Significant)
	NON VEG	100	114.02	11402.00	
	Total	200			

- In our study the results according to Kruskal-Wallis test in table : 2 ,Serum iron(µg/dl) has 0.032 < 0.05 P Value significant, Serum ferritin has 0.001 < 0.05 P Value significant, according to age group.
- Table: 3 ,Mann-Whitney Test results are as follows , Hb has 0.000 < 0.05 p-value (Significant), SERUM IRON (µg/dl) has 0.000 < 0.05 p value (Significant), SERUM FERRITIN (ng/ml) has 0.229 > 0.05 p-value (Not Significant), according to diet in Mann-Whitney Test.

DISCUSSION

- Anemia is the most widespread clinical nutritional deficiency disease, a topic of global concern is always among the prime agendas of various development goals in India and globally.[7]
- India ranks 170 out of 180 countries for anemia among women, according to the global nutrition survey, 2016.[11] While, WHO (in 2012) had targeted to achieve 50% reduction of anemia in reproductive age women by 2025.[8]
- Dietary iron bioavailability is low in populations consuming monotonous plant-based diets. The high prevalence of iron deficiency in the developing world has substantial health and economic costs, including poor pregnancy outcomes, impaired school performance, and decreased productivity.
- Recent studies have reported how the body regulates iron absorption and metabolism in response to changing iron status by upregulation or downregulation of key intestinal and hepatic proteins.
- Targeted iron supplementation, iron fortification of foods, or both, can control iron deficiency in populations. Although technical challenges limit the number of bioavailable iron compounds that can be used in food fortification, studies show that iron fortification can be an effective strategy against nutritional iron deficiency
- Iron is rightly considered a nutrient of concern for vegetarians.[12]This is especially true for child bearing age group women.[4] To overcome iron deficiency in vegetarian diet women of child bearing age is much more difficult to meet with vegetarian diet.[10]
- Iron absorption from vegetarian diet can be improved by modifying food selection and food combination. Which results in greater absorption of iron.[2]

Limitations of the Study

- Few parameters were cost effective to use for the study purpose. Funding was one of the limitation steps for my study.

CONCLUSION

- The current study suggests that women who are taking non vegetarian diet have high Serum Iron and Serum Ferritin levels compared to women who are taking vegetarian diet inspite of hemoglobin levels being near to normal.
- Every three months serum iron and serum ferritin estimation is needed for women in reproductive age group [3].

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International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN(O): 2687-5365; ISSN(P): 2753-6556