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DETECTION AND CORRECTION OF IRON DEFICIENCY ANEMIA IN YOUNG FEMALES

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Abstract

Anemia refers to a decrease in the total number of circulating red cells with decrease in hemoglobin when compared with normal for that age group and gender. Iron deficiency (ID) is one of the most common micronutrient deficiencies worldwide and it is designated as a reduction of total body iron.

Object

To detect the prevalence of anemia in young adult females. How to control the iron deficiency in adult female.

Method

A prospective study was undertaken among age varies from 17 to 28 years subject in Anand Gujarat. CBC and peripheral smear were noted.

Result

Subject were classified based on severity of iron deficiency anemia. We found that adult females associated with iron deficiency anemia in which two categories mild (32%) and moderate (27%).

Conclusion

As per the study females were more prone to iron deficiency anemia.

Key words

anemia, iron deficiency, severity, Iron.

1. Introduction

Decrease in oxygen carrying capacity in blood due to low level of hemoglobin or decrease RBC mass or both for particular Age, Gender and Climate is known as Anemia. There are several types of anemia, and they can be classified based on the underlying cause. Some common types of anemia include iron deficiency anemia, hemolytic anemia, vitamin deficiency anemia, aplastic anemia, sickle cell anemia etc(1).

Pathophysiology

Iron is a crucial element that is primarily regulated through dietary consumption, absorption in the intestines, and the process of iron recycling(1). Iron plays a crucial role in the human body as it is a vital component of both hemoglobin in red blood cells and myoglobin in muscles. These two proteins alone account for approximately 60% of the total iron content in the body. Furthermore, iron is essential for various cellular mechanisms, including enzymatic processes, DNA synthesis, and the generation of energy in mitochondria(2)

Iron Metabolism

Iron is present in hemoglobin, myoglobin and iron containing enzymes of cytochrome system. Daily requirement in diet should contain 10-15 mg of elemental iron and with approximately 8-10% absorption the net requirement per day is 1 mg in males and 1.5 mg in females in their reproductive period(3).

Iron Absorption

Absorption of iron occurs in the duodenum and upper jejunum and depends on specific carrier mechanisms. The transporter protein Divalent Metal Transporter 1 (DMT1), located on the apical surface of enterocytes, facilitates the uptake of non-haem ferrous iron (Fe^{2+}) from the intestinal lumen. Ferric iron (Fe^{3+}) in the intestinal lumen must be reduced to ferrous iron (Fe^{2+}) by duodenal cytochrome B reductase (DcytB) before uptake by DMT1. The iron within enterocytes can either be stored as ferritin, or transferred into the bloodstream via the protein ferroportin. Once in the blood, iron is bound to the transport protein transferrin, and is mostly transported to bone marrow for erythropoiesis. Some iron is taken up by macrophages in the reticuloendothelial system as a storage pool.Approximately 1-2mg of iron is lost from the body each day from the skin and gastrointestinal mucosa. A well-balanced diet contains sufficient iron to balance this loss, as approximately 10% of the 10-20 mg of dietary iron in a balanced diet is absorbed each day(2, 4).

Storage of Iron

The iron is store inside the human body in the two forms A. Hemosiderin and B. ferritin that can be store in liver, spleen, bone marrow, duodenum, skeletal muscle, and other anatomical areas(5).

Treatment

Iron treatment done in two phases 1 oral 2 intravenous. as per my study we gave oral iron tablet to treat the iron deficiency anemia(3).

2. Material & Methodology

Data collection

After obtaining the person approval the current investigation was conducted. Data collected from 104 person varying in age group of 17-28 years.

Inclusion criteria

i. All cases of suspected iron deficiency anemia belonging the age group of 17 – 28 years.
ii. All the subject having hemoglobin less 12 g/dL.

Exclusion criteria

i. Subject previously transfused with blood within 120 days.
ii. Subject already iron therapy.
iii. Above 12 g/dl

Methods

In this study we have done complete blood count and peripheral blood smear.

3. Result

Table 1: Prevalence of anemia

	Total Subject	Anemic	Normal	Mild	Moderate	Severe
No. of Subjects	104	61	43	33	28	Nil
Percentage	100%	59%	41%	32%	27%	Nil

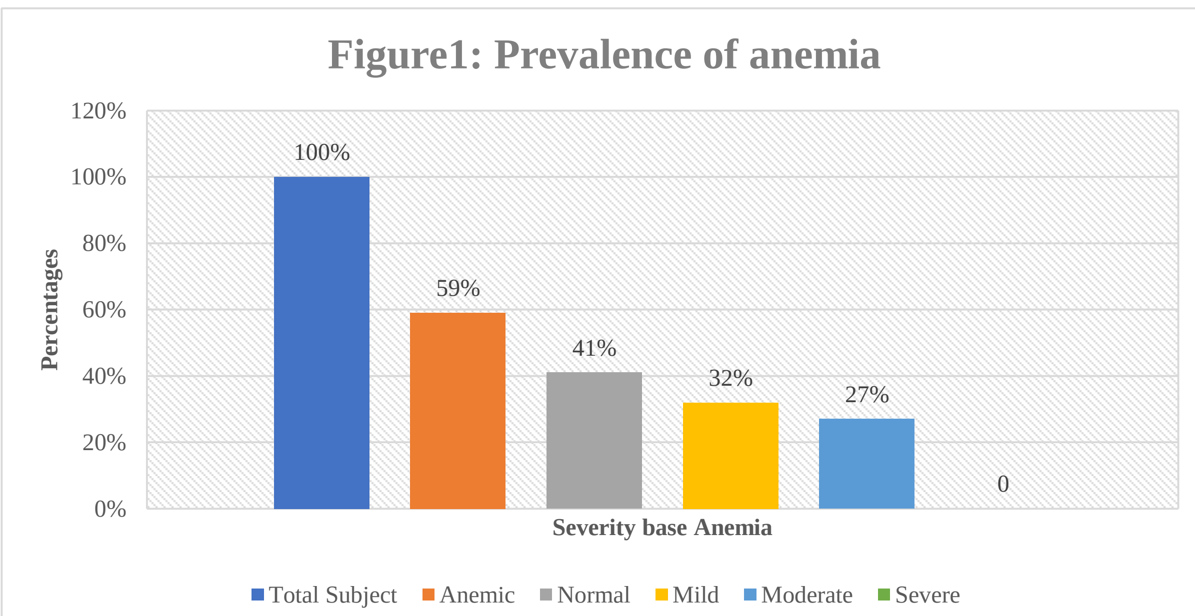


Table 2: age incidence in study and control group

Age (Years)	No. of Subject	Percentage
17-20	74	71.15%
21-28	30	28.85%
Total	**104**	**100%**

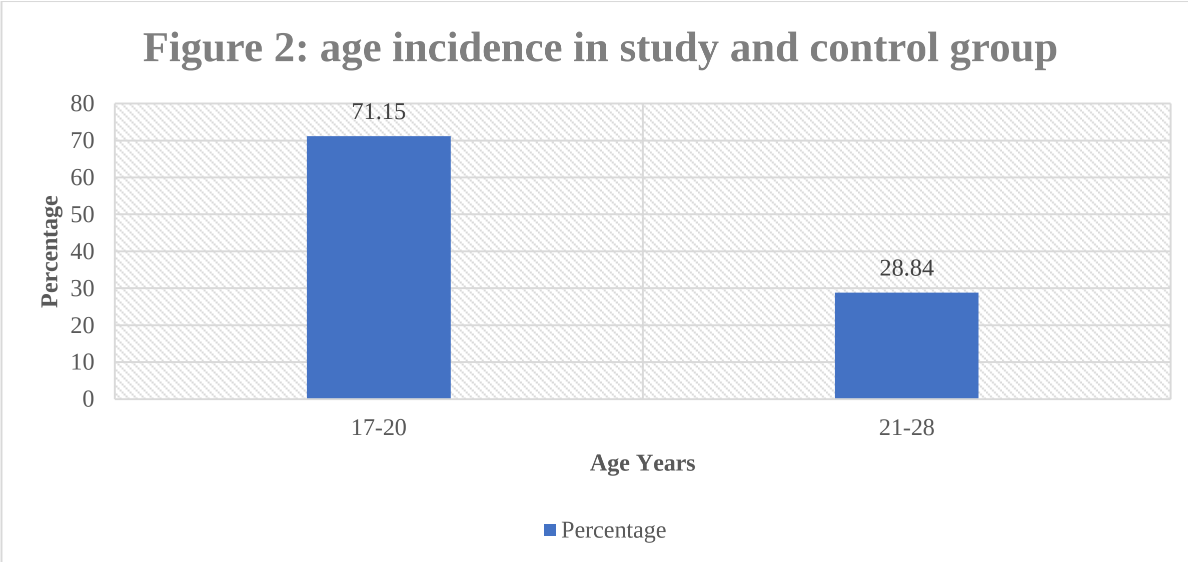


Table 3: Mean value of hematology parameter before treatment of anemia n=104:

variables	Minimum	Maximum	Mean	Std. deviation
Hb (gm/dl)	8.2	14.3	11.54	1.26
RBC mill/cumm	2.92	4.79	3.81	0.39
HCT (%)	16.5	40.8	32.88	3.62
MCV (fl)	58.5	125	87.37	11.56
MCH (p g)	20	44.1	30.68	4.44
MCHC (gm/dl)	30.8	37.6	34.87	1.16
RDW-CV (%)	12.1	33.9	16.99	3.20

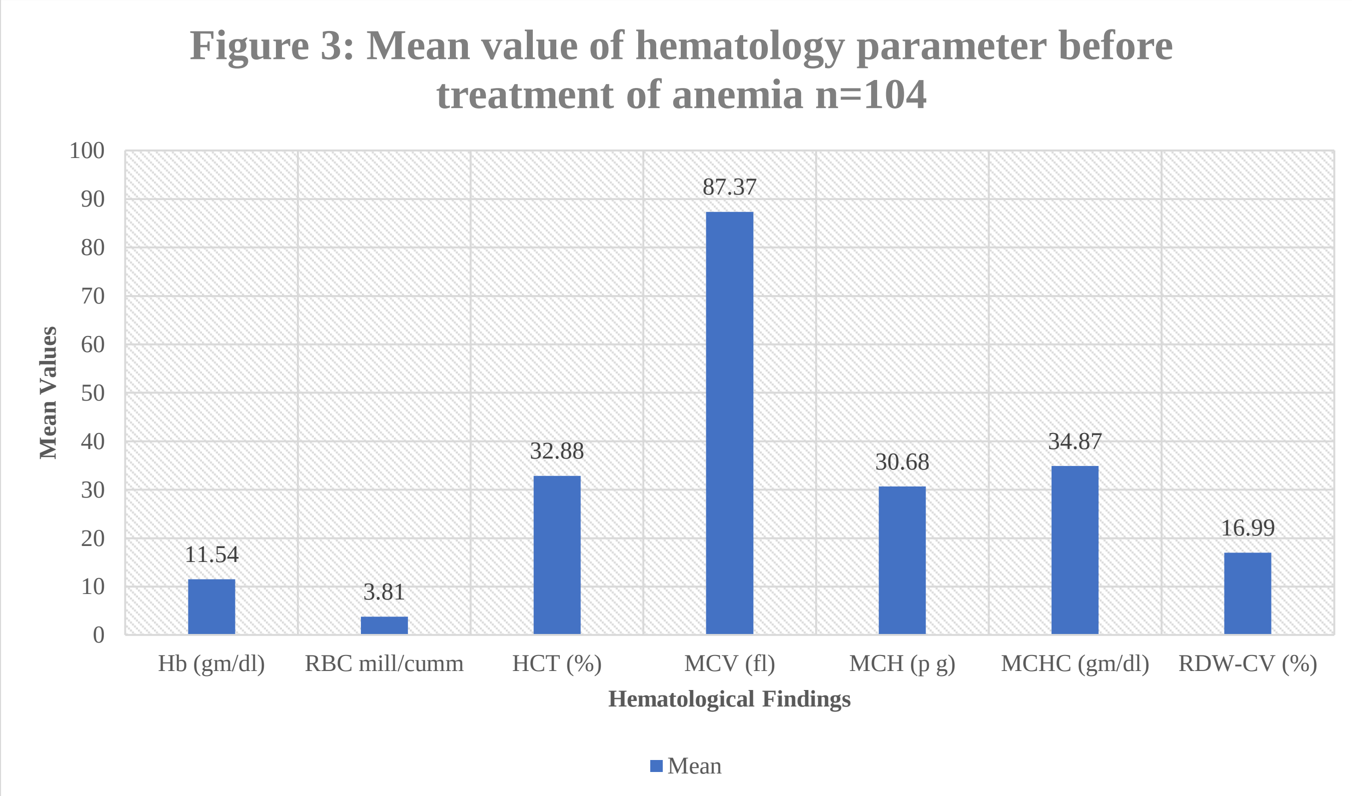


Table 4: comparison of hematological findings between anemic and normal

variables	Study statistic			Test statistic		
	subjects	**Mean**	**SD**	**T test**	**P values**	**Remarks**
HB(g/dl)	Anemic	10.72	0.93	12.45	<0.0001	HS
	Normal	12.70	0.56			
RBC (mill/cmm)	Anemic	3.78	0.42	1.04	0.2998	IS
	Normal	3.86	0.33			
HCT (%)	Anemic	31.2	2.40	7.57	<0.0001	HS
	normal	35.52	3.42			
MCV (fL)	Anemic	83.04	11.37	5.07	<0.0001	HS
	Normal	93.51	8.71			
MCH (pg)	Anemic	28.98	4.38	5.24	<0.0001	HS
	Normal	33.10	3.23			
MCHC(g/dl)	Anemic	34.53	1.20	3.73	<0.0003	HS
	Normal	35.34	0.91			
RDW-CV (%)	Anemic	18.04	2.78	4.34	<0.0001	HS
	Normal	15.49	3.17			

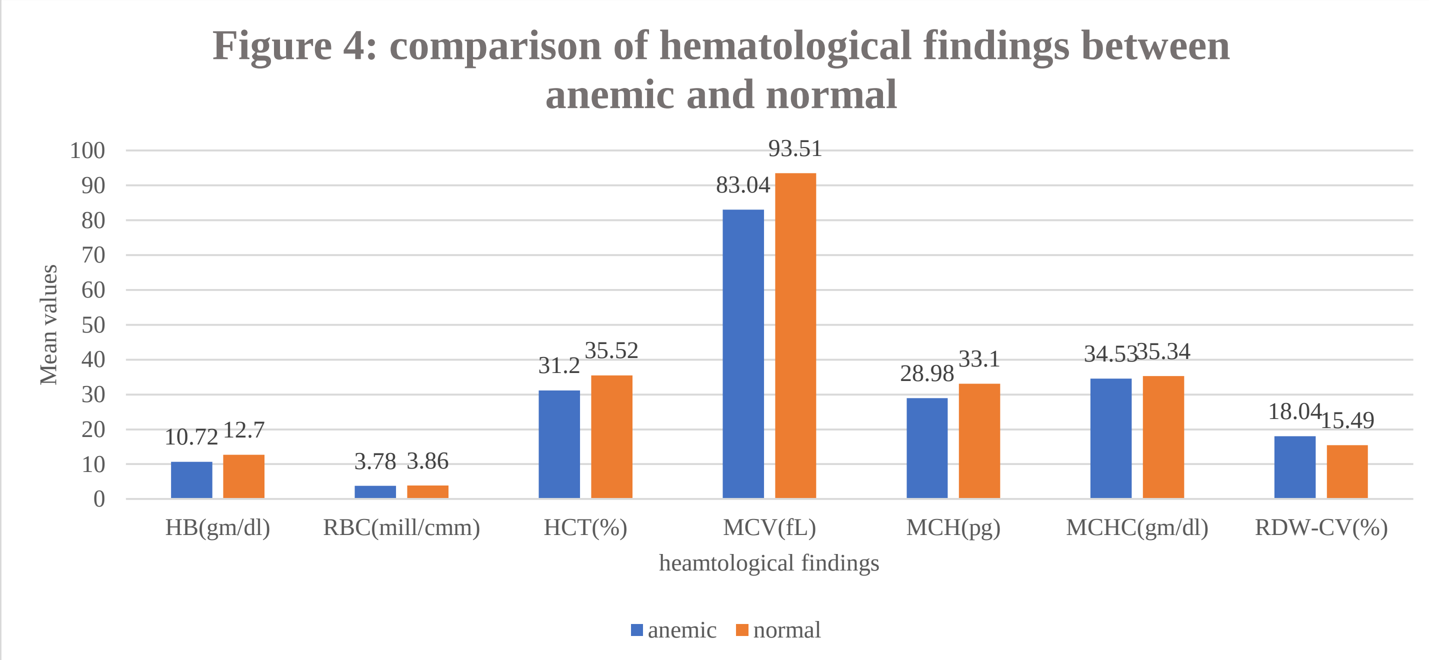
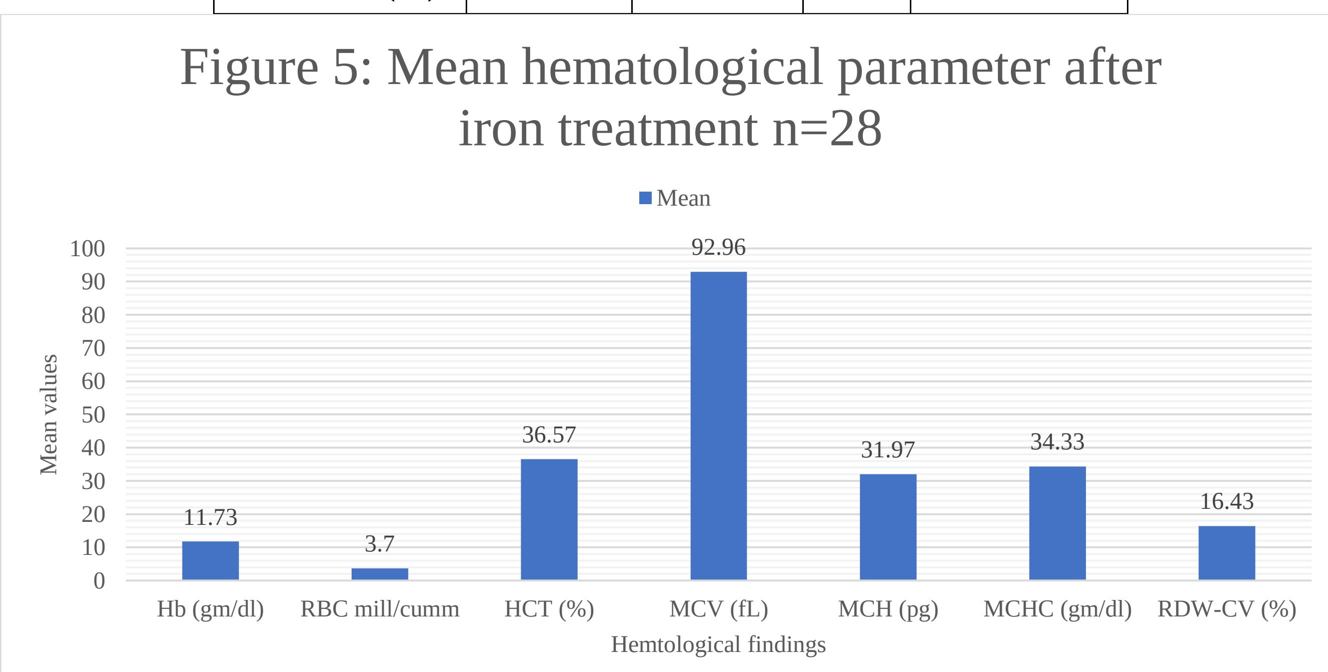


Table 5: Mean hematological parameter after iron treatment n=28

variables	Minimum	Maximum	Mean	Std. deviation
Hb (gm/dl)	9.8	13.8	11.73	0.87
RBC mill/cumm	3.12	4.37	3.70	0.36
HCT (%)	29.2	99	36.57	12.28
MCV (FL)	67.2	121.6	92.96	10.87
MCH (pg)	22.5	41.2	31.97	4.07
MCHC (gm/dl)	32.6	36.7	34.33	0.99
RDW-CV (%)	12.8	20.5	16.43	2.20



Comparison table 5.1 pre and post treatment (mean + SD)

	Pre treatment	Post treatment
variables	Mean + SD	Mean + SD
Hb (gm/dl)	10.72±0.93	11.73±0.87
RBC mill/cmm	3.78±0.42	3.70±0.36
HCT (%)	31.2±2.40	36.57±12.28
MCV (fL)	83.04±11.37	92.96±10.87
RDW-CV (%)	18.04±2.78	16.43±2.20

Table 6: Who took medication?

Taking medication	*n* %
Yes	28 (45.90 %)
No	33 (54.09 %)

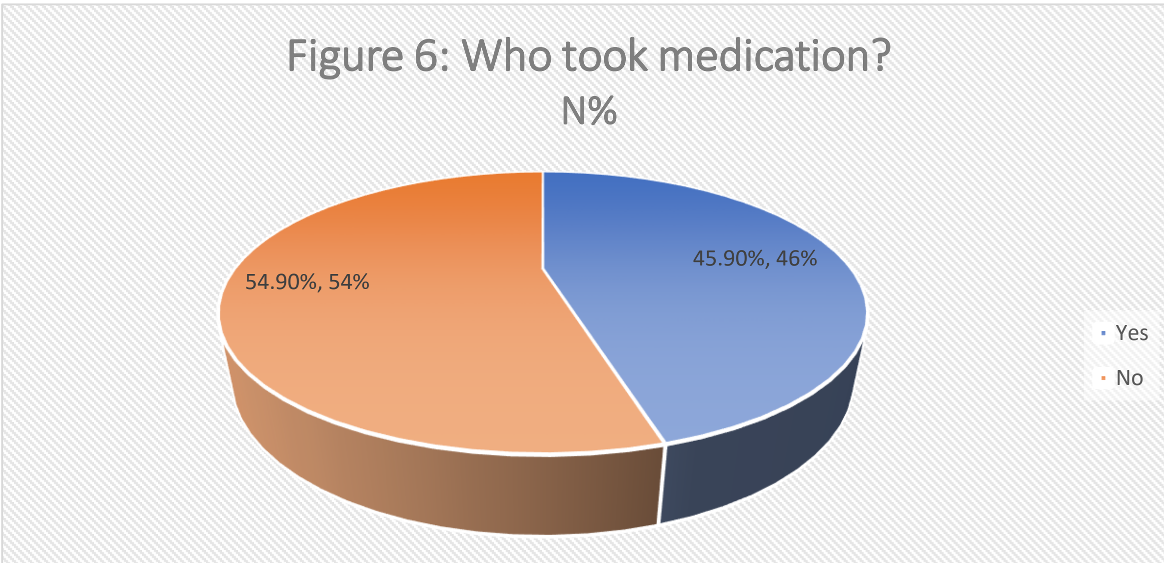


Table 7: Improvement in Hb after taking iron tablet

Taking medication	*n* %	Improvement Hb
3 months	11 (39.28 %)	Cure (0.4 – 3.0 g/dL)
2 months	12 (42.85 %)	Cure (0.4 – 1.5 g/dL)
< 1 months	5 (17.85 %)	No improvement

Table 7.1: Comparison of RBC parameters between time duration

	Taking medication (mean + SD)		
variables	3 months	2 months	< 1 month
Hb (gm/dl)	12.54 ± 0.59	11.54 ± 0.20	10.42 ± 0.37
RBC mill/cumm	3.65 ± 0.33	3.69 ± 0.39	3.84 ± 0.31
HCT (%)	36.27 ± 2.23	39.20 ± 18.06	30.94 ± 1.53
MCV (fL)	99.92 ± 9.11	91.57 ± 7.97	80.96 ± 8.41
RDW-CV (%)	15.1 ± 1.69	16.96 ± 2.04	18.12 ± 1.83

CONCLUSION

The present study was conducted from December 2023 to march 2024 at BN Patel institute of paramedical and science, BN Patel collage of physiotherapy also BN Patel collage of nursing.

- The study composed with 104 subjects, all of whom are female individuals.
- The participants were selected from various age groups ranging from 17 to 28 years.
- Out of the total 104 subjects, 61 individuals were found to be anemic.
- Among the anemic subjects, 33 were classified as having mild anemia, while 28 were categorized as having moderate anemia.
- In the 61 subjects, anemic was diagnosed, and they are sensitized to take oral iron tablets.
- After a 3-month treatment period, blood samples from 28(45.90%) subjects are taken, out of which 11(39.28%) had completed the full course of tablets over the same 3-month period.
- Upon completion of the tablet course, subjects showed an improvement in hemoglobin levels ranging from 0.4 to 3.0g/dl.
- The 12(42.85%) participants who are consuming iron tablets for two months have experienced an increase in their hemoglobin levels ranging from 0.4 to 1.5g/dl.
- Who have taken treatment for <1 months does not showing any improvement in HB level.

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