Compliance with Weekly Iron Folic Acid Supplementation and Anemia among Adolescent Girls in Public Schools of Pokhara Metropolitan City

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ABSTRACT

Introduction: Iron deficiency anemia is a major nutritional problem among adolescent girls. It affects their overall growth and development. In Nepal, the Ministry of Health and Population initiated the Weekly Iron Folic Acid Supplementation program for adolescent girls to combat anemia among adolescent girls. This study aims to assess the compliance with the weekly iron and folic acid supplementation and anemia among adolescent girls in Public Schools of Pokhara Metropolitan City.

Methods: A cross- sectional study was conducted in two public schools in Pokhara Metropolitan City among adolescent girls aged 10-19 years. A total 260 sample was recruited using multistage probability sampling. Data was collected administering validated pretested structured self-administered questionnaires and blood samples were taken for hemoglobin estimation. For data analysis descriptive and inferential statistics were applied using SPSS version 16 for statistics.

Results: The finding of the study concluded that 36.2 percent had compliance with Iron folic acid supplementation and 63.6 percent of adolescent girls had anemia. There was statistically significant association between level of iron and folic acid supplementation compliance with experience of side effects and sources of information ($p<0.001$).

Conclusions: Anemia among adolescent girls in public schools of Pokhara Metropolitan City was higher than the national prevalence. A large proportion of adolescent girls were non-compliant with the weekly iron and folic acid supplementation program, primarily due to side effects. Family type was significantly associated with anemia. These findings highlight the need for targeted school-based and family- centered interventions to improve adherence to supplementation and to enhance awareness of anemia prevention.

Keywords: Adolescent Girls, Anemia, Compliance, Weekly Iron Folic Acid Supplementation

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INTRODUCTION

Adolescent period is the life span between 10 to 19 years according to World Health Organization.[1] Adolescents age represents a critical phase for physical, intellectual, emotional, psychological, and behavioral growth. It is also the stage most vulnerable

to the development of anemia, particularly among adolescent girls often neglected in terms of nutrition, health care, education and overall growth and development. Addressing these issues is critical for ensuring their well-being and future prospects.[2] Nutritional anemia is particularly prevalent among young children, who need sufficient iron intake for healthy growth.[3]

A cross-sectional analytical study conducted in selected urban schools of Puducherry among adolescents aged 10 to 18 years reported a high prevalence of anemia at 62.7%. Among the affected, 27.3% had mild anemia, 32.5% moderate, and 2.8% severe. The study also noted that 67.7% of the adolescents were compliant with the weekly iron and folic acid supplementation program.[4]

A school-based comparative cross-sectional study was conducted in Kathmandu, Nepal, anemia had been less common in schools with the WIFAS program than in those without it, indicating that WIFAS played an important role in improving anemia status.[5] The Nepal demographic Health Survey 2022 indicated that among adolescent girls aged 10-19 years, the prevalence of anemia was 34%. Additionally, the survey highlighted higher rates of anemia in the Terai region at 45%, compared to 23% in mountainous areas and 20% in hilly regions.[6]

Anemia becomes a significant public health concern when its prevalence exceeds 20% within specific demographic groups. In response to this issue, the World Health Organization recommends interventions such as the distribution of iron -folic acid supplements and other public health programs. In Nepal, the Ministry of Health and Population initiated the Weekly Iron Folic Acid Supplementation Program for adolescent girls to combat anemia among adolescent girls. Under this program, girls aged between 10-19 years receive weekly iron-folic acid tablets either in schools from teacher or in communities from female community health volunteers. Each girl receives one tablet per week for 13 weeks, totaling 26 tablets per year.[7] The aim of this study is to assess the prevalence of anemia and compliance with weekly iron folic acid supplementation among adolescent girls. The finding of the study might be helpful to school as well school health program for further plan on implementation of Weekly Iron Folic acid supplementation program with specific interventions to increase awareness on importance of iron folic acid.

METHODS

This descriptive cross-sectional study was conducted in public schools of Pokhara Metropolitan City. In the first stage, all 33 wards of the metropolitan city were listed, and 2 wards were randomly selected using the lottery method. In the second stage, one school from each selected ward was randomly chosen through the lottery method. In the final stage, adolescent girls from each selected school were included using a complete enumeration technique. A total of 260 adolescent girls participated in the study, of whom 215 were from Indra Rajya Laxmi Secondary School and 45 were from Nawa Pravat Secondary School. Thus, the study sample was selected using a multistage probability sampling technique.

Structured self-administered questionnaire was used for data collection. The questionnaire was developed by the researcher according to the objective of the study, literature review, discussion with a peer, faculty teachers, consulting research advisor and expert. The questionnaire was developed in English and translated into the Nepali language and then back to English with the help of a language expertise. The tool consists of three parts.

The Parts I includes questions related to the background information of the respondent like age, grade, age of menarche, religion, parent's education, parent's occupation, types of food etc. These questions were crafted by

the researcher through literature review and consultation with the research advisor, co-advisor, and subject matter experts.

The Parts II consists of knowledge on anemia and compliance with weekly iron folic acid supplementation (WIFAS). The knowledge of anemia related questions were definition of anemia, cause, sign and symptoms, diagnosis, treatment, prevention, source of iron etc. The knowledge of WIFAS related questions were benefits, reasons, side effects, recommended age, number of iron tablets per year etc. Questionnaire was assessed by totaling the scores from relevant questionnaire items. Each correct answer was assigned a score of "1", while an incorrect answer was assigned as score of "0".

To assess the compliance with WIFAS program, questions such as frequency of distribution and the intake of IFA tablets was asked for last 3 months using the questionnaire.

The Parts III consists of Hb estimation. Researcher herself (skilled specialized nurse) collected 2ml blood sample in EDTA (ethylenediaminetetraacetic Acid) vial from respondents. Which was estimated hemoglobin using standard Cyanmethemoglobin method in Province Public Health Laboratory, Gandaki Province. Anemia among adolescent girls were categorized based on WHO cut - off values. Normal: Hemoglobin >12g/dl, Mild anemia: Hemoglobin > 11g/dl to < 11.9 g/dl, Moderate anemia: Hemoglobin > 8g/dl to <10.9 g/dl, Severe anemia: Hemoglobin < 8 g/dl.

The study was conducted after administrative approval from the research committee of Pokhara Nursing Campus and ethical approval from Institutional Review Committee of Tribhuvan University (TU), Institute of Medicine (IOM). A written request letter from Pokhara Nursing Campus was submitted to concerned authority (Pokhara metropolitan city, health division and education division) Then, preliminary visit was made to get permission from the school authorities prior to data collection. Researcher was visited the selected classrooms, self-introduced and explained the objectives, possible benefit and risk associated with the study a day before data collection and distribute the consent form to the students to get consent from their parents and get assent from adolescent girls.

Along with the consent form a format developed, explained the objective, risk, and benefit associated with the study including researcher personal phone number was sent. If the parents have any queries, they can call researcher and researcher was clarifying their queries through the phone calls.

Confidentiality was assured by ensuring the adolescents that collected data was used for research purposes only and was not shared with others. Adolescent girls were informed that the results of those data were presented in aggregates during dissemination.

The time for data collection was discussed with the class teacher. Instructions about the questionnaire was explained to the adolescence girls. Data collection was conducted in separate class room. The confidentiality was maintained by coding. It took around 10-15 minutes for data collection. The researcher was stay until the adolescent girls completed the questionnaire. The questionnaire was collected immediately after completion.

Adolescent girls were thoroughly informed and counsel about the procedure for blood draw, including timing and the significance of hemoglobin levels and anemia status. The researcher study was safe for the researcher and participants. Made sure whether the adolescent girls have allergies, phobias or has eve fainted during previous injections or blood draw. Made sure to identify the appropriate veins to puncture. Wearing gloves for each adolescent girls, sterilize the site and insert needle, avoiding trauma and excessive probing, applying adequate pressure to avoid

formation of a hematoma and hence safely disposed of potentially infectious materials. After finishing the procedure and transferred the blood sample(s) into laboratory tubes, the used equipment was promptly disposed of in a sharp's container. The specimens were transported in containers designed to prevent any breakage or spillage of blood. Anemia among adolescent girls was categorized based on WHO cut - off values.

In cases where anemia was identified, adolescence girls assured of referral to nearby health facilities, accompanied by proper counseling and education on the importance of regular intake of iron-rich foods and weekly iron folic acid supplementation. The data collection was done in 4 weeks (8/9/2024 to /04/10/2024).

The collected data were checked for accuracy and completeness. All data were entered for editing and coding. Data entry and processing were done using Epi Data version 3.1 and exported to Statistical Package for Social Science (SPSS) version 16 computer software for further analysis. Data analysis was performed using descriptive statistics (mean, frequency, percentage, and standard deviation) to describe the background information and prevalence of anemia. Inferential statistics, especially the Chi-square test, were used to assess the association between status of anemia and selected demographical variables as well as the level of compliance to Iron folic acid supplementation.

RESULTS

The mean age of adolescent girls was 14.05 years and SD was 1.65. Majority of the Adolescent girls were in grade 6-8. The majority 71.9 percent adolescent girls take albendazole every 6 month (Table 1).

Table 1: Background Characteristics of Adolescent Girls (n=260)

Characteristics	Number	Percent
Age in Years		
Early adolescence (10-14)	157	60.4
Late adolescence (15-19)	103	39.6
Mean Age ± SD =14.05 years ± 1.65 Range = 10-19		
Grade		
Primary	152	58.5
Secondary	108	41.5
Achieved Menarche	205	78.9
Age of Menarche (n=205)		
9-12	145	70.7
13-15	60	29.3
Types of family		
Joint	196	75.4
Nuclear	64	24.6
Deworming within 6 months	187	71.9

The level of compliance with weekly iron and folic acid supplementation. The majority (63.8%) of adolescent girls are non-compliant with weekly iron folic acid supplementation (Table 2).

Table 2: Compliance with Weekly Iron Folic Acid Supplementation among Adolescent Girls (n=260)

Level of compliance	Number	Percent
Noncompliance (< 13 tablets)	166	63.8
Compliance (≥ 13 tablets)	94	36.2

Table 3: Status of Anemia in Adolescent Girls (n=250)

Variables	Number	Percent
Normal > 12g/dl	91	36.5
Mild > 11g/dl-11.9g/dl	113	45.2
Moderate >8g/dl	42	16.8
Severe < 8 g/dl	4	1.5
Mean ± SD = 11.09 ± 2.47 Minimum-Maximum = (6.1g/dl-14g/dl)		

Regarding Status of Anemia in Adolescent Girls 36.5% of adolescent girls were no anemic. Almost half (45.20%) were mildly anemic, (16.8%) were moderately anemic, and only 1.53 percent were severely anemic. Out of 260 adolescent girls, 10 adolescent girls refuse to have their blood drawn (Table 3).

There is a highly significant association between the level of compliance to Weekly Iron Folic Acid Supplementation and the type of family, experience of side effects, sources of information of adolescent girls (Table 4).

Table 4: Association between Level of Compliance and Selected Demographic Variables (n=260)

Variables	Level of Compliance		x^2	*p*-value
	Non-Compliance No. (%)	Compliance No. (%)		
Age in Years				
10-14	107 (68.2)	50 (31.8)	3.184	0.074
15-19	59 (57.3)	44 (42.7)		
Grade				
6-8	103 (67.8)	49 (32.2)	2.432	0.119
9-10	63 (58.3)	45 (41.7)		
Status of Menarche				
Yes	130 (63.4)	75 (36.6)	0.078	0.780
No	36 (36.5)	19 (34.5)		
Types of family				
Nuclear	29 (45.3)	35 (54.7)	12.634	<0.001**
Joint	137 (69.9)	59 (30.1)		
Experience of side effects				
Yes	119 (79.9)	30 (20.1)	38.802	<0.001**
No	47 (42.3)	64 (57.7)		
Source of information				
Teachers	134 (72.4)	51(27.6)	20.484	<0.001**
Others	32 (42.7)	43 (57.3)		

*x^2 (Chi square test) **Significance at p<0.05*

There is a significant association between the status of anemia and the type of family (Table 5).

Table 5: Association between Status of Anemia and Selected Demographic Variables of Adolescent Girls n=250

Variables	Status of Anemia		x^2	*p*-value
	Anemia	No anemia		
	No. (%)	No. (%)		
Age in Years				
10-14	90 (59.6)	61 (40.4)	2.632	0.105
15-19	30 (30.3)	69 (69.7)		
Grade				
6-8	88 (59.9)	59 (40.1)	2.151	0.142
9-10	71 (68.9)	32 (31.1)		
Status of Menarche				
Yes	128 (65.0)	69 (35.0)	0.758	0.384
No	31 (58.5)	22 (41.5)		
Types of family				
Nuclear	47 (75.8)	15 (24.2)	5.306	0.021**
Joint	112 (59.6)	76 (40.4)		
Sources of information				
Teachers	111(62.7)	66 (37.3)	0.207	0.649
Others	48 (65.8)	25 (34.2)		

*x^2 (Chi square test) **Significance at p<0.05*

DISCUSSION

The study shows that 63.6 percent of the adolescent girls were anemic, with nearly half (45.2%) having mild anemia, (16.8%) moderate anemia, and (1.53%) severe anemia, which was similar to the study conducted in study conducted in Puducherry India (62.7%), Devdaha, Rupandhi, Nepal (60.5%) and Delhi, India (59%). [4,8, 9]

According to WHO classification, the prevalence in this study is higher than the national data from Nepal's NDHS 2022, which reported (39.4%) anemia, including (21.3%) mild, (16.2%) moderate, and (2%) severe anemia .[12] Anemia cases in Pokhara might be higher than national average due to poor dietary habits and high junk food intake. This finding slightly higher than the studies conducted in Morang, Nepal, (51.3%) Indonesia (49.3%) and Karnataka, India (51%). [11, 12,13] Whereas Kavrepalanchowk (14.7%) and Dhankuta Municipality, Nepal, (17.5%).[4,14] Both reporting significantly lower anemia rates than this study.

This study reveals that adolescent girls who have experienced menarche shows a higher prevalence of anemia (65%). However, no statistically significant relationship was found between menstrual status and anemia (p= 0.384). Similar trends were observed in studies conducted in India and Ehiopia. [12,16]

The present study finds a significant association between anemia status and family type as well as source of information (p =0.021). This finding contrasts with a study conducted in Kathmandu, Nepal, which showed significant associations between anemia and the age of adolescent girls (p = 0.032), maternal education level (p < 0.001), and maternal occupation (p=0.005).[10]

Regarding compliance with Weekly Iron Folic Acid Supplementation, one-third (36.2%) of adolescent girls are compliant, which differs from studies conducted in Kathmandu, Nepal 47.8 percent[17] and urban Puducherry, India was 67.7 percent.[4] In contrast, studies conducted in Indonesia 14.74 percent [17] and Bhopal (M.P.), India 16.3 percent [18] reported lower compliance rates.

The present study shows that statistical association between the level of compliance to Iron Folic acid supplementation and experience of side effects (p ≤ 0.001).

CONCLUSIONS

Anemia among adolescent girls in public schools of Pokhara Metropolitan City was higher than the national prevalence. A large proportion of adolescent girls were non-compliant with the weekly iron and folic acid supplementation program, primarily due to side effects. Family type was significantly

associated with anemia. These findings highlight the need to ensure regular monitoring, follow-up, and timely supply of WIFAS tablets in schools to improve program adherence, enhance effectiveness, and reduce anemia.

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CONFLICT OF INTEREST: None

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