Original Research Article

A Study to Know the Effectiveness of Iron and Vitamin A Supplementation in Adolescent Girls in a District of Central Uttar Pradesh

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ABSTRACT

Background: Vitamin A & Iron deficiencies are important nutritional problems in developing countries affecting particularly preschool children, as well as pregnant and lactating women. These are two challenging public health problem in adolescent girls also due to nutritional imbalance despite increasing dietary requirement and additional blood loss via menstruation. WHO estimates that the prevalence of anaemia ranges from 40-60% in the developing countries. Half of those who suffering from anaemia is supposed to be suffering from iron deficiency anaemia. It is generally assumed that 50% of anaemia is due to iron deficiency anaemia (WHO-2008).

Methodology: The present study was conducted by department of Obstetrics and Gynaecology, Major S.D. Singh Medical College, Farrukhabad. It was a prospective study among adolescent school girls in urban Farrukhabad. The study was conducted from 1st January, 2014 to 31st December, 2014. The study population was school going adolescent girls of age 13-16 years who gave consent and were ready to participate in the study.

Results: A total of 100 girls aged between 13-16 years were enrolled for the study purpose and they were from class 8th, 9th and 10th. Out of total 100 participants 51 belonged to 8th standard 29 belonged to 9th standard and 20 belonged to 10th standard. A total of 20, 29, 32 and 19 were in the age group of 13, 14, 15 and 16 respectively. Out of 100 study subjects 72 were diagnosed as anaemic and 28 were diagnosed non anaemic. Prevalence of anaemia before the study was 72% and after the study it was 40.6%.

Keywords: Vitamin A, Iron, Anaemia, Adolescent Girls

INTRODUCTION

Vitamin A & Iron deficiencies are important nutritional problems in developing countries affecting particularly preschool children, as well as pregnant and lactating women. These are two challenging public health problem in adolescent girls also due to nutritional imbalance despite increasing dietary requirement and additional blood loss via menstruation. Women's health is central to the survival of the society as they give beginning to new life on the earth. Both developed and developing countries are affected by anaemia. It has been a global public health problem with major consequences for human health. It affects people of all age groups but its prevalence is more in pregnant women and young children. [1]

WHO estimates that the prevalence of anaemia ranges from 40-60% in the developing countries. Half of those who suffering from anaemia is supposed to be

suffering from iron deficiency anaemia. It is generally assumed that 50% of anaemia is due to iron deficiency anaemia (WHO-2008). The main risk factors for iron deficiency anaemia include a low intake of iron, poor absorption of iron from diets and period of life when iron requirements are high (i.e. growth & pregnancy). Iron deficiency anaemia thus more frequently occurs in pregnant women, young children and adolescent girls. [2] Anaemia retards physiological growth in adolescent girls. Thus assessment of prevalence of anaemia among children, adolescent girls and pregnant women is vital to strengthen the Reproductive and Child Health Programme.

Along with the other causes like heavy blood loss, parasitic infections, chronic infections, deficiency of micronutrients including vitamin A, vitamin B12, folic acid, riboflavin and copper increases the risk of anaemia. Strong co-relations between vitamin A status and haemoglobin level have demonstrated. Vitamin A deficiency leads to ineffective erythropoiesis by the down regulation of renal erythropoietin expression in the kidney.

Despite intensive efforts to improve the quality of life among both rural and urban population, several studies showed that anaemia and Vitamin A deficiency are highly prevalent particularly among adolescent girls. Show the present study was conducted-

- To know the prevalence of anaemia among school going adolescent girls.
- To Study the effect of Vitamin A and Iron supplementation to the study group.
- To make recommendations as per the results of the study.

MATERIALS AND METHODS

The present study was conducted by department of Obstetrics and Gynaecology, Major S.D. Singh Medical College, Farrukhabad. It was a prospective study among adolescent school girls in urban Farrukhabad. The study was conducted from 1st January, 2014 to 31st December, 2014. The study population was school going adolescent girls of age 13-16 years who gave consent and were ready to participate in the study. The sample size of the study group was calculated by using formula-

$$n= 4pq/d^2$$

Where- p= prevalence, q= 100-p, d= 20% of p

Using the average prevalence rate of anaemia in adolescent girls as 53.9% (NFHS-III) the sample size was calculated 86 and it was rounded to 100.

The list of schools and inter colleges were collected from district officers and out of them one inter college was selected randomly for study purpose. Adolescent girls between 13-16 years were included in the study who gave consent to participate in the study. Following students were excluded from the study –

- Irregular menstrual bleeding
- Known haemolytic disease
- Haematuria
- Any other bleeding disorders
- Features of vitamin A deficiency
- Any chronic disease
- Severe malnourishment

Permission was taken from head of the college. The principal and class teachers of the college were explained about the objectives and methodology of the study. Parents of the students were also informed regarding the study. Written consent of the parents were also taken before the study. De-worming of all the participants was done by the given Albendazole tablet. After obtaining relevant clinical history, blood samples of the participants were collected for determining haemoglobin level. The level of haemoglobin was estimated by using Cyan-meth-haemoglobin method.

Study participants who were diagnosed anaemic work grouped in to two parts randomly and participants who were not diagnosed as anaemic were formed third group. In the group one iron supplementation was given twice a week

for a period of 100 days. In the group two 2 lakh international units of vitamin A along with iron was given for the 100 days. In the group third only placebo was given. Students as well as their parents were kept blind about which they belong to.

Haemoglobin level of each participants of the study was majored twice during the study-

- Before the initiation of the intervention.
- On the completion of the intervention i.e. 100 days

The cut of level for haemoglobin concentration to diagnose anaemia is 12 gm/dl for concern age group according to WHO. Anaemia was categorized as mild

(11-11.9gm/dl), moderate (8-10.9gm/dl) and severe (<8gm/dl) according WHO criteria.

Data was analysed by using appropriate statistical tests.

RESULTS

The present study was conducted by the department of obstetrics and gynaecology, Major S.D. Singh, Medical College, Farrukhabad for a period of one year. Ethical clearance was taken from the institutional Ethical committee.

A total of 100 girls aged between 13-16 years were enrolled for the study purpose and they were from class 8th, 9th and 10th.

Table-1 : Distribution of study subjects according to age and educational standard

Age (Years)	8th Standard	9th Standard	10th Standard	Total (%)
13	20	0	0	20 (20%)
14	22	7	0	29 (29%)
15	8	19	5	32 (32%)
16	1	3	15	19 (19%)
Total	51 (51%)	29 (29%)	20 (20%)	100 (100%)

Table-1 shows distribution of study subjects according to age and educational standard. Out of total 100 participants 51 belonged to 8th standard 29 belonged to 9th standard and 20 belonged to 10th standard. A total of 20, 29, 32 and 19 were in the age group of 13, 14, 15 and 16 respectively.

Table-2: Prevalence of anaemia in the study subjects as per severity

Non-Anaemic (Hb≥12gm/dl)	Anaemic(Hb<12gm/dl)		
Normal	Mild (11-11.9 gm/dl)	Moderate (8-10.9gm/dl)	Severe (<8 gm/dl)
28 (28%)	20 (20%)	48 (48%)	4 (4%)

Table-2 shows prevalence of anaemia in the study subjects as per severity. Out of 100 study subjects 72 were diagnosed as anaemic and 28 were diagnosed non anaemic. Out of 72 who were diagnosed as anaemic 20 were having mild anaemia, 48 were having moderate anaemia and 4 were having severe anaemia.

Students who were diagnosed as mild and moderate anaemia were categorised randomly in to two equal groups. Severely anaemic girls were excluded from the study due to ethical issues. Those participants who were not diagnosed anaemic formed the third group.

Group 1: 34 participants received vitamin A along with iron for 100 days
Group 2: 34 participants received only iron for 100 days
Group 3: 28 non anaemic participants received only placebo

Table-3: Prevalence of Anaemia among study subjects before and after interventions

Anaemic/ Non Anaemic	Before interventions	After interventions
Severe Anaemia	4 %	-
Moderate Anaemia	48 %	21.88 %
Mild Anaemia	20 %	18.78 %
Non-Anaemic	28 %	59.34 %

Table-3 shows prevalence of Anaemia among study subjects before and after interventions. Prevalence of anaemia before the study was 72% and after the

study it was 40.6%. The prevalence of mild and moderate anaemia before the study was 20% and 48% respectively and it was found 18.78% and 21.88% respectively after the study.

Table-4: Distribution of various groups of study subjects and control group before and after the interventions

	Group 1		Group 2		Group 3	
	Before interventions	After interventions	Before interventions	After interventions	Before interventions	After interventions
Moderate Anaemia	24	7	24	6	0	0
Mild Anaemia	10	6	10	7	0	3
Non Anaemic	0	8 (38.10%)	0	5(27.78%)	28	54

Table 4 shows distribution of various groups of study subjects and control group before and after the interventions. In group-1, 24 participants were moderately anaemic and 10 were mildly anaemic before the interventions. After the interventions 7 participants were became moderately anaemic and 6 were mildly anaemic and 8 participant became non anaemic. 38.10 subjects in group-1 became non-anaemic after the intervention.

In group-2, 24 subjects were moderately anaemic and 10 were mildly anaemic before the intervention. After the intervention 6 subjects were moderately anaemic and 7 subjects were mildly anaemic and 5 subjects became non anaemic. In group-2, 27.78 subjects became non-anaemic after the intervention.

In group-3, all the 28 subjects were no anaemic before the study. After the study 3 subjects were diagnosed mild anaemic and rest 54 were non anaemic.

DISCUSSION

In the present study 100 adolescent school girls aged between 13-16 years who gave consent to participate in the study were enrolled for the study. They were screened for anaemia. Out of these 100 girls 72 were diagnosed as anaemic as per WHO criteria. Out of 72 girls diagnosed as anaemic 4 were seriously anaemic and they were excluded from the study. According to WHO (2001) up to 88% of pregnant and 74% of non-pregnant women are anaemic in India. [3] Anand K et al (1998) conducted a study in Haryana among school going student and they found prevalence of anaemia was 48% in all adolescent girls while in young adolescent girls it was 51%. [4] Sheshadri S (1997) conducted a study among 1500 rural girls (10-19 years) from 10 villages in Gujarat in which the prevalence of anaemia was reported to be 60%. [5] Kaur S et al (2006) studied the epidemiological correlates of nutritional among adolescent girls in rural Wardha by a cross-sectional study in which the prevalence of anaemia was found to be 59.8%. [6] Toteja TS et al (2006) assessed the status of anaemia among adolescent girls from 16 districts of 11 states of India. The overall prevalence of anaemia was 90.1% with 7.1% having severe anaemia and prevalence of moderate and mild anaemia were 50.9% and 32.1% respectively. [7] Deshpande et al (2013) conducted a survey in Maharashtra to find out prevalence of anaemia in adolescent girls and its co-relation with demographic factors. 1000 adolescent girls were included in the study between 12-15 years of age. Among 1000 adolescent girls, 60% found to be anaemic. 18.4% were mild, 41.3% were moderate and 0.4% were severe anaemic. [8] Mwanri L et al (2000) conducted a randomized controlled trial of the effects of dietary supplements on anaemia in 136 anaemic school children. The supplements were vitamin A alone, iron and vitamin A, iron alone or placebo in four groups. Vitamin A supplementation increased the mean haemoglobin concentration by 13.5 gm/L compared with 3.5gm/L for placebo. However the group of children who received combined vitamin A and iron supplementation had the greatest improvements as compared with placebo.

[9] Similar results were obtained by Htet MK et al (2013) who conducted a study to know the reasons high prevalence of anaemia among adolescent school girls and to know the role of vitamin A in contributing to iron deficiency anaemia. Among 1269 school girls who were previously screened for anaemia, 391 anaemic girls were further assessed for iron, vitamin A and subclinical inflammation status. Logistic regression was done to determine whether vitamin A status and subclinical inflammation were risk factor for iron deficiency. Logistic regression showed that low vitamin A status was a significant predictor for being iron deficiency. [10]

CONCLUSION

For prevention and effective treatment of anaemia and its complications, it is essential to know the course of disease as well as various factors which contribute to the development of disease are modified the course of disease. Present study was conducted to evaluate whether or not vitamin A supplementation helps to restore the blood haemoglobin level along with iron therapy and helps to improve the status of anaemia. The major limitation of present study was its small sample size. Show further studies may be done in the large of population to know the definitive role of vitamin A supplementation in anaemia.

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