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 anaemia. 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-
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%, 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 one day in a week, iron and folic acid (IFA) tablet containing 100 mg elemental iron and 500 mcg folic acid. 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 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**

**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.

**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 anaemia 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 Cross-Sectional study was conducted among adolescent girls, studying from 7th to 10th standard in Government/Government aided and private schools 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. 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 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.
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 anaemia 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 anaemia (p=0.437). Among those who had attained menarche, that is 138 girls in total, prevalence of anaemia was higher in private school going adolescent girls (45;62.5%) as compared to government school going 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 anaemia has also been shown by the study conducted by Shobha P Shah who reported prevalence of anaemia 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.

A longitudinal study done by Angadi N and Balu PS showed that, prevalence of anaemia improved from 38% to 26% among adolescents school girls en-

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

| Grade     | 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 haemoglobin levels among the two comparison groups (n=208)**

| Class/Standard | Mean (SD) Hb in gm/dl (SD) | p value* |
|---------------|----------------------------|----------|
| 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]
rolled in the WIFS program and their mean haemoglobin concentration was increased by 0.37gm/dl.  

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. 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 %). 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. Further in the present study, there was no significant association between attainment of menstruation with anaemia and among those who attained menarche there was no significant difference in prevalence of anaemia 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 anaemia.  

CONCLUSIONS
Weekly Iron and Folic Acid Supplementation (WIFS) Programme has a great impact in reduction of anaemia. The present revealed that the prevalence of anaemia among the Govt. school girls was lower as compared to the private school girls, suggesting the role of WIFS in the reduction of prevalence of anaemia. 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.

ACKNOWLEDGMENT
We would like to acknowledge the funding of this research by Indian Council of Medical Research as a Short Term Studentship Research Project We would like to thank the Dean of the Institution for his encouragement and support. We would also like to thank all participants of this study.

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