

Effect of health education and IFA and albendazole on anemia among adolescent girls in rural field practice area of Bagalkot: A Non-randomized interventional trial without control

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Abstract

Background: Anemia is one of the most important public health problem among adolescent girls in developing countries. The incidence of anemia is more in rural areas. Health education plays a very important role in changing the food habits and behavior.

Objectives: To determine the prevalence of anemia & its influencing socio demographic factors and the effectiveness of intervention (health education and IFA & Albendazole) among adolescent girls.

Methods: A Non-randomized interventional trial without control was conducted in the rural field practice area. The study participants were in the age group of 14-19 years. Pre-test was conducted to know the existing knowledge about anemia and a pre-test Hb% estimation was done. Health education sessions were conducted in the schools by peer educators, link workers and the staff. Anemic adolescent girls were made to take 100 IFA tablets and one albendazole tablet. Post-test evaluation survey was done to know the effectiveness of health education sessions and Iron and Folic Acid (IFA) Supplementation and albendazole tablets.

Results: Prevalence of anemia in adolescent girls was 53.18%. The association between socio-economic status and anemia was found to be significant. There was significant increase in level of knowledge among adolescent girls regarding anemia after health education intervention and there was significant increase in Hemoglobin level among adolescent girls after IFA and Albendazole ingestion.

Conclusion: The intensive health education and IFA and albendazole administration brings down the anemia problem which can prevent the anemia related complications in the future.

Key words: Anemia, Adolescent girls, Rural area, IFA, Albendazole

Introduction

Adolescent is the period of life between 10-19 years. During this period of life physical, psychological and behavioral changes takes place.^[1] Adolescence word came from the Latin word, 'adolescere' means "to grow, to mature".^[2] During adolescent period physical and physiological changes takes place and this leads to demand in their nutritional requirements and they are more vulnerable to anemia. The burden of anemia is due to increased requirement of iron, poor intake of iron rich foods, infection and worm infestation, early

marriage and adolescent pregnancy.^[3]

In India, anemia is most common health problems and it is much more in the rural than in the urban areas. Anemia is a nutritional problem worldwide and the prevalence is more in developing countries than the developed countries.^[4] Women of child-bearing age and adolescent girls are mainly affected by anemia.^[2]

The causes of anemia include family with low socio-economic class; neglected female child and the menstrual blood loss. India has 190 million adolescents in which 22% are girls. This is vulnerable period for

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nutritional anemia.^[5] In India, according to NHFS-4 survey, the prevalence of anaemia among adolescent girls, 15-19 years is 54.1%. Among pregnant women, the prevalence of anemia in India is 50.4% and in lactating women 58%.^[6]

'Iron Deficiency Anaemia' (IDA) is very common disorder among adolescent girls.^[7] Incidence of anaemia is considerably higher in rural areas. IDA is a health challenge in developing countries and remains high instead of national programs to control this deficiency.^[8] If adolescents are well nourished, they can be healthy citizens and parents of healthy babies^[9]. Most effective steps to reduce the prevalence of anemia is health promotion by providing information, health education, and skill training.^[10]

Interventional studies of anemia are not conducted in this part of Karnataka. Hence this study had been undertaken to find out the prevalence, influencing factors and the outcome of intervention in the form of health education and IFA supplementation.

Objectives:

1. To determine the prevalence of anemia & its influencing socio demographic factors
2. To find out the effectiveness of intervention (health education and IFA & Albendazole) among adolescent girls

Methodology

A Non-randomized interventional trial without control was conducted in the Rural field practice area of Department of Community Medicine, S.N. Medical college, Bagalkot, where all the six schools, were included in the study:

Sample size calculation: Sample size is calculated based on the NFHS-4 survey^[11].

By taking the prevalence of anemia among 14-19 years as 45.3%

Prevalence (p)= 45.3%, $q=100-p=100-45.3=54.7\%$, $d=11\%$ of p is 4.983

$N=4pq/d^2=4 \times 45.3 \times 54.7 / 4.983 \times 4.983$

$=399=400$. (rounded off). Minimum sample size required is 400.

A total of 440 adolescent girls were interviewed.

Inclusion criteria

14-19 years (Mid and late adolescents) girls attending schools in rural field practice area and are willing to give consent

Exclusion criteria: Those who are suffering from chronic illnesses and Loss to follow up

Sampling technique for adolescents: All the 440 adolescent girls of 7th, 8th, 9th standard, belonging to mid and late adolescents in the schools of the study area, were included in the study.

Parameters studied and techniques employed:

The study was conducted from March 2018- June 2019. Three link workers were identified and were allocated the schools. Link worker training was done by the Program Management Unit (PMU) at Department of Community Medicine, S N Medical College, Bagalkot in the following aspects They were asked To identify the study groups i.e. adolescent girls.

Phase I: The training was imparted to the link workers by using integrated methods like LCD, demonstration and posters regarding the collection of baseline demographic data and Knowledge of Anaemia and doubts were clarified.

A predesigned pretested semi-structured questionnaire was prepared in Kannada language. It contained two parts: 1) Socio-demographic factors such as age, occupation, literacy status, locality, socioeconomic status 2) Knowledge related questions about nutritional anaemia (Sources of iron rich foods, clinical features of anaemia, diagnosis, complications, treatment and preventive aspects as well as Iron and Folic Acid & albendazole). Data collection reporting was done by the link workers and later reviewed.

Institutional Ethical clearance was obtained and Permission from the DDPI and Principal of the respective school was taken for conduction of survey in the schools and informed consent from the parents was taken prior to the study. The consent was also taken from the students for participation in the study as per the ICMR guidelines.

Phase 2: Activities undertaken in this period were,

1. Conducting awareness sessions in the schools to the adolescent girls.
2. Distribution and monitoring the Iron and Folic acid tablets intake among study population
3. Each school was visited once in a month and health education was given for duration of six months by the Community Medicine staff and link workers.
4. Monitoring visits were done by the staff once every fortnight.

Health education by the link workers in the schools:

Trained link workers visited the schools to impart health education once per week. Three trained workers visited their respective allotted schools in the study area, a total of 12 visits per month by all the three link workers was done. It was supervised by the concerned staff.

Health education was given to the adolescent girls by the following methods. Demonstrations were done by showing intake of iron and folic acid and albendazole tablets. Iron rich foods were displayed and explained. Videos relating to anemia were shown.

On the day of pre-test, Baseline hemoglobin estimation was done to find out the anemic adolescent girls by trained lab technician using a calibrated standardized haemoglobin estimation instrument Hemocue Hb201+.

Table : Level of hemoglobin and its management^[12]

| Level of hemoglobin | Treatment |
|--|--|
| Mild Anaemia (11–11.9 gm/dl) | 60 mg of elemental iron and 100 microgram of folic acid daily for 3 months |
| Moderate Anaemia (8–10.9 gm/dl) | 60 mg of elemental iron 100 microgram of folic acid daily for 3 months |
| Severe Anaemia (<8 gm/dl) | Refer urgently to DH/FRU |

100 IFA tablets (60 mg of elemental iron) for 100 days(1 tablet per day) and 1 tablet of Albendazole in the dosage of 400 mg once was given after meals to those who are found to be anaemic. The study subjects were not consuming WIFS IFA tablets issued by the state Government. The albendazole tablet was received by the students prophylactically through the Government priorly. In this study, albendazole tablet was given to those who were found to be anemic as a treatment. The IFA and albendazole tablets were supplied to girls by the investigators at free of cost. Five girls developed side effects such as gastritis & nausea and they were treated for the same and monitored throughout the course for any side effects.

After six months, the impact of health education and IFA and albendazole Administration on anaemia was assessed by using post-test questionnaire. Post-test Hb% estimation was done by trained lab technician using a calibrated standardized Hemoglobin estimation instrument Hemocue Hb201+.

The staff members visited the schools and health education sessions were given. School teachers and monitors were selected for every class and assigned a sheet to tick mark for consumption of IFA tablets for each student separately. Absent students were also followed up to complete the full course of IFA Administration. The compliance to IFA treatment was ensured by maintaining log book in the form of large sheets.

Collection of samples

A calibrated standardized hemoglobin estimation instrument Hemocue Hb201+ was used. The participant was explained about the procedure, priory and consent was taken by the participant and their parents. With the help of a sterile lancet, with all aseptic precautions the finger pulp was pricked. The blood was allowed to ooze. The microcuvettes tip was touched to the edge of the blood drop with the help of capillary action the blood entered into the microcuvettes. Then the microcuvette is inserted into the slot provided in the instrument. Then the reading is noted down. Similar procedure was followed for other participants using the new microcuvettes.

Phase 3:

Post-test evaluation survey was done to know the effectiveness of health education sessions and Iron and Folic Acid (IFA) Supplementation and albendazole tablets. Scoring was done for the proforma and each correct answer was awarded 0.5 marks Data was entered in Microsoft excel sheet. Mean scores of individual students pretest and post-test were tabulated and were summed up. Correlation test was applied using paired t test using SPSS version 16.

Results

Table no. 1: Distribution according to the adolescent girl’s age group

| Age (yrs) | No. | % |
|-----------|-----|------|
| 14 | 275 | 62.5 |
| 15 | 90 | 20.5 |
| 16 | 72 | 16.4 |
| 17 | 03 | 0.6 |
| Total | 440 | 100 |

62.5% of the adolescent girls were in the age group of 14 years.

Table 2: Distribution according to the adolescent girl's family size

| Family size | No. | % |
|-------------|-----|------|
| <6 | 194 | 44.1 |
| 6 - 10 | 192 | 43.6 |
| >10 | 54 | 12.3 |
| Total | 440 | 100 |

44.1% of adolescent girl's family size is less than 6 and 43.6% between 6 to 10.

Table 3: socio-demographic profile of adolescent girls

| Socio Economic Class | No. | % |
|--------------------------|-----|------|
| I | 05 | 1.1 |
| II | 19 | 4.3 |
| III | 31 | 7.1 |
| IV | 137 | 31.1 |
| V | 248 | 56.4 |
| TOTAL | 440 | 100 |
| Fathers education | | |
| Illiterate | 99 | 22.5 |
| Primary school | 106 | 24.1 |
| Middle school | 118 | 26.8 |
| High school | 78 | 17.7 |
| Intermediate/diploma | 37 | 8.4 |
| Graduate | 02 | 0.5 |
| Total | 440 | 100 |
| Mothers education | | |
| Illiterate | 193 | 43.9 |
| Primary school | 104 | 23.6 |
| Middle school | 112 | 25.5 |
| High school | 21 | 4.8 |
| Intermediate/diploma | 09 | 2 |
| Graduate | 01 | 0.2 |
| Total | 440 | 100 |

56.4% of adolescent girls were from Socio Economic class V and 31.1% from class IV according to B G Prasad classification. 22.5% of adolescent girl's fathers were

Table 7: Distribution of anemia status of adolescent girls according to their mother's education

| Mothers education | Anemia | No-anemia | Total |
|----------------------|-------------|------------|-------|
| Illiterate | 111 (57.5%) | 82 (42.5%) | 193 |
| Primary school | 48 (46%) | 56 (54%) | 104 |
| Middle school | 56 (50%) | 56 (50%) | 112 |
| High school | 12 (57%) | 09 (43%) | 21 |
| Intermediate/diploma | 06 (66.7%) | 03 (33.3%) | 09 |
| Graduate | 0 | 1(100%) | 01 |
| Total | 233 | 207 | 440 |

Chi-square: 4.758 and p: 0.313

Among adolescent girls of illiterate mothers, 57.5% are anemic. This was statistically not significant.

illiterate and 24.1% have completed primary schooling. 43.9% of adolescent girl's mothers were illiterate and 23.6% have completed their primary schooling.

Table no. 4: Prevalence of anemia among adolescent girls

| Anemia status | Total | Percentage |
|---------------|-------|------------|
| Anemia | 234 | 53.18 |
| No anemia | 206 | 46.82 |
| | 440 | 100 |

Prevalence of anemia in adolescent girls was 53.18%

Table 5: Grading of anemia among the adolescent girls

| Grading | No. | % |
|-----------------|-----|--------|
| Mild anemia | 90 | 20.46 |
| Moderate anemia | 118 | 26.82 |
| Severe anemia | 17 | 03.86 |
| No anemia | 215 | 48.86 |
| Total | 440 | 100.00 |

Among the total 440 adolescent girls 20.46% had mild anemia, 26.82% had moderate anemia and 3.86% had severe anemia

Table 6: Distribution of anemia status of adolescent girls according to their socio-economic status

| Socio Economic Class | Anemia | No-anemia | Total |
|----------------------|------------|------------|-------|
| I | 01(20%) | 04(80%) | 05 |
| II | 16(84%) | 03(16%) | 19 |
| III | 19(61.3%) | 12(38.7%) | 31 |
| IV | 63(46%) | 74(54%) | 137 |
| V | 135(54.4%) | 113(45.6%) | 248 |
| Total | 234 | 206 | 440 |

Chi-square:13.382 and p:0.009

Among adolescent girls of socio-economic status V, 54.4% are anemic as compared to socio-economic status I which is 20%. This was statistically significant.

Table 8: Change in knowledge among adolescent girls after health education intervention

| Health education | Mean | Correlation (r) | p value | t value | p value |
|------------------|---------|-----------------|---------|---------|---------|
| Pre-test | 10.0686 | 0.318 | 0.000 | -23.761 | 0.000 |
| Post- test | 14.5355 | | | | |

There is increase in level of knowledge among adolescent girls regarding anemia after health education intervention and which was found to be statistically significant by correlation and paired t-test.

Table 9: Change in haemoglobin level among adolescent girls after IFA and Albendazole intervention

| Haemoglobin % | Mean | Correlation (r) | p value | t value | p value |
|---------------|---------|-----------------|---------|---------|---------|
| Pre-test | 10.2613 | 0.037 | 0.566 | -14.997 | 0.000 |
| Post- test | 12.2492 | | | | |

There is increase in Haemoglobin level among adolescent girls after IFA and Albendazole intervention and which was found to be statistically significant by paired t-test.

Discussion

The present study was undertaken among the adolescent girls of schools in rural area with the objective of finding the prevalence of anemia & its influencing socio demographic factors and effectiveness of intervention (health education and IFA & Albendazole). A Non-randomized interventional trial without control was conducted. A total of 440 adolescent girls were interviewed.

In the present study, Prevalence of anemia in adolescent girls was found to be 53.18% which is higher than the study done by Sabita Basu, wherein 34.23% of the adolescent girls were anemic in rural area of Chandigarh^[13].

The study done by Sajitkumar Soman During June -December 2016 showed the prevalence of anemia as 62% among school going adolescent girls of 5th to 10th standard which is found to be higher than the present study^[14]. The prevalence of anemia among adolescent high school girls was found to be very high (96.88%) in a study conducted by Dayalaxmi T in the rural field practice area of JJM Medical college^[15].

In a study done by Akshaykumar Parik among adolescent girls of rural Mathura, the prevalence of anemia was 71.43% which is higher than the present study^[16]. A higher prevalence of anemia (79.5%) was reported by Shobha P shah et al among adolescent tribal girls of Gujarat^[17].

In this study, among adolescent girls of socio-economic status V, 54.4% were anemic as compared to socio-economic status I which is 20%. The anemia was found to be more in lower socio economic class when compared to higher class. This was statistically significant.

In the current study, the knowledge of anemia was not up to the mark among adolescent girls before

intervention. There was increase in level of knowledge among adolescent girls regarding anemia after health education intervention. The mean score increased from 10.06 from pre test to 14.53 in the post test and it was found to be statistically significant by correlation and paired t-test.

This study is in line with the study conducted by Monika Singh. They observed that, there was a change in the knowledge among adolescent girls in respect to anemia after giving intensive health education. It was statistically significant^[18]. Similar observation was made by Lina Bandyopadhyay conducted among school children of 7th to 9th standard in rural area of West Bengal. The study revealed that, after post test intervention the knowledge score was increased^[19].

In the present study, there was increase in Haemoglobin level among adolescent girls after IFA and Albendazole intervention and the mean hemoglobin increased from 10.26 to 12.24 gm % which was found to be statistically significant. The reduction in anemia after intervention may be due to good compliance which was monitored by peer educators, link workers and the staff.

Aditi Sen in a study done among school girls at Vadodara found that, the intervention group showed higher increment in HB% after IFA administration daily which was statistically significant^[20]. The study findings were similar to the present study.

The study done by Shoba P et al among adolescent girls at Gujarat found that there was rise in Hb% after IFA administration. The association was found to be significant in change in hemoglobin before and after intervention^[17]

The reasons of high prevalence of anemia among adolescent girls showed by many studies may be due to the negligence of the female child in food and other

aspects. This is added by the menstrual blood loss.

This study showed that, there is an urgent need to address the problem of anemia in terms of Iron and Folic acid supplementation and consumption of single dose of albendazole also. Along with distribution we need to make them to consume by giving health education about the importance of IFA and albendazole both prophylactically and as a treatment. Adolescent girls should be educated about the iron rich foods and its importance. An attempt is made in this study to supplement IFA and albendazole to the anemic girls with health education.

Conclusion and Recommendations

This study showed that, detecting the anemic adolescent girls by hemoglobin estimation and giving intensive health education and administering Iron and Folic Acid, albendazole improves hemoglobin and we can reduce the prevalence of anemia and its complications in the community.

Health education intervention plays a very important role in improving the existing knowledge and the behavior. The school is the best place to impart health education with the help of teachers. Health education should be continued by the trained health workers to maintain sustainability. The adolescent girls should use supplementary nutrition effectively provided by anganawadis. At the time of entry into the school, adolescent girls should be tested for Hb% so that adequate measures can be taken for those who are found to be anemic.

References

1. A.K.Sinha, G.M. Singh Karki. Prevalence of anemia among adolescents in Biratnagar, Morang, Dist. Nepal. *A International journal of pharmaceutical and biological archives* 2012;3[5];1077-1081.
2. Nayar PD, Mehta R. *Child Health*. In: Gupta P, Ghai OP, Editors. *Textbook of Preventive and Social Medicine*. 2nd ed. New Delhi: CBS Publishers and Distributors; 2007; 428-37.
3. WHO S-C-02. *Prevention of iron deficiency anaemia in adolescents role of weekly iron and folic acid supplementation*. Available at: http://apps.searo.who.int/PDS_DOCS/B4770.pdf?ua=1. Accessed on 16 June 2017.
4. Garg N, Bhalla M. To study the prevalence of anaemia among school going children in rural area of Faridkot district, India. *Int J Contemp Pediatr* 2016;3:218-23.
5. Siddaram S M, Venkatesh G. M. *International journal of biological and medical research*. 2011; 2[4]; 22-924.
6. *International institute for population sciences (IIPS) and ICF. 2017. National family health survey (NFHS-4), 2015-16; India. Mumbai: IIPS, 334-5.*
7. U. Kapil, A. S. Bhadoria: *National Iron-plus Initiative Guidelines for control of iron deficiency anaemia in India, 2013. The National Medical Journal of India, Vol. 27, No. 1, 2014, pp: 27 - 29.*
8. Poskett, M.E. Elizabeth. *Early history of iron deficiency anemia. British Journal of Haematology, 122 (4), 2003: 554- 562.*

9. Vasanthi G, Pawashe AB, Susie H, Sujatha T, Raman L. *Iron nutritional status of adolescent girls from rural area and urban slum. Indian Pediatr.* 1994; 31:127-32.
10. *Ethiopia demographic and health survey 2011 (2012) Central statistical agency, Addis Ababa, Ethiopia. Available at: <https://dhsprogram.com/pubs/pdf/FR255/FR255.pdf> accessed on 1.6.2020*
11. UNICEF, *Adolescent development: perspectives and framework NO.1. Retrived http://www.unicef.org/adolescence/files/ADAP_series_1.pdf. Accessed on 5.6.2020.*
12. www.nhm.gov.in/images/pdf/programmes/child-health/guidelines/control-of-iron-deficiency-anemia.pdf accessed on 5.6.2020.
13. Sabita Basu, Srikanta Basu, Ranzita Hazarika & Veena Permar. *Prevalence of anemia among school going adolescents of Chandigarh. Indian Paediatrics*. June 2005; Vol 42: 593-97.
14. Sajitkumar Soman, Beenu Areekal, Asha Joan Murali, Rosin Goerge Verghese. *Adolescent anemia its prevalence and determinants: A cross sectional study from south Kerala. International journal of Community Medicine and public health*. 2017 August; 4(8): 2750-56.
15. Dayalaxmi T, Vidyasastry GS, Suryakanta A, Vijaykumar B.A. *Comparative study on prevalence of anemia among urban and rural adolescent high school girls of Davanagere Karnataka. International journal of Community Medicine and public health*. December 2017; Vol 4(12):4638-43.
16. Akshaykumar Parikh, Shalini Gandhi, Jayshree Parikh. *Prevalence of anaemia among adolescent patients of rural Mathura, U.P., India. IOSR Journal of Dental and Medical Sciences*. October. 2016; 15(10): 24-28.
17. Shobha P Shah, Pankaj Shah, Shrey Desai, Dhiren Modi, Gaytri Desai, Honey Arora. *Effectiveness and feasibility of weekly Iron and Folic Acid supplementation to adolescent girls and boys through peer educators at community level in the tribal area of Gujarat. Indian J Community Med*. 2016 Apr-Jun; 41(2): 158-161.
18. Singh M, Honnakamble RA, Rajoura OP. *Knowledge, Attitude and Practice Change about Anemia after Intensive Health Education among Adolescent School Girls of Delhi: An Intervention Study. Int J Med Public Health*. 2019; 9(3):71-3.
19. Bandyopadhyay L, Maiti M, Dasgupta A, Paul B. *Intervention for improvement of knowledge on anemia prevention: A school based study in a rural area of West Bengal. Int J Health Allied Sci* 2017;6:69-74.
20. Aditi Sen. *Impact of iron-folic acid supplementation on cognitive abilities of school girls in Vadodara. Indian Pediatrics*. February 2009; 46:137-43.

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