

Iron Supplementation Consumption in High School Students: A Cross-Sectional Study

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Abstract

Background: Girls are one of the high risk groups for iron deficiency anemia. Iron supplementation program is a preventive strategy for female students in high schools in Iran. This study aimed to estimate the prevalence of iron supplements consumption among high school students in the southeast of Iran.

Methods: A quantitative study was conducted in Zahedan (the capital of Sistan and Balochestan province) in the southeast of Iran in 2015. The sample size was 400 high school students from different areas of Zahedan who were randomly selected. A standard questionnaire was used for data collection. The data were analyzed using SPSS statistical software through descriptive statistics, one way ANOVA and Chi-square.

Results: In total, 68.2% of the students did not administer any tablets whether regularly or irregularly during the past 16 weeks. About 41 third grade students did not take any tablets in 16 weeks. There were a statistically significant correlation between lack of taking tablet and their grade point average of the last year ($P=0.003$, $F=1.078$); also, it had a significant association with school grade of students ($P=0.009$).

Conclusion: Most of the students did not use iron supplementation in Zahedan high schools. Measures should be taken to increase the culture of consuming iron tablets by providing appropriate environmental conditions; it seems that iron supplementation programs will have positive impacts on the students.

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Introduction

The World Health Organization (WHO) defined anemia as hemoglobin under 12 gr/dl in women and hemoglobin under 13 gr/dl in men.¹ Iron deficiency is a major public health issue² which affects two billion people worldwide.³ Approximately, 25% of population are anemic and 50% of all anemia cases are due to iron deficiency.⁴

Sufficient amount of iron is critically important for normal function of the vital organs of the human body. Iron deficiency leads to growth retardation, fatigue, cognitive disorders, poor concentration, asthenia, attenuation of the immune system and subsequently it ends in mortality.⁴

WHO surveys during 1993-2005 showed that 25% of 5-15 year old children, 41.8% of pregnant women, and 15.3% of women aged 15-60 were anemic.⁵ Moreover, the WHO reports showed the highest prevalence of iron deficiency anemia among 15-45 year old women compared to other age groups in the society.⁶ Studies on the iron deficiency anemia in women of childbearing age in Nepal, Norway and Lebanon showed a prevalence of 6%, 3% and 13.5%, respectively.⁷

Girls during menstruation, pregnant women and the elderly constitute the high risk group for iron deficiency anemia. Iron supplementation program has been suggested as a strategy for prevention and treatment of iron deficiency and iron deficiency

anemia in many countries.⁸ In addition, in some situations, this program is the best approach as it can specifically target high risk group, is safe and flexible, and is implemented quite rapidly.⁸ In Iran, iron supplementation program is a preventive strategy for female students in high schools.⁴ Kianifar in his study found that a weekly iron dose was effective in treating anemia in high school girls.⁹

A study (2015) on the effect of planned behavior theory education on iron tablet consumption in Iran proved that education positively influences the consumption of iron tablet.⁸ Also, a study on the investigation of iron tablet consumption in Iran showed that it was not satisfactory.⁹

Since anemia is important for females as to-be-mothers and the iron supplementation program is costly, this study aimed to estimate the prevalence of iron supplements consumption among high school students in Zahedan in the southeast of Iran.

Methods

A quantitative study was conducted in 2015 in Zahedan, the capital city of Sistan and Balochestan as the largest province in Iran and one of the underprivileged regions in Iran. All female students of high schools in Zahedan constitute the study population. Inclusion criterion was all female students in the Zahedan high schools and exclusion criterion was unwillingness to participate in the study. About 400 students were selected through the formula using clustering sampling method and 95% confidence interval. $P=0.2$,¹¹ $d=0.04$ and $\alpha=0.05$. Since there were four grades in the high schools with about equal number of students in the each grade, 100 students were allocated to the study in each grade.

Firstly, the researcher clustered Zahedan into five regions, including Northeast, Northwest, Southeast, Southwest and the Center. In each region, two schools were selected randomly, and then four clusters out of 10 were randomly selected from each high school. Thereafter, in each cluster, the samples were selected through systematic random sampling. After coordination between school managers and Zahedan School of Public Health, the researchers attended the schools for data collection.

In this study, a standard questionnaire was used for data gathering. The questionnaires were completed by students under the supervision of a researcher. It included demographic questions, parents' occupation and, level of education, the grade point average of the previous year, number of siblings, and rank of birth in family. Iron tablet complete consumption was defined as a condition in which the student takes all tablets that she had received in all distributions during 16 weeks or 4 months; otherwise, the consumption was considered incomplete.⁸

Data Analysis

In this study, descriptive statistics were used; moreover, Chi-square was used to determine the association of iron tablet consumption with school grade of students, fathers' education, father's job, mother's job, and birth rank of the student in the family. Also, one way ANOVA test was used to determine the association of iron tablet consumption with grade point average of the previous year and number of children in family. SPSS, version 21, was used to analyze the data and the level of significance was considered as 0.05.

In this research, ethical considerations including confidentiality of information and having the right to withdraw from the study were considered from the beginning to the end of the study. The study was approved by Ethics Committee of Zahedan University of Medical Sciences (ZAUMS).

Results

This study was conducted on 400 female high school students. Mothers of 66% of the students were housewives. Grade point average of the previous year for 38% of the student was between 18-20. Moreover, a negative significant association was observed between iron supplement consumption and the grade point average of the previous year ($P=0.003$, $F=1.078$). As shown in Table 1, about 41 students in the third grade had not consumed any tablet in 16 weeks and there was a significant association between students' school grade and iron tablet consumption ($P=0.009$, $\chi^2=17.11$). Other demographic variables are shown in Table 1.

Moreover, the results showed that 153 students (38.2%) did not take any tablets through 16 previous weeks.

Discussion

This study showed that 38.2% of the students had not taken any tablet in the 16 previous weeks. It can be associated to poverty, deprivation and culture of the province of Sistan and Balochestan students who lived in Zahedan. In the same line with the finding, a study in American schools showed that the prevalence of iron deficiency was highest among adolescent girls. The average math scores were lower for children with iron deficiency than those with normal iron status.¹² In upper secondary school students, symptoms of vertigo/dizziness were significantly more common among students with iron deficiency.¹³ Moreover, iron supplementation was effective in reducing the symptoms of vertigo/dizziness, irritability, depressive symptoms, and indisposition.¹³ A study in France showed that the 'general health' was significantly lower in the iron deficient group.¹⁴ Another study in India on physical

Table 1: Demographic information of female high school students in Zahedan in 2015

Student variables	Dimensions	N (%)	Iron tablet consumption			P value
			Yes	No	Irregular	
School grade of student	1	100 (25.0)	23 (5.8)	36(9.0)	41 (10.2)	0.009•
	2	100 (25.0)	43 (10.8)	39 (9.8)	18 (4.5)	
	3	100 (25.0)	29 (7.2)	40(10.0)	31 (7.8)	
	4	100 (25.0)	29 (7.2)	34 (8.5)	37 (9.2)	
Fathers' education	Illiterate	21 (15.2)	4 (1.0)	11 (2.8)	6 (1.5)	0.547•
	Under diploma	143 (35.8)	38 (9.5)	38 (9.5)	34 (8.5)	
	Diploma_ Collegiat	196 (49.0)	82 (20.5)	100 (25.0)	87 (21.8)	
Father's job	Unemployed	17 (4.2)	3 (0.8)	7 (1.8)	7 (1.8)	0.920•
	Employee	184 (46.0)	57 (14.2)	70 (17.5)	57 (14.2)	
	Self-employment	170 (42.5)	54 (13.5)	61 (15.2)	55 (13.8)	
	other	29 (7.3)	10 (2.5)	11 (2.8)	8 (2.0)	
Mother's job	Housewife	266 (66.2)	82 (20.5)	100 (25)	84 (21.0)	0.300•
	Working at home	35 (9.0)	16 (4.0)	9 (2.2)	10 (2.5)	
	Employee	99 (24.8)	26 (6.5)	40 (10.0)	33 (8.3)	
Grade point average of the previous year	10_16	100 (25.0)	17 (4.2)	45 (11.2)	38 (9.5)	0.003••
	16_18	148 (37.0)	56 (14.0)	45 (11.2)	47 (11.8)	
	18_20	152 (38.0)	51 (12.8)	59 (14.8)	42 (10.5)	
Number of children in family	1	13 (3.2)	4 (1.0)	7 (1.8)	2 (0.5)	0.658••
	2	114 (28.5)	35 (8.8)	40 (10.0)	39 (9.8)	
	3	79 (19.8)	28 (7.0)	25 (6.2)	26 (6.5)	
	>4	194 (48.5)	57 (14.5)	77 (19.2)	60 (15)	
Birth rank of the student in the family	1	153 (38.2)	45 (11.2)	53 (13.2)	55 (13.8)	0.290•
	2	100 (25.0)	40 (10.0)	34 (8.5)	26 (6.5)	
	3	63 (15.8)	16 (4.0)	28 (7.0)	19 (4.8)	
	>4	84 (21.0)	23 (5.8)	34 (8.5)	27 (6.8)	

•Test: Chi square; ••Test: One way ANOVA

work capacity of female college students indicated that combined energy and iron deficiency have greater adverse effects than energy or iron deficiency alone.¹⁵ Studies in India, Kenya and Indonesia showed an improvement in growth after supplementation.¹⁶ Moreover, some studies showed the impact of iron supplementation on serum ferritin and other hematological indices of iron status in menstruating women.^{8,9} Since a high percentage of the students did not consume iron tablets in high schools, that the health managers, health policy makers and school managers should pay more attention to this issue. Therefore, providing better conditions for taking tablets is suggested in order to improve iron supplementation program. However, studies in Mexico and Bangladesh reported no benefit of iron supplementation on growth.^{17,18}

Also, a significant relationship was observed between iron supplement consumption and the grade point average of the previous year. The lower grade point average leads to lower tendency to take pills. So, it is obvious that family culture and level of education, students' insufficient knowledge and not having health teacher around have an impact on taking iron supplements. Consistent with this finding, a study conducted on the effect of planned behavior theory education on iron tablet consumption in Iran indicated that education positively influences the consumption of iron tablet.⁸ So, it is suggested that workshops should be held in schools aiming at prevention of iron deficiency anemia and improvement

in iron tablet consumption. The survey of iron tablet consumption in all sections of Zahedan was the strength of the study. Also, lack of investigation of reasons for not taking iron tablets among the students was the limitation of the study.

Conclusion

Most of the students did not take iron supplementation in Zahedan high schools. Measures should be taken to increase the culture of consuming iron tablets by providing appropriate environmental conditions; it seems that iron supplementation programs will have positive impacts on the students. It is recommended that the reasons of iron tablet non-consumption in schools should be evaluated in the futures studies.

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