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## IGNORANCE OF THE LITERATE: TIME TO TARGET HIGHER EDUCATIONAL INSTITUTIONS FOR ANAEMIA CURSE

**Sanjana R. Bhat\***

1. Department Of Pharmacy, Birla Institute of Technology and Science, Pilani, Rajasthan-333031

### ABSTRACT

Lack of awareness about anaemia among well educated girl students in a university as well as a lack of a demonstrable methodology to combat it. To assess- the prevalence of iron deficiency anaemia and its awareness among female students, the effectiveness of different treatment modalities on their haemoglobin level and suggest methods to overcome nutritional anaemia. A randomised controlled study of 94 girl students with. Group 1-Control Group (31), Group 2-Vitamin C Group (31) and Group 3 - Iron and Vitamin C Group (32) was undertaken. Albendazole 400mgm, two doses two weeks apart were given to all the respondents. Subgroup 2 respondents were given 100 mgs of Vitamin C/day while subgroup 3 respondents were given 60mgms of elemental iron, 7.5mcg Vit.B12 and 1.5mgm folic acid/day along with 100mgm of Vit.C/day for a period of 90 days. Haemoglobin estimation was done at the start of the study and at the end of 90 days of supplementation. After 90 days of interventions, the proportion of mild anaemia increased from 34.04 % ( 32) to 43.61% (41), while that of moderate anaemia decreased from 67.96% (62) to 39.37% (37).Sixteen (17.02%) girls attained normal range of haemoglobin after the interventions .The difference in the prevalence of anaemia before and after the interventions was statistically significant in the experimental subgroups 2 & 3. There is an urgent need to address anaemia curse in educational institutions through a longitudinal testing and provision of supplements.

**Key Words:** Iron Deficiency, Anaemia, Vitamin C, Adolescent Girls, Awareness, Haemoglobin

\*Corresponding Author Email: [sanjana.rambal@gmail.com](mailto:sanjana.rambal@gmail.com)

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## INTRODUCTION:

Nutritional anaemia is a great public health problem especially in the developing countries where poverty, inadequate diet, poor access to health services, worm infestation and conditions like malaria, early marriage in girls with repeated child births at short intervals further aggravates the problem<sup>1</sup>. All age groups are vulnerable especially children and adolescent females, in whom the incidence of iron deficiency is on a rise<sup>2</sup> In the latter group, menstrual blood loss, erratic feeding habits especially the habit of skipping meals, eating fast food, sweetened drinks that are energy dense and nutrient poor, make matters worse. On top of this, complete lack of awareness among adolescent girls regarding nutritional anaemia and its impact on their academic performance, immune status, physical capacity, work performance<sup>3</sup> and the ignorance about an optimal haemoglobin level has perhaps contributed to continuation of this problem. Further, the inter-generational transfer of anaemia, which has been proven by studies, puts the health of our future generations, also, at risk<sup>4</sup>.

Despite having so many National programs for the control of anaemia, the prevalence in adolescents is very high (90% ICMR study)<sup>5</sup> Rarely is haemoglobin checked during adolescence. But adolescence is a critical period for addressing anaemia in girls in order to improve their quality of life. This includes making them aware that the problem of anaemia exists and the dietary modifications they need to make in order to overcome the problem.

The present study was, thus, undertaken with the following objectives:

- To assess the prevalence of iron deficiency anaemia and its awareness among female students
- To assess the effectiveness of different treatment modalities on haemoglobin level
- To suggest measures to combat nutritional anaemia in female students.

## MATERIALS AND METHODS

This randomised controlled study was conducted on the female students of a Premier All India Engineering Institute (in Rajasthan) having pan India representation of the girl students. Ethical clearance from the Institutional Human Ethical committee was undertaken before the onset of the study. The selection of the girl students was done by random selection technique using their I/D No. as a sampling frame, using pseudorandom number chart. All those selected randomly for the study were informed in detail about the objectives and the purpose of the study, duration of the

study, the procedures involved, any short term/long-term risks or discomfort involved and a written informed consent from all the participants was taken.

A pre-tested and pre-designed proforma was used to collect the information on age, family history, age at menarche, menstrual history, dietary history, history of intake of iron preparation, history of acid peptic disease or any drug allergy and awareness about the normal haemoglobin level in non-pregnant females.

Physical examination including measurement of height and weight was done. Weight was taken using a standard weighing scale with standard minimum clothing to the nearest 0.5K.g. The height was measured using the height chart from CIPLA with heels, buttocks and occiput of the subjects against the wall and head in Frankfurt plane to the nearest 0.5 cm. This was followed by haemoglobin estimation by Sahli's haemoglobinometer and standard blood smear examination. Out of 115 students who consented for participation in the study, 107 reported for physical examination and haemoglobin estimation. After scanning the questionnaires, 13 respondents who were already on oral iron therapy or had some contraindication for oral iron therapy were excluded from the study. Remaining ninety-four respondents were randomly assigned into the control group 1 and the experimental group. The experimental group was further subdivided into two subgroups 2 and 3.

- Group 1— Control Group (31)
- Group 2— Vitamin C Group (31)
- Group 3 — Iron and Vitamin C Group (32)

Albendazole 400mgm, two doses two weeks apart were given to all the respondents. Subgroup 2 respondents were further supplemented with a multivitamin preparation containing 100 mgs of Vitamin C/day for a period of 90 days while subgroup 3 respondents were supplemented with preparation containing 60mgms of elemental iron, 7.5mcg Vit.B12 and 1.5mgm folic acid/day along with 100mgm of Vit.C/day for a period of 90 days.

All the respondents were followed for a period of 90 days and haemoglobin estimation was done at the start of the study and at the end of 90 days of supplementation using the same apparatus and by the same technician. No untoward incident was reported during the supplementation phase. The cut-off level used for diagnosis of anaemia was haemoglobin (Hb) level of < 12gm%. Those with Hb level between 10—11.9 gm% were classified as having mild anaemia, those with Hb level between 7—10gm% as moderate anaemia group and those with Hb less than 7gm% as having severe anaemia.

Awareness lectures covering various aspects of iron deficiency anaemia, foods rich in haem and non-haem iron, role of vitamin C in increasing absorption of dietary iron, various inhibitors like tea, coffee etc. and the importance of cooking chapattis on an iron plate in the mess was highlighted at the end of the intervention period for all the girl students in order to enable them to make informed choice about their dietary intake in future.

The results were analysed using paired t-test of difference in mean haemoglobin levels before and after intervention at 5% significance level in all the groups. The difference in the number of respondents with mild and moderate anaemia in all the groups was analysed using chi-square test at 5% significance level.

## RESULT AND DISCUSSION

Majority of the respondents 62 (57.94%) were less than 20 years of age while 44 (41.12%) were between 20-30 years while only 1(0.93%) was more than 30years of age. 78(72.35%) were vegetarians while 29(27.65%) were non-vegetarians. 76(71.02%) had a normal BMI while 15(14.01%) were underweight, 14(13.08%) were pre-obese and 2(1.86%) were obese. Only 50 (46.72%) respondents were aware of the normal haemoglobin level in females {Table I}

**Table I: Distribution of subjects according to their Age, BMI\* and Dietary Habits and awareness about normal haemoglobin level (N=107)**

Age (yrs.)	No. of subjects	Percentage (%)
<20	62	57.94
20-30	44	41.12
>30	1	0.93
<b>Body Mass Index*</b>		
Underweight <18.5	15	14.01
Normal 18.5-24.99	76	71.02
Pre-obese 25.0-29.99	14	13.08
Obese 30.0-34.99	2	1.86
<b>Dietary habits</b>		
Vegetarian	78	72.89
Non-Vegetarian	29	21.11
<b>Awareness about normal Hb level in non-pregnant females</b>		
Yes	50	46.72
No	57	53.28

A very high overall prevalence of iron deficiency anaemia (100%) was found in the study population. The gradation in anaemia was mild in 34.04% (32) respondents and moderate in 67.96% (62) respondents. Fortunately no case of severe anaemia with haemoglobin <7 gm% was seen. The general blood picture was predominated by microcytic hypochromic type while a few had normocytic hypochromic type of blood picture.

After 90 days of interventions, the proportion of mild anaemia increased from 34.04 % (32) to 43.61% (41), while that of moderate anaemia decreased from 67.96% (62) to 39.37% (37). Sixteen (17.02%) girls attained normal range of haemoglobin after the interventions .The difference in the prevalence of anaemia before and after the interventions was statistically significant in ( $p < 0.05$ ) in the experimental subgroups 2 & 3 while it was not significant in the control group 1 {Table II}.

**Table II: Comparison of the prevalence of anaemia in subjects before and after intervention**

	Before Intervention#(n=94)			After Intervention# (n=94)			Chi-test( $\chi^2$ )
	Normal Hb	Mild anaemia	Moderate anaemia	Normal Hb	Mild Anaemia	Moderate anaemia	
Gr. 1	-	14	17	2	12	17	0.31/N.S
Gr.2	-	11	20	3	18	10	4.85/ S*
Gr.3	-	07	25	11	11	10	5.25/S*

S\*- statistically significant difference ( $p < 0.05$ )

N.S- not statistically significant

# No case of severe anaemia were observed either before or after the intervention.

In Group 1, at the end of the intervention period of 90 days ,the mean haemoglobin level of respondents increased from 9.05gm%( range 8gm%-11.2gm%) to 9.235gm%( range 9gm%-12gm%)— the difference being statistically significant at 5% significance level.

In experimental Groups 2 & 3, the mean haemoglobin level of the respondents increased from 9.622gm% ( range 8.2gm%-11gm%) to 10.066gm%( range 8gm%-12.2gm%) and from 9.425gm%( range 7gm%—11gm%) to 10.157gm%(range 9gm%—12gm%) respectively and the difference in the mean haemoglobin levels after interventions was highly significant in both these groups ( $p < 0.001$ ) { Table III}.

**Table III: Mean Haemoglobin of the respondents at the start of the study and after 90 days of intervention**

	Mean Hbgm% before intervention*	Mean Hbgm% after intervention*	t-value	Mean gain in Hbgm%	95% CI	p-value
Group 1	9.05±0.6285	9.235± 0.8171	5.40	0.185	0.126-.247	<0.05**
Group 2	9.62± .7296	10.066± 0.88	22.0	0.44	0.40-0.480	<0.001***
Group 3	9.42±0.8913	10.157± 0.704	22.18	0.732	0.671-0.793	<0.001***

\*values are mean±S.D

\*\*Significant at 5% level

\*\*\*Significant at 1%level

A high prevalence of iron deficiency anaemia among girl students is a matter of concern as majority of these young educated females were unaware of their haemoglobin level and of the possibility of iron deficiency being present in them. This could partly be explained as majority of them were vegetarians and that haemoglobin detection had never been done before. There was considerable improvement in the haemoglobin status of these anaemic girls on supplementation with Vitamin C alone or with iron/B12/Folate. Those with haemoglobin in lower range before intervention benefited the most.

In an intervention study<sup>(6)</sup> done on adolescent girls of poor community it was observed that even weekly supplementation with Vitamin C along with Iron/folate had a significant higher increase in haemoglobin concentration (0.76g/dl) as compared to weekly iron/folate supplementation alone( 0.71g/dl) after three months of supplementation. This finding is consistent with the findings in this study where the mean gain in haemoglobin in Group 3 was 0.732g/dl and in group 2 was 0.44g/dl. This highlights the importance of increasing Vitamin C rich foods like lemon, amla, guava in the diet.

The number of girls with mild anaemia increased while those with moderate anaemia decreased in Group2 and group3 after intervention .This could possibly be explained by the improvement in the haemoglobin level of the subjects after intervention who moved from moderate to mild anaemia category. A similar increase in the proportion of mild anaemia cases from 14.8% to 29.14% and a decrease in the proportion of those with moderate anaemia from 72% to 36% was observed in an intervention study on non-pregnant females of peri urban areas of Aligarh <sup>(7)</sup>. The improvement seen in Group1 could be due to de-worming treatment that they received. These findings are consistent with those found in a randomised controlled trial in school-aged children using Albendazole where there was an increase of 1.89g/dl in mean haemoglobin level while Albendazole had no impact<sup>(8)</sup>. The fact that iron/folic acid supplementation is the corner stone for treatment of iron deficiency anaemia is a known fact. This study created awareness among girl students that the problem of anaemia is a real one and how can one adopt dietary modifications and take supplements to treat it by providing them with a tangible proof in the form of their reports, which probably acted as a big motivator for them to act. The enthusiasm with which the respondents participated shows the importance of tackling this important issue at institutional level nation wide. As these girl

## CONCLUSION:

It is high time that we address the issue of nutritional anaemia in adolescent girls. As these girls are the future mothers also, making them think and act early, would also go a long way in breaking the vicious cycle of inter-generational transfer of iron deficiency anaemia and thus making our future generations healthy.

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