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Evaluation of effectiveness of daily or weekly Iron, Folic acid supplementation with or without intensive health education among adolescent anaemic school girls of Cuttack (Odisha)

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Abstract:

Anaemia is currently one of the most common and intractable nutritional problems globally. Nutritional anaemia in India is common morbidity seen in late adolescent and young female population. There are many conflicting opinions regarding dosage of iron & folic acid supplementation for managing this simple nutritional deficiency disorders. Anaemia has been defined as hemoglobin <12 gm% in adolescent girls, with haemoglobin level between 10-11.9 gm%, 7-9.9 gm% and <7 gm% are termed as mild, moderate and severe anaemia respectively. Haemoglobin estimation was done at the beginning and end of the study. The mean age of study subjects in 'daily iron & folic acid supplementation', 'weekly iron & folic acid supplementation' and 'weekly iron & folic acid supplementation with health education' group was 15.85, 15.76 & 15.72 years respectively. Their mean & SD pre-intervention Haemoglobin was 10.1±0.14gm/dl, 10.3±0.02gm/dl and 9.94±0.13gm/dl respectively. The mean & SD post-intervention Hb was 12.34±0.11 gm/dl, 12.39±0.12 gm/dl and 12.73±0.15gm/dl. Our study shows clearly advantage of weekly iron and folic acid therapy among adolescent school girls of selected schools of Cuttack district over daily iron therapy. Mean rise of haemoglobin% in daily and weekly groups are almost similar whereas adverse drug reaction percentage is less in weekly supplemented Group B & C.

KEYWORDS: anaemia, iron supplement, iron, haemoglobin, folic acid

Introduction:

According to estimation by WHO more than two billion people are affected by iron deficiency anaemia. In developing countries particularly in South East Asia and Western Pacific iron deficiency anaemia tops the nutritional deficiency disorder,[1,2] where 20 to 40% of adolescent girls and 40 to 50% of adolescent pregnant girls are anaemic.[3] The prevalence of anemia is high in adolescent girls in

India, with over 70% anemic. Iron-folic acid (IFA) supplements have been shown to enhance adolescent growth elsewhere in the world including India.[4] Adolescence as per definition by WHO includes period of life between10-19 years which is the period of major physical and psychological change including changes in social interactions and relationships.[5] Adolescent period which is very crucial for growth and development has remained largely neglected particularly in adolescent females. Reasons of anaemia in this group are multifarious starting from inadequate dietary intake particularly in lower socio economic group, loss due to menstruation, high demand due to growth, infections such as malaria, hookworm and other parasitic infections.[3] The physiological growth spurt, with its attendant rise in mean hemoglobin level, and menarche cause an increase in daily iron requirement, which if not met, can rapidly result in anemia. Diagnosis and treatment of anemia is of particular importance in adolescent girls because they enter the reproductive cycle soon after menarche. Even a marginal iron deficiency at this stage can precipitate severe anemia later on due to the stress imposed by pregnancy and parturition. Adolescent girls can be easily approached through school-based intervention programs.[6]

Objective of the study:

Based on study in rats, it has been suggested that iron supplementation should not be given daily, but rather weekly or twice weekly.[7] With a daily dose, the intestinal mucosal cells get saturated quickly, and iron absorption stops. Because the turnover rate of these cells is 5 to 6 days, a single weekly dose may be as efficacious and more cost-effective. Compliance might also improve because fewer doses of iron would be needed. This hypothesis has been supported by studies comparing the effectiveness of hemoglobin or hematocrit response, which was found to be similar regardless of whether supplementation was daily, weekly or twice weekly.[8,9] To the contrary, Cook and Reddy[10] concluded that there is no significant absorptive advantage in giving iron less often than once daily. Hallberg[11] reiterated that there is no evidence that weekly supplementation better prevents iron deficiency because the fundamental argument in its favor, that daily supplementation causes a mucosal block, is not valid.

Anaemia has been defined as hemoglobin <12 gm% in adolescent girls, with Hb level between 10-11.9 gm%, 7-9.9gm% and <7gm% are termed as mild, moderate and severe anaemia respectively.[12]

In view of the above we plan to investigate whether daily or weekly iron-folate supplement administered at school would improve hemoglobin concentrations in adolescent girls, including those with anemia with or without intensive health education.

Study Design:

The study was conducted between July to October 2013 and design of study being community based trial. The study was conducted in suburban/slum area of Cuttack city with three randomly selected Senior Secondary Schools located within the chosen geographical region. The girl students from above schools were selected to participate in the study and inclusion criteria would be as follows:

*Age-15 to 19 years

*Gender-female only

*Written parenteral consent were obtained

Exclusion criteria were any active medical disease other than iron deficiency anaemia.

Out of three schools selected students of one school were given daily iron and folic acid supplementation (Group-A), second school children weekly iron and folic acid supplementation (Group-B) and third school children were given weekly iron and folic acid supplementation with health education (Group-C) for three months.

Tools used for study were weighing machines, non stretchable tape, Haemocueanalyser (301), Microcuvettes, lancet, spirit and iron folic acid

tablets containing 100 mg of iron and 0.5 mg of folic acid.

Haemoglobin was estimated by haemocue system which consists of disposable microcuvettes containing chemicals in dried form. Haemocueanalyser required a finger prick and few drops of blood were drawn in to microcuvettes. Each microcuvette contained three reagents in dried form which converts the haemoglobin to methaemoglobinazide (HiN3). Other reagents like sodium deoxycholate haemolyses the RBC, sodium nitrite converts Hb (Ferrous Hb) to methaemoglobin (Ferric Hb) and sodium azide converts methaemoglobin to methaemoglobinazide (HiN3). After this haemoglobin levels were read immediately by a photometer in the analyser for estimation of haemoglobin concentration. Hemocue method has sensitivity of 89% and specificity of 82% to detect anaemia.

Methodology:

Three schools selected were named as school A, B and C respectively. From this school's 20 students each was selected on the above based criteria. Due care was observed to select anaemic girls of the above age group for clinical pallor of the conjunctiva, palm and nail beds. The student having clinical pallor are usually anaemic, though degree of anaemia may vary.[13] Hemoglobin estimation were done at the beginning and end of the study.

Intensive health education given to students from school 'C' were on causes of iron deficiency anaemia, emphasis on iron rich diet, prevention and personal hyegine.[14]

Statistical analysis of each parameters were performed by the students 't' test by using microtab-2 software and the p values which were < 0.05 were considered as significant.

Results:

The results from our study shows clearly advantage of weekly iron and folic acid therapy among adolescent school girls of selected schools of Cuttack district over daily iron therapy, after the study the data so obtained was analyzed statistically. Effect of weekly versus daily iron supplementation in improving anaemic status of adolescent school going girls were documented in detail in Table 1 & 2.

Table 1: Mean age of selected students and comparison of mean Hb level before and after intervention among daily IFA supplementation, weekly IFA and weekly IFA supplementation with education:

Groups	Mean age (yrs)	Pre-intervention	Post-intervention	P-value
		Mean Hb (gm%)	Rise of Mean Hb (gm%)	
A (n=20)	15.85	10.1±0.14	12.34±0.11	<0.0001
B (n=20)	15.76	10.3±0.02	12.39±0.12	<0.0001
C (n=20)	15.72	9.94±0.13	12.73±0.15	<0.0001

*statistically significant p-value is <0.0001

Table 2: Adverse drug reactions

Groups	Nausea & vomiting	Constipation	Abdominal pain	others	%
A (n=20)	4	1	2	-	35
B (n=20)	1	2	-	-	15
C (n=20)	2	-	1	-	15

Discussion:

The results from our study shows clearly advantage of weekly iron and folic acid therapy among adolescent school girls of selected schools of Cuttack district over daily iron therapy. Mean rise

of haemoglobin percentage in daily and weekly groups are almost similar (Table-1) whereas adverse drug reaction percentage is less in weekly supplemented group B&C. It has been noticed that there is significant improvement in correction of anaemia in all the cases. It has been documented that supplementation of iron and folic acid improves nutritional status in adolescent girls.[4]

Since there is paucity of data available in literature pertaining to adolescent school girls in rural India regarding weekly iron folic acid supplementation with health education, our study will definitely throw some light regarding effects of interventions besides iron folic acid therapy in anaemic adolescent school going girls of rural India. It was previously documented that efficacy of weekly supplementation of iron and folic acid tab is remarkable in controlling iron deficiency anaemia in adolescent girls.[16] Due to side effects of iron therapy there is reduction in compliance[15] where as in weekly supplementation side effects are less as shown in our Table 2. Health education is an important component of school education and we tried to impart health education to a group of twenty school girls (Group C) on iron deficiency anaemia with help of literature, group discussion, and nutritional education. As our findings Group-C beneficiaries have shown more improvement in correction of anaemia status. Few other studies earlier also stressed the importance of nutritional education in schools to combat anaemia.[14]

Conclusion:

Adolescence is a significant period of human growth and maturation. In school going adolescent girls in slum areas are prone to anaemia due to lack of nutrition, menstrual loss and lack of health education. Iron deficiency anaemia affects ability to read, write and learn. Our study demonstrates the importance of weekly iron and folic acid supplementation and with health education to combat anaemia in these vulnerable populations. Increasing the educational level on nutrition by IEC methodologies and health education in rural schools should be undertaken routinely. This will also ensure safe mother hood to these girls at a later stage.

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