Effect of instruction cum treatment on haemoglobin levels among anaemic adolescent girls

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Abstract
A quasi experimental study with experimental approach was undertaken to identify the effectiveness of instruction cum treatment on haemoglobin levels among adolescent girls between 15-19 years of age. Data was collected longitudinally. Seven hundred and forty six anaemic adolescent girls were selected by multistage random technique and were divided into three groups i.e treatment I, II and control group. Study findings revealed that 63% of them had mild anaemia and 34% had moderate anaemia in all the groups. None had severe anaemia. Comparison of mean, SD and mean difference with regard to haemoglobin level of anaemic girls reveals that the effectiveness of treatment was higher for those in the treatment I.

Conclusion: It is concluded that deworming, STP, SIM and iron treatment for 100 days was effective in gain in heamoglobin levels while comparing to treatment II i.e deworming, SIM and iron treatment for 100 days.

Keywords: Instruction, Treatment, Haemoglobin, Anamic, Adolescent girls.

Introduction
Adolescence is a transitional period from childhood to adulthood which ranges from 10 to 19 years. Adolescence age has been recognized as a special period in the life cycle that forms an important physiological group requires specific and special attention. Female adolescents in India comprise almost 47% of the total adolescent. Adolescent girls' health plays an important role in determining the health of future population, because their health has an intergenerational effect.[1]

Anaemia is rampant in all states and it is a female disease. Anaemia at any age has significant negative impact on the health of an individual varying from poor scholastic performance and cognitive impairment in children to one of the major indirect causes of maternal mortalities.[2] Collaborative study report from Hyderabad, New Delhi, Calcutta and Chennai showed that naemia among the girls between 16-18 years of age was 63.8%, 65.7%, 64% and 98.7% respectively.[2] Prevalence of anaemia among adolescents in Kerala from recent study reports was around 30% which has highest literary rate in India.[3]

The National Family Health Survey highlights that Karnataka had highest percentage (59.5%) of anaemia in the age group of 15-49 years which is more or less similar to the all- India figure 57.9%.[4] A study on prevalence of anaemia among adolescent high school girls of Udupi district of Karnataka reported that 32% of girls were anaemic.[5]

Anaemia ranks to the seventh position in the causes of death. In India the death due to anaemia in female in the age group of 15-24 years is 63%.[6] In the developing countries, about 82 million girls between the age of 10 and 17 will marry before their 18th birthday, disrupting their education, limiting their opportunities and increasing the danger of too early child bearing. Of that 4.5 million marriages take place in India every year, three million involve 15-19 years old girls.[7]

Adolescent child bearing is a serious social, medical, developmental and economic problem. It has been observed that many Indian girls enter motherhood without adequate precaution for it. It results in high wastage of human resources, increased rate of maternal mortality, infant and child mortality. The most relevant cause behind this problem is ignorance of mother, inadequate preparation of adolescent girls for safe motherhood, and undesirable practices prevalent in Indian society. Reports about teen pregnancy in the United States reveals that a total of 229,715 babies were born to women aged 15–19 years, for a birth rate of 22.3 per 1,000 women in this age group.[8] Over past decade, India has successfully reduced the proportion of pregnancy between 15-19 years to half (16% during NFHS 3 in 2005-06 and 7.9% during NFHS 4 in 2015-16).[9] Still, the estimation by UNFPA runs to 11.8 million teenage pregnancy for the country.[10]

About 14 million babies are born to adolescent girls under 19 years of age every year, accounting for 10 percent of all births. Pregnancy related deaths are the leading cause of mortality for 15 to 19 year old girls worldwide. In least developed countries, one in every six births is to young women aged 15 to19 years whereas 33% of women in less developed countries give birth before the age of 20.[11]

Adolescence is an opportune time for interventions to address anaemia. In addition to the growth needs, girls need to improve iron status before pregnancy. Adolescent girls in India have received the least attention of all, even though they move rapidly from child hood to marriage and motherhood within a brief span of their adolescence.[12]

Community based intervention study conducted with adolescents aged 10-19 years, through supplementation of iron folic acid tablets, the overall findings suggest that the prevalence of anemia reduced from 79.5% to 58% among adolescent girls. Mean rise of hemoglobin seen was 1.3 g/dl among girls.[13]

A double-blind, placebo-controlled clinical trial assessed the effects of iron supplementation on cognitive function in adolescent girls reports revealed that post intervention haematological measures of iron status were

significantly improved in the treatment group (serum ferritin 27·3 *vs* 12·1 µg/L, p<0·001).[14]

RCH programme recommended antenatal care right from the adolescent stage itself instead of conventional practice of beginning from conception. Iron and folic acid supplementation of adolescent girls is being under taken in the World Bank assisted ICDS projects and RCH programme since 1973, anaemia among adolescent is existing in India which increases the maternal mortality. Studies on prevalence on anaemia and consequences of anaemia were identified that even though RCH, safe motherhood, adolescent girl's scheme, mid day meal programme and anaemia prophylaxis programme are there, anaemia is still present among adolescent girls. Educational institutions are a primary site for adolescent health promotion and diseases prevention. Group interventions offer adolescents a sense of anonymity, which they prefer when obtaining information about sensitive topics.[15]

Objectives

The objectives of the study were to

1. Assess the pretest degree of anaemia among adolescent girls.
2. Compare the haemoglobin levels of control group, treatment I & II group pretest and posttests.
3. Find the significant difference between haemoglobin levels of adolescent girls between control group, treatment I & II.
4. Find the association between haemoglobin level and selected factors: age, education, family income, type of family, residential area and type of diet with treatment I & II.

Methodology

A quasi experimental study with experimental approach (pretest post test control design) was adapted where data was collected longitudinally. Multistage random sampling technique was used to select the sample. There were 11 urban colleges with arts, science and commerce courses. In the first stage six urban colleges were selected, as sample colleges for the study by using simple random sampling. In the 2nd stage of sampling two colleges were selected by using simple random sampling for each group. Further in 3rd stage of sampling from each class 25 anaemic adolescent girls were selected by using simple random sampling. Thus for each group there were 250 anaemic adolescent girls and a total of 750 anaemic adolescent girls were included as samples for study.

Instruments

The instruments used for the study consisted of a demographic proforma and checklist for Hb levels estimation. Hb level in the adolescent was estimated by cyanmethemoglobin method and expressed in gram percentage. In this study Hb levels was categorized based on WHO criteria. Hb level 12gm/dl refers to non anaemic and anaemia refers to Hb level below 12gm/dl. Further anaemia was classified as mild if the Hb level is 10- 11.9gm/dl, moderate if 7-9.9gm/dl and sever if less than 7gm/dl.

Data Collection

After obtaining permission from the district education board and the block education office the purpose of the study was explained and written consent obtained from both the adolescent girls and parents. Ethical clearance was obtained from the institutional ethical committee. Adolescent girls were requested to fill in information in the self administered questionnaire. Following this the Hb samples was collected by the investigator and laboratory assistant's help was taken for calorimeter reading.

Deworming tablets were given by the researcher to the anaemic adolescent girls on the first day for treatment group I & II. From the third day onwards iron and folic acid tablets (60 mg) were given to the treatment group I & II for 100 days with the help of teachers and mothers. The tablets were handed over to the teachers by the researcher once a week to the class teacher with the instruction to send the medicine to the mother to give the child on Sunday and holiday if any. Thus every Monday the medicine was given by the investigator in the morning. Diary was maintained by the teacher regarding the intake of tablets and it was verified by the researcher every week. Structure teaching programme was implemented in two sessions (2nd & 3rd day) by the researcher on iron deficiency anaemia and its prevention for the treatment group I. The SIM was also handed over by the researcher individually on the second day for treatment group I. For treatment group II no teaching was given only SIM was handed over by the researcher individually on the second day. The posttest estimation of haemoglobin levels of anaemic adolescent girls were carried out after three and six months of intervention in treatment group I, II and control group.

Findings

A total of 746 anaemic adolescent girls from the age group of 15- 19 years were included in the study. The demographic data showed that in all the groups around 20% were in the age group of 19 years, around 60% were Hindus, around 64% were in the income group of Rupees 4000 and above per month, most (90%) were from nuclear family, 90% were residing in urban areas and around 93% were non vegetarian. All the three groups had more or less similar demographic variables.

Percentage wise distribution of anaemia among adolescent girls according to their pre-test haemoglobin percentage shows that in all the groups around 65% had mild degree of anaemia and around 35% were moderately anaemic. However the difference between all the groups vary only one to two percent. It seems that majority of the adolescent girls had mild anaemia during pretest. (Fig. 1)

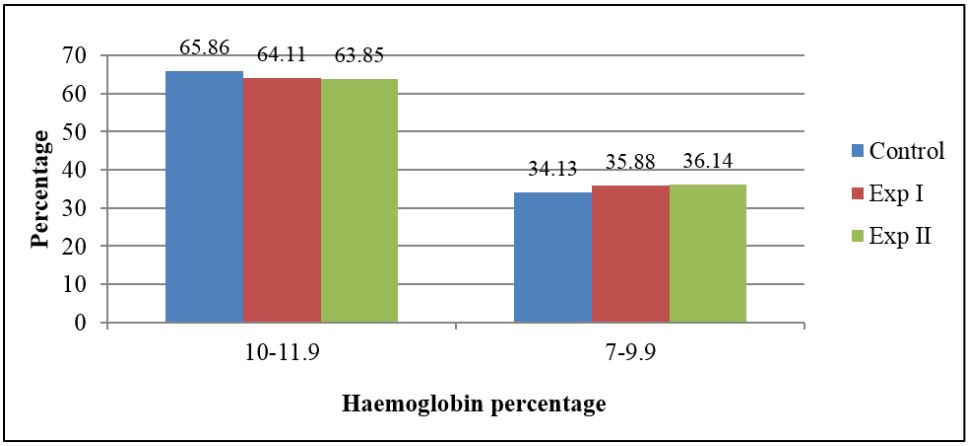

Fig. 1: Percentage wise distribution of anaemia among adolescent girls according to their pretest haemoglobin percentage

Comparison of posttest haemoglobin with pretest levels found that in treatment group I 64.11% were mild anaemic before intervention which was reduced to 52. 82% in posttest I to 32.66% in posttest II. Further in posttest I 42.33% and in posttest II 64.51% were non anaemic. It is depicted that the haemoglobin percentage was increased within three months and it was maintained up to six months (Fig. 2).

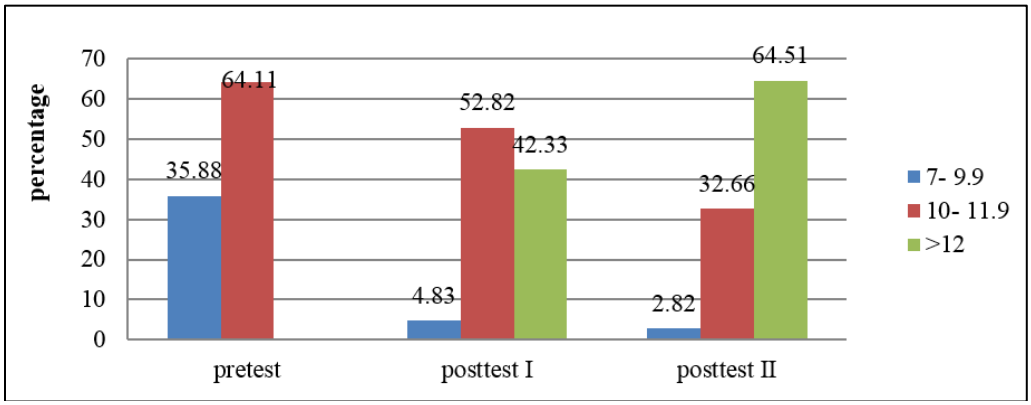

Fig. 2: Comparison of posttests haemoglobin percentage of treatment I with pretest haemoglobin percentage

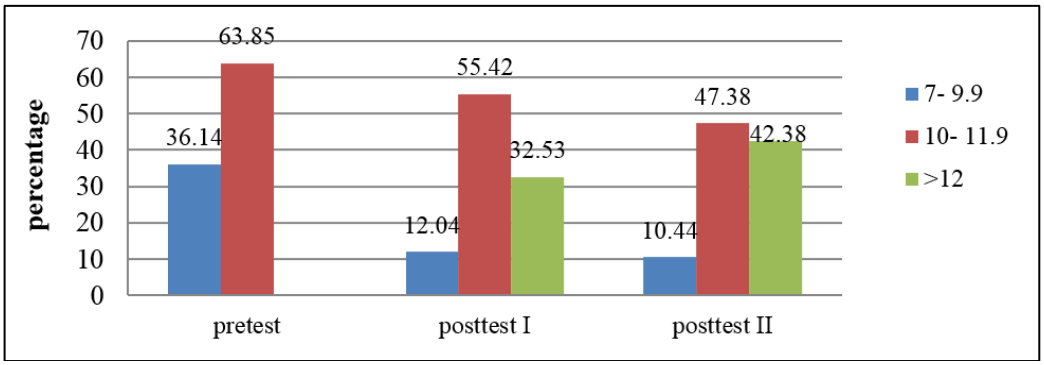

Fig. 3: Comparison of posttests haemoglobin percentage of treatment II with pretest haemoglobin percentage

It was also found that in treatment group II 63.85% were mild anaemic before intervention which was reduced to 55. 42% in posttest I and 47.38% in posttest II. Further in posttest I 32.53% and in posttest II 42.16% were non anaemic. It is depicted that the haemoglobin percentage was increased within three months and it was maintained up to six months. (Fig. 3).

Table 1: Comparison of pretest, posttest 1& 11 mean, SD and mean difference of haemoglobin levels of anaemic adolescent girls (N= 248,249 & 249)

	Haemoglobin		
Treatment 1	**Mean**	**SD**	**MD**
Pretest	10.01	1.09	
Posttest 1	11.66	0.35	1.65
Posttest 11	11.82	0.42	1.80
Treatment 11			
Pretest	10.02	1.07	
Posttest 1	11.32	0.33	1.30
Posttest 11	11.36	0.37	1.34
Control group			
Pretest	10.14	1.07	
Posttest 1	10.12	1.06	0.02
Posttest 11	10.10	1.04	0.04

Comparison of mean, SD and mean difference between treatment- I, II and control group with regard to heamoglobin percentage of anaemic adolescent girls shows that the pretest mean haemoglobin percentage in control group was 10.14±1.07 which decreased to 10.12±1.06 in posttest I and 10.10±1.04 in posttest II. Whereas in treatment group I the mean haemoglobin percentage was 10.01±1.09 which increased to 11.66±0.35 in posttest I and 11.82±0.42 in posttest II with mean difference of 1.65% and 1.80% respectively. Treatment group II reveals that the pretest mean haemoglobin percentage was 10.02±1.07 which increased to 11.32±0.33 in posttest I and 11.36±0.37 in posttest II with mean difference of 1.3% and 1.34% respectively. It shows both the treatments were effective. However the mean difference was higher in treatment group I (Table 1).

Table 2: Significant difference of treatment I, II and control group on haemoglobin levels of anaemic adolescent girls after intervention (N=248, 249 & 249)

Variables	df	Sum of squres	Mean square	F	Levels of significance
Haemoglobin					
Between Groups	2	388.126	194.063	188.752	Highly significant
Within Groups	743	762.880	1.028		
Total	745	1151.006			

($P < 0.001$ highly significant)

The 'F' value calculated among the treatment group I, II and control group on haemoglobin levels shows that the means of haemoglobin levels have significant difference among the treatment group I, II and control group (Table 2).

Chi – square value computed between anaemia and selected variables; age, educational status, type of family and family income reveals that no association between haemoglobin percentage and selected variables.

Discussion

Among the anaemic adolescent girls around 20% were in the age group of 19 years in all the groups. It is observed that as age increased percentage of anaemic adolescent girls increased. Around 60% girls were Hindus in all the groups. Around 64% girls from each group were in the income group of Rs 4000 and above per month. Most of them (90%) were from nuclear family in all the groups. It might be associated with the place of study. About 90% of them were residing in urban areas in the entire group. Around 93% were non vegetarian in all the groups. All the three groups had more or less similar demographic variables.

Distribution of pretest haemoglobin levels of the anaemic adolescent girls shows that the highest percentage around (63%) of them had mild anaemia and 34% had moderate anaemia in all the groups. None of them had severe anaemia. It depicts that all the groups were more or less similar when compared to pretest haemoglobin percentage. The findings are consistent with the findings of Mathews, et al. that most of the adolescent girls had mild anaemia.[16]

Comparison of posttest I and II on haemoglobin percentage of treatment I & II with pretest haemoglobin percentage reveals that the percentage of girls with mild anaemia was reduced from 64.11% to 52.82% in posttest I & 32.66% in posttest II in treatment I and 63. 85% to 55.42% in posttest I and 47. 38% in posttest II in treatment group II. Moreover during posttest I & II 42.33% &64.51% of the girls in treatment I and 32.55% and 42.16% of them in treatment II were non anaemic. As the intervention period prolonged the haemoglobin percentage was increased. It shows that haemoglobin percentage was increased within three months and it was maintained up to six months in both the groups. The difference was high in treatment group I when compared to treatment group II. Both the treatments seem to be effective. However the effectiveness of treatment was higher for those in the treatment group I. These findings were supported by the findings of Deshmukh, et.al. that the

mean haemoglobin concentration in study group was significantly higher (126.3± 14.3g/L vs 121.5g/dL ± 11.9g/L, p< .001).[17]

Comparison of mean, SD and mean difference between treatment- I, II and control group with regard to heamoglobin levels of anaemic adolescent girls shows that the mean haemoglobin level was more or less similar in all the groups. However in posttest I & II it was 10.12± 1.06 and 10.10 ± 1.04in control group, 11.66 ± 0.35and 11.82 ±0.42 in treatment group I and 11.32 ± 0.33and 11.36 ± 0.37 in treatment group II. It shows both the treatments were effective. However the mean difference was high in treatment group I. It shows that treatment with STP & SIM was more effective when compared to treatment with SIM and control group. These findings were supported by the findings of Deshmukh, et al. that the mean haemoglobin concentration in the study group was significantly higher (126.3± 14.3g/L vs 121.5 ± 11.9g/L, p<.001).

Conclusion

Adolescent age group is the window of opportunity to correct anaemia. If we intervene correctly during this period we can prevent future consequences and reduce the rate of maternal mortality, infant and child mortality. Promotion of proper utilization of iron and folic acid supplementation and deworming are recommended to treat anemia among adolescents.

Conflict of Interest: None.

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