Prevalence of Anaemia among Adolescent Girls on Weekly Iron and Folic Acid Supplementation (WIFS) and Non WIFS Group in Rural Schools of Mangalore, Karnataka; a Comparative Study

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ABSTRACT

Background: Weekly Iron and Folic Acid Supplementation (WIFS) Programme is an initiative to decrease the burden of anaemia among adolescents studying in Government schools.

Objective: To assess the difference in prevalence of anaemia among Government school-going adolescents girls on WIFS as compared to private school girls not on WIFS.

Methods: Cross-sectional study was conducted among adolescent girls, 7th to 10th standard in Government schools (on WIFS) and private schools (not on WIFS). The sample size in each group was 104, selected by multi-stage sampling. Data was collected using semi-structured questionnaire, clinical examination and haemoglobin estimation. Chi-square test and Unpaired t test used to compare the categorical and continuous variables respectively.

Results: The prevalence of anaemia among the school children in government schools was 51% and in the private schools it was 64.4%. The mean haemoglobin was 11.77 ± 1.41 and 11.34 ± 1.49 in government and private school girls, respectively, which was statistically significant (p=0.013).

Conclusions: The prevalence of anaemia among the government school girls was lesser as compared to the private schools girls, suggesting the role of WIFS in the reduction of prevalence of anemia. WIFS programme may be extended to private schools as well.

Key-words: Adolescent, Anaemia, Weekly iron and folic acid supplementation, School

INTRODUCTION

Anaemia is the most common nutritional disorder worldwide.[1] According to National Family Health Survey-3 (NFHS-3), in India about 56% of adolescent girls are anaemic.[2] The iron needs are high in adolescent girls because of the increased requirements for expansion of blood volume associated with the adolescent growth spurt and the onset of menstruation.[3] Anaemia in adolescent girls affects their reproductive physiology as well as their physical work capacity and cognition, it results in impaired physical growth, mental development, weakness, tiredness, menstrual irregularities, and increased susceptibility to infection.[4] The next generation also gets affected when malnourished girls become mothers during adolescence or later in adulthood.[5] Government of India launched the Weekly Iron and Folic Acid Sup-

plementation (WIFS) Programme in the year 2012 which is implemented in urban and rural areas for adolescent boys and girls in school (10–19 years) through the platform of Government/Government aided. In these schools, 6 to 12th classes are given one day in a week, iron and folic acid (IFA) tablet containing 100 mg elemental iron and 500 mcg folic acid.[5,6] This new program is an initiative to decrease the burden of anaemia among adolescents. Many studies are done to study the compliance and effectiveness of this program, however few studies are done in rural areas to determine the prevalence of anaemia among adolescents girls on WIFS as compared to those not on it. Hence this study was conducted to assess the difference in prevalence of anaemia among government school-going adolescent's girls on WIFS as compared to private school going girls not on WIFS in rural areas.

METHODS

A Cross-Sectional study was conducted among adolescent girls, studying from 7th to 10th standard in Government/Government aided and private schools situated in the rural field practice area of the teaching hospital. The study was conducted for a period of 3 months (Sept-Nov 2019). After obtaining the ethical clearance from the Institutional Ethics Committee, the proposed study was commenced.

Considering the prevalence of anaemia (p) as 45.7%,[7] among adolescent girls of coastal Karnataka, with absolute precision of 10% (d) and a confidence interval of 95%, with q=(100-p), calculated sample size using the formula $4pq/d^2$, was 95. Adding a 10% non response rate, the final sample size came to 104. Hence, 104 adolescent girls from each group that is Government /Government aided and private schools were included.

Multistage sampling technique was used in the study. The rural field practice area of the teaching hospital has five Government/Government aided schools where Weekly Iron and Folic Acid Supplementation (WIFS) Programme is implemented and 5 private schools where WIFS programme is not implemented. By simple random technique, 2 schools were selected from each of the two comparison groups (i.e., 5 Government/Government aided schools and 5 private schools). Among the selected schools, adolescent girls from class 7th to 10th standard were included. In the WIFS group, that is Government/ Government aided schools, the girls who have consumed at least 3 Iron and folic acid (IFA) tablets per month since last one year were included in the study(information was availed from WIFS 'compliance card' maintained at the school). From the selected Government/ Government aided and private schools, 13 adolescent girls, who fulfilled the inclusion criteria were selected from each class by simple random sampling technique, such that 52 students were selected from each school and 104 adolescent girls were recruited in

each comparison group. Final analysis included 208 adolescent girls.

After obtaining parental written consent and child assent from the selected students, data pertaining to socio-demographic variables, menstrual history and iron and folic acid intake history were collected using a semi-structured questionnaire. The blood sample was collected under aseptic precautions with a 2ml disposable syringe. Haemoglobin was estimated using calibrated auto-analyzer SYSMEX XP 100.

Statistical analysis: The data was analyzed using SPSS (Statistical Package for Social Sciences) trial version 21. Chi-square test was used to find the association anemia with type of school (on or not on WIFS). Unpaired t test used to compare the comparing the mean haemoglobin levels among the two groups. Statistical significance set at 5% level of significance (p < 0.05).

RESULTS

A total of 208 female students were included in the study of which 104 were from Government schools and 104 from private schools. The mean age of the study population was 13.58 ± 1.1 years. Table 1 depicts the socio- demographic profile of the study population.

Table 1: Socio demographic profile of the two comparison groups (n=208)

Socio demographic Variables	Government School (%)	Private School (%)	Total (%)
Age			
11 years	2 (1.9)	2 (1.9)	4 (1.9)
12 years	17 (16.3)	19 (18.3)	36 (17.3)
13 years	32 (30.8)	22 (21.2)	54 (26)
14 years	38 (36.5)	31 (29.8)	69 (33.2)
15 years	11 (10.6)	29 (27.9)	40 (19.2)
16 years	4 (3.8)	1 (1)	5 (2.4)
Religion			
Hindu	49 (47.1)	8 (7.7)	57 (27.4)
Muslim	49 (47.1)	93 (89.4)	142 (68.3)
Christian	6 (5.8)	3 (2.9)	9 (4.3)
Socioeconomic Status*			
BPL	92 (88.5)	49 (47.1)	119 (57.2)
APL	10 (9.6)	27 (26)	59 (28.4)
Mothers' Education			
Illiterate	11 (10.6)	14 (13.5)	25 (12)
< High School	89 (85.6)	76 (73.1)	165 (79.3)
≥ High School	4 (3.8)	14 (13.5)	18 (8.7)
Fathers' Education			
Illiterate	13 (12.5)	9 (8.7)	22 (10.6)
<High School	83 (79.8)	58 (55.8)	141 (67.8)
≥High School	8 (7.7)	37 (35.6)	45 (21.6)
Family Size			
≤4	35 (33.7)	26 (25)	61 (29.3)
5-6	37 (35.6)	58 (55.8)	95 (45.7)
≥7	32 (30.8)	20 (19.2)	52 (25)

BPL: Below poverty line; APL: Above poverty line.
*Socioeconomic status: 30 students who were not certain about their socioeconomic status have been excluded.

Table 2: Distribution of severity of anaemia among the two comparison groups (n=208)

Grading of anaemia (Hb in gm/dl)	Govt. School (%)	Private School (%)	Total (%)
Normal (≥12)	51 (49)	37 (35.6)	88 (42.3)
Mild (11.9 to 10)	45 (43.3)	50 (48.1)	95 (45.7)
Moderate (9.9 to 7)	8 (7.7)	17 (16.3)	25 (12)

Table 3: Standard wise comparison of mean hemoglobin levels among the two comparison groups (n=208)

Class/ Standard	Mean (SD) Hb in gm/dl (SD)		p value*
	Government School	Private School	
7th	11.55 (1.81)	11.67 (1.79)	0.82
8th	11.34 (1.01)	10.54 (0.95)	0.82
9th	11.72 (1.31)	11.63 (1.40)	0.82
10th	12.46 (1.18)	11.51 (1.46)	0.013
Total	11.77 (1.41)	11.34 (1.49)	0.03

SD = Standard deviation. * Independent sample t test

With regard to menstruation status, 66 (63.5%) among the government school girls and 72 (69.2%) in private schools had attained menarche. The mean age of menarche was 12.2±1.0 years in government schools and 11.9±1.0 years in private schools and overall 12.0±1.0 years. The mean duration of menstruation was 5 ±1.5 days and 5.3 ±1.5 days in government and private school girls, respectively.

The overall prevalence of anaemia was found to be 57.7 %. Among the Govt. school girls, the prevalence of anaemia was 51% and among the private school girls, it was 64.4 %. The difference between the two groups was statistically significant (p=0.049), showing that students on WIFS in Government schools had significantly lower prevalence of anaemia.

Among the Govt. school girls, 45 (43.3%) were mildly anaemic and 8 (7.7 %) were found to have moderate anaemia. In the private school girls, 50 (48.1 %) were mildly anaemic and 17 (16.3 %) were moderately anaemic [Table 2].

An independent sample t test was conducted to compare haemoglobin concentration in Government and Private school girls, the mean haemoglobin concentration in the Government school girls (11.77±1.41) was higher when compared to private school girls (11.34±1.49) and this difference was statistically significant (p=0.03). The average haemoglobin for Government School children was 0.43 mg/dl higher than the private school children.

When comparing the mean haemoglobin levels across the various standards, it was seen that government schools girls who were on WIFS was higher than private school students who were not on WIFS. Further, the 10th standard students of Govt. school had mean haemoglobin of 12.46 ± 1.18 which was higher than the private school girls mean hemoglobin; 11.51 ± 1.46. This difference was statistically significant(p=0.013). [Table 3]

Further, among the Government school girls, 32 (62.7 %) and 21 (39.6%) were anaemic in the age groups of 11-13 years and 14-16 years respectively. The prevalence of anemia was lower in higher age groups and this difference was statistically significant (p=0.02). However, in the private school girls, 27 (62.8 %) and 40 (65.6 %) in the age group of 11-13 years and 14-16 years were having anaemia. There was no statistically significant difference across the age groups.

Among those who had attained menarche, anaemia was present in 55.8% girls and among others, it was 61.4 %. There was no statistically significant association of menstrual status with anemia (p=0.437). Among those who had attained menarche, that is 138 girls in total, prevalence of anemia was higher in private school girls (45;62.5%) as compared to government school girls (32;48.5%), however this difference was not statistically significant (p=0.09).

DISCUSSION

Anaemia is a critical public health problem in India and adolescents (10–19 years) are at higher risk of iron deficiency. Weekly Iron and Folic Acid Supplementation (WIFS) Programme is an evidence-based major initiative in India to tackle the nutritional anaemia. This study compared the prevalence of anaemia among government school-going adolescent's girls on WIFS with that of private school going girls not on WIFS in rural areas. In the present study, the overall prevalence of anaemia among the female students studying from 7th to 10th standard was 57.7 %. According to NFHS-3, in Karnataka, the prevalence of anaemia in adolescent girls was 51.3 %.[8]

In this study, in Govt. school girls the prevalence of anaemia was estimated to be 51%, who were taking weekly iron and folic acid tablets regularly not less than one year. Among the private school girls, who were not taking any iron and folic acid tablets the prevalence was 64.4 %. Also, the mean haemoglobin concentration in the Government school girls (11.77±1.41gm/dl) was higher when compared to private school girls (11.34±1.49gm/dl). Further, these differences were statistically significant. Lower prevalence of anaemia and higher mean haemoglobin levels in government schools may be attributed to WIFS Programme. Effectiveness of WIFS in reducing anemia has also been shown by the study conducted by Shobha P Shah who reported prevalence of anemia to have reduced from 79.5% to 58% among adolescent girls.[9] In the study done by Rakesh P et al in southern Kerala, the prevalence of anaemia (30.1%) was less in the Government where WIFS tablets are given as compared to management schools (33.4%) where WIFS is not given. Similarly in our study lower prevalence of anaemia was noted in the Govt. school girls compared to private school girls.[10] A longitudinal study done by Angadi N and Balu PS showed that, prevalence of anemia improved from 38% to 26% among adolescents school girls en-

rolled in the WIFS program and their mean haemoglobin concentration was increased by 0.37gm/dl.[11]

In our study among Govt. school girls, 43.3% were having mild anaemia and 7.7 % were found to have moderate anaemia. In the private school girls 48.1 % were mildly anaemic 16.3 % were moderately anaemic. Whereas, in the study done by Prayag A, 35.7%, 22.5 % and 5.5 % showed mild, moderate and severe anaemia respectively in rural girls.[12] In our study none were found to be having severe anaemia.

In the present study among the Government school girls, 62.7 % from the age group of 11-13 years were anaemic. Whereas among the age group of 14-16 years the prevalence of anaemia reduced to 39.6%.This difference was statistically significant. In the study done by Rakesh et al higher prevalence of anaemia was noted in the age group 12-14 yrs (35.3%) compared to that of >14 years (31.1 %).[10] The reduction of prevalence may be due to regular intake of WIFS tablets for more years in the age group 14-16 years compared to 11-13 years.

In this study the mean age of menarche was 12 years, similarly in a study by Subramanian M et al mean (SD) age at menarche was 13.2 (1.2) years.[13] Further in the present study, there was no significant association between attainment of menstruation with anemia and among those who attained menarche there was no significant difference in prevalence of anemia between government and private school girls. Similarly in the study by Subramanian M et al, there was no significant association between age at menarche and menstrual history with anemia.[13]

CONCLUSIONS

Weekly Iron and Folic Acid Supplementation (WIFS) Programme has a great impact in reduction of anemia. The present revealed that the prevalence of anaemia among the Govt. school girls was lower as compared to the private schools girls, suggesting the role of WIFS in the reduction of prevalence of anemia. It may be recommended that WIFS programme which is currently implemented only in Government schools be extended to private schools as well in view of high prevalence of anaemia in private school going adolescent girls.

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REFERENCES

1. Siva PM, Sobha A, Manjula VD. Prevalence of Anaemia and Its Associated Risk Factors Among Adolescent Girls of Central Kerala. J Clin Diagn Res2016;10(11):19-23.

2. Kumar MGH, Patnaik S, Selvaraj K, Anbalagan J.Evaluation of Weekly Iron and Folic Acid Supplementation Program for Adolescents in Rural Kanchipuram, India.Nat J Res Community Med 2018;7(2):101-3.

3. Kumar A, Goyal A, Verma N, Mahesh A. Study of anemia among adolescent school girls and young adults. Int J Adv Med 2018;5:877-81.

4. Sarada AK, Thilak SA. Evaluation of Weekly Iron and Folic Acid Supplementation Programme for adolescents in rural schools of Kannur, North Kerala, India: A Cross-sectional Study. Int J Med Sci Public Health 2016;5:2259-63

5. Governnment of India.NHM.Guide for training master trainers on wifs.pdf [cited 2021 Jan 19] Available from: http://nhm.gov.in/nrhmcomponnets/reproductive-childhealth/adolescent-health/wifs.html

6. Bellad A, Kapil R, Gupta A. National Guidelines for Prevention and Control of Iron Deficiency Anemia in India.Indian J Comm Health 2017; 30(1):89-94.

7. Priya SH, Datta SS, Bahurupi YA, Narayan KA, Nishanthini N, Ramya MR. Factors influencing weekly iron folic acid supplementation programme among school children: Where to focus our attention?. Saudi J Health Sci 2016;5:28-33.

8. Nutrition and Anaemia; NFHS-3. Karnataka. Report 2005-2006: Vol 1. 2008: 89. [cited 21.04.2021]. Available from rchiips.org/nfhs/NFHS-3 Data/Karnataka_report.pdf

9. Shah SP, Shah P, Desai S, Modi D, Desai G, Arora H. 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;41(2):158-61.

10. Rakesh P. S., Rajeswaran T, Rakesh R., Gigil M., Sheeja A. L., Subhagan S., et al. 2015. Anaemia among schoolchildren from southern Kerala, India: a cross-sectional study. Natl Med. J. 2015;28:225–7.

11. Angadi N, Balu PS. Effectiveness of Weekly Iron and Folic Acid Supple- mentation Programme to Control Anemia among Rural Adolescent School Girls of Davangere, Karnataka. Natl J Community Med 2019;10(8):479- 482

12. Prayag A, Ashtagi GS, Mallapur MD. A Study on Assessment of Severity of Anaemia among Urban and Rural Children of Belagavi, Karnataka. Ntl J Community Med 2016; 7(8):708-11.

13. Subramanian M, Malhotra S, Kant S, Goswami K, Perumal V, Kaloiya G. Prevalence of Anemia Among Adolescent Girls Residing in Rural Haryana: A Community-Based Cross-Sectional Study. Cureus 2022;14(1): e21091.