Determinant of Highschool Girl Adolescent’ Adherence to Consume Iron Folic Acid Supplementation in Kota Depok

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(Received June 13, 2019)

Summary Anemia is one of the major problems among female adolescents in Indonesia. Weekly iron-folic acid supplementation was a cost-effective measure to tackle adolescent anemia. However, adherence to the supplementation is low. This study was aimed to explore the determinants of highschool females’ adherence to consume iron-folic acid tablets. Using cross-sectional design with 274 subjects. After obtaining consent the data were collected, coded and analysed using SPSS23. The inclusion criteria were high school female from 18 schools which had iron tablets program. The majority of subjects was 14–16 y old (73.7%). The majority of schools gave iron tablets to students without organizing taking iron tablets together (63.5%). The adherence to consume iron and folic acid tablets in this study was 45.6% (n=125). Almost half of highschool female (36.1%) cited they did not think that iron tablets are necessary while 12.4% cited experiencing side effects. Factors that were correlated (p<0.005) were school organizing taking iron tablets together, the student’s age, knowledge, motivation, self efficacy, prior Hb level examination, and teacher educating the benefits of iron tablets to students (OR=9.5, CI=5.4–16.8, OR=0.43, CI=0.23–0.78, OR=2.12, CI=1.29–3.48, OR=6.55, CI=3.77–11.4, OR=6.39, CI=3.7–10.9 respectively). The most important factors which determined highschool female’s adherence were school organizing students to take iron tablets together at school (OR=7.2, CI=3.5–14.6, p=0.000), student’s motivation (OR=5.3, CI=2.5–11.3, p=0.000), and class teacher educating students on anemia and IFA (OR=2.3, CI=1.2–4.6) meanwhile student’s knowledge, self efficacy, and prior Hb level examinations were confounding factor.

Key Words adherence, anemia, schoolgirl adolescent, weekly iron folic acid supplementation

One in three non-pregnant women, which corresponded to almost 500 million women globally was anemic in 2011. Iron deficiency is believed to contribute at least half of the global burden of anemia (1). Anemia during adolescent reduce girls’ learning capacity and physical performance as well as their work capacity and ability to earn income later in life. When anemic adolescent female become pregnant, she has a risk to become anemic pregnant woman which is associated with an increased risk of maternal mortality, premature delivery, low birth weight and perinatal mortality. Moreover, infants born to anemic mothers also have a higher risk of anaemia in the first 6 mo of life (2).

Anemia is also one of the major problems among adolescents in Indonesia. Research data in various regions in Indonesia shows the prevalence of anemia in female adolescent ranging from 32.4–61% (3). School-based weekly supplementation of iron and folic acid was considered as an effective measure to increase hemoglobin level and has been adopted as one of the national health policy (4). Beside that, the school based weekly iron and folic acid supplementation program was aimed to improve adherence as well as reducing the possible side effects without lowering the efficacy (5–7). However, adherence to the supplementation is still low. Riskesdas 2018 found that the high coverage of iron supplement at school (80.9%) was not accompanied by high consumption of iron supplement as required, reporting only 1.4% school going girl adolescent who consumed 52 tablets (8). Muro et al (1999) state that insufficient compliance has been identified as a major contributing factor to the low effectiveness of iron supplementation programmes. Low adherence to consume IFA will causing low iron intake and poor absorption of dietary iron are insufficient to meet iron requirements for growth, menstrual blood loss, and blood volume expansion and other events related to pregnancy and delivery (9). Symptoms of vertigo/dizziness were significantly more common among students with iron deficiency but if they adhere to consume weekly iron folic acid tablets, it were effective in reducing symptoms of vertigo/dizziness, irritability, depressive symptoms, and indisposition (10).

Previous research explored the issue of adherence to IFA from individual perspective which focuses on knowledge, perceived benefit, perceived susceptibility,
perceived seriousness, perceived threat, and perceived barriers. Findings suggest the barriers for the adherence due to lack of nutritional education, low tablet quality, no drinking water supply and lack of monitoring (11–13). Meanwhile there is another important factor such as school community. School based WIFAS involving school community as the actor which had important role in improving their students’ adherence to consume WIFAS (Kheirouri and Alizadeh). This study aimed to determine factors which contribute to high-school girls’ adherence to consume Weekly Iron Folic Acids Supplementation (WIFAS) both at individual level and context level that is school.

**MATERIALS AND METHODS**

*Study design and sampling procedure.* This cross-sectional study was conducted in October-December 2018 in Depok City, West Java, Indonesia. This study aims to capture factors which determined the highschool girls’ adherence to consume WIFAS. Purposive sampling was used as the sampling technique to select 18 schools as sample unit under 10 primary health centers that had highest prevalence of student anemia in Depok. The number of respondents recruited was 274 high-school girls. The power of the study is 95%. The inclusion criteria were high-school girl from 18 schools who had followed the program and took iron tablets. The minimum sample size was calculated using Lemmeshow formula (14).

The study was conducted according to the Helsinki declaration and all procedures involving human subjects were approved by the University of Pembangunan Nasional Veteran Jakarta (UPNVJ)’s Ethics Committee: N0. B/1607/IX/2018/KEPK. All respondents participating in this study provided written informed consent before enrollment.

*Measurement and variables.* Adherence to consume iron folic acid (IFA) assessed by following question: “What did you do when you take IFA from school usually”? There was 4 choice of answer: 1) never drunk it at all 2) drunk it irregularly 3) bring and drink at home 4) always drank it at school. To which respondent answer number 3 and or number 4, we classified as adhere to consume WIFAS. In this formative study, the measured variables as determinants of adherence consisted of age, knowledge of anemia, motivation to consume iron folic acid (IFA), self efficacy related to anemia and iron folic acid, prior Hb level examination, if the parents ever attended health education about anemia, and parents’ education level and school implementation to consume iron folic acid together, school role in organizing students to take IFA tablets together at school regularly once a week, Class teacher ever talks about anemia and IFA at school, Principal/Health unit teacher talks about anemia and IFA at school, existence of health education session from primary health staff, and the availability of health education media using Chi square test with a confidence level of 95%. All test were two sided and the result was considered as significant if \( p < 0.05 \).

**RESULTS**

*National and local policy context*

In Indonesia Weekly Iron Folic Acid Supplementation (WIFAS) Program for young women has a legal basis to implementation, namely Law No. 36 of 2009 concerning Health, Presidential Regulation No. 42 of 2013 concerning the National Movement for the Acceleration of Nutrition Improvement which focuses on saving 1000 HPK, Joint Regulation between the Minister of Education and Culture, Republic of Indonesia Minister of Health, Minister of Religion and Minister of Home Affairs Number 6/X/PB//2014; Number 73 of 2014,

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**Table 1. Respondent’s characteristics.**

| Respondent’s characteristics | n   | %   |
|------------------------------|-----|-----|
| Age                          |     |     |
| 14–16 y old                  | 202 | 73.7|
| 17–18 y old                  | 72  | 26.3|
| Highschool student’s knowledge about WIFAS is good | 124 | 45.3|
| Highschool student’s motivation to consume iron tablets is good | 132 | 51.8|
| High School student’s self efficacy to consume iron tablets is good | 165 | 60.2|
| Self report of body iron status |     |     |
| Severe iron deficiencies     | 38  | 13.9|
| Body iron status is adequate/ideal | 66 | 24.1|
| Don’t have iron deficiencies | 42  | 15.3|
| Better than ideal            | 6   | 1.5 |
| Don’t Know                   | 122 | 44.5|
| Prior Hb level examination   | 140 | 51.1|
| Parents ever attending health education | 16 | 5.8 |

**Total** 274 100

**Data management and analysis.** Data were collected using questionnaires and interviews by trained enumerators. After informed consent was obtained, the data were collected, coded, and analysed using SPSS 23 (International Business Machines corporation Amonk, New York USA), Descriptive statistical method were used to describe the study population using frequencies. The bivariate analysis was to analyse the association of high school girl’s adherence and high school girl’s age, knowledge, motivation, self efficacy related to anemia and iron folic acid, prior Hb level examination, parents experienced attending to health education about anemia, and parents’ education level and school implementation to consume iron folic acid together, school role in organizing students to take IFA tablets together at school regularly once a week, Class teacher ever talks about anemia and IFA at school, Principal/Health unit teacher talks about anemia and IFA at school, existence of health education session from primary health staff, and the availability of health education media using Chi square test with a confidence level of 95%. All test were two sided and the result was considered as significant if \( p < 0.05 \).
High school girl adolescent’s adherence to consume IFAS

Number 41 of 2014; Number 81 of 2014 concerning Development and Development of School/Madrasah Health Enterprises; Regulation of the Minister of Health No. 08 of 2014 concerning Iron Folic acid Supplementation program for Women of Childbearing Age and Pregnant Women. Furthermore, there is the Directorate General of Public Health Circular No.Circular No.HK/03.03/VI/0595/2016 concerning Iron Folic acid Supplementation for Girl Adolescent. This Circular Letter was followed up by governor regulations. In West Java province, West Java Governor issuing Circular No. 440/25/Yanbagos concerning Policy Support for Iron Folic Acid Supplementation Program for Girl Adolescent and Fertile Age Women.

The circular letter states that the school have responsibility to distribute IFAS to student by held drinking IFA together at one day a week and to record school going girl student adherence to consume IFAS. Meanwhile IFA tablet distribution is belong to health district office responsibility. In this circular letter does not state about monitoring and evaluation period and technical guideline.

**High school girl adolescent’s characteristics and school role in implement iron folic acid (IFA) supplementation program**

The high school girl’s characteristics were listed in Table 1. It showed that the majority of respondents age were 14–16 y old (54.9%) and came from private vocational schools (40.8%), with the majority of their parents never attended any health education session about anemia (94.2%). The majority of respondents had poor

Fig. 1. High school girl's behavior regarding to WIFAS.

![Graph showing schoolgirl's behavior regarding WIFAS.]

Fig. 2. Reasons not consume Iron Folic Acid.

![Graph showing reasons not consume Iron Folic Acid.]

Table 2. Institutional level (School’s role in WIFAS).

| School’s role related to WIFAS | n  | %  |
|-------------------------------|----|----|
| School Organize IFA day at school regularly once a week | 100 | 36.5 |
| Class teacher ever talks about anemia | 138 | 50.4 |
| Principal talks about anemia and IFA | 179 | 65.3 |
| Existence of health education session from primary health center staff | 109 | 39.8 |
| Availability of health education media | 17 | 6.2 |

Table 3. Relationship between respondent’s characteristic, knowledge, motivation, self efficacy with schoolgoing girl’s adherence to consume iron tablet.

| Related factors | Consume IFA | OR (95%-CI) |
|----------------|------------|------------|
|                | Yes | No | p    |
| **n** | %  | n  | %  |    |
| Age            |      |    |     |    |
| 14–16 y        | 55  | 117 | 32.0 | 68.0 | 0.43 | (0.23–0.78) | 0.00 |
| 17–18 y        | 17  | 85  | 16.7 | 83.3 | 0.53 | (0.32–0.86) | 0.02 |
| Prior Hb level examination | 42  | 98  | 30.0 | 70.0 | 0.53 | (0.32–0.86) | 0.02 |
| Yes            | 60  | 74  | 44.8 | 55.2 | 0.53 | (0.32–0.86) | 0.02 |
| No             | 42  | 98  | 30.0 | 70.0 | 0.53 | (0.32–0.86) | 0.02 |
| Schoolgirl adolescent’s Knowledge on anemia and IFA |      |    |     |    |
| Good           | 58  | 66  | 46.8 | 53.2 | 2.12 | (1.29–3.48) | 0.00 |
| Poor           | 44  | 106 | 29.3 | 70.7 | 2.12 | (1.29–3.48) | 0.00 |
| Schoolgirladolescent’s Motivation |      |    |     |    |
| Good           | 77  | 55  | 58.3 | 41.7 | 6.55 | (3.77–11.4) | 0.00 |
| Poor           | 25  | 117 | 17.6 | 82.4 | 6.55 | (3.77–11.4) | 0.00 |
| Schoolgirladolescent’s self efficacy |      |    |     |    |
| Good           | 68  | 41  | 62.4 | 37.6 | 6.39 | (3.72–10.9) | 0.00 |
| Poor           | 41  | 131 | 20.6 | 79.4 | 6.39 | (3.72–10.9) | 0.00 |
knowledge about anemia and iron folic acid (IFA) benefit (54.7%), but they had good attitude toward IFA supplementation program (51.8%) and self-efficacy to consume IFA (60.2%). This research found that high school girl’s adherence to consume IFA regularly at school was only 21.9%, and 15.3% consume it at home (See Fig. 1).

The majority of respondents did not adhere to consume IFA (62.8%) with the most common reason because they thought it was unnecessary (36.1%) (see Fig. 2). The majority of respondents stated the factor which influenced their decision to consume IFA the most was their knowledge about anemia and IFA benefits (37.2%). The majority of respondents had checked their Hb level (51.1%) but didn’t know or had forgotten about their results (44.5%).

In Table 2 show the school’s role in implementing iron folic acid (IFA) program. Only 36.5% schools implemented taking IFA at school regularly once a week, while 50.4% respondents stated that their teacher ever talked about anemia and IFA benefits, and only 6.2% respondents stated that their school had health education media about anemia and IFA benefits. Only 39.8% of respondents cited that there were health education sessions from the primary health center (PHC) staff. Factors related to high school girl’s adherence to consume WIFAS

Table 3 and 4 showed that factors related to high school female adolescent’s adherence to consume iron supplement were student’s age, knowledge, motivation and self-efficacy, prior Hb level examination, school organizing to take IFA together and teacher educating the benefit of iron tablet to students (OR = 0.43.2, CI =

Table 4. Relationship of School’s role and schoolgirl adolescent’s adherence to consume iron folic acid tablets.

| School’s characteristics                     | Consume IFA |         | OR      | p     |
|---------------------------------------------|-------------|---------|---------|-------|
|                                             | Yes  | No  |         |       |
|                                             | n    | %   | n       | %    |
| School organizing students to take IFA once a week | 69   | 69.0| 31      | 31.0 |
| Yes                                         | 69   | 69.0| 31      | 31.0 |
| No                                          | 31   | 19.0| 141     | 81.0 |
| Availability of Health education media about IFA at school | 4    | 23.5 | 13      | 76.5 |
| Yes                                         | 4    | 23.5| 13      | 76.5 |
| No                                          | 98   | 38.1| 159     | 61.9 |
| Principal/Health unit teacher talked about anemia | 74   | 41.3| 105     | 58.7 |
| Yes                                         | 74   | 41.3| 105     | 58.7 |
| Not                                         | 28   | 29.5| 67      | 70.5 |
| Existence of health education from primary health staff | 61   | 37.0| 104     | 63.0 |
| Yes                                         | 61   | 37.0| 104     | 63.0 |
| No                                          | 41   | 37.6| 68      | 62.4 |

Table 5. Modelling of Highschool girl adolescent’s adherence to consume WIFAS Determinant.

| Variabel                                      | p value | OR     | CI (95%) |
|-----------------------------------------------|---------|--------|----------|
| School organizing students to take IFA once a week | 0.000   | 7.197  | 3.549–14.595 |
| Student’s Motivation                          | 0.000   | 5.267  | 2.463–11.265 |
| Class teacher educating about anemia and IFA  | 0.013   | 2.332  | 1.192–4.561 |
| Student’s knowledge about anemia and IFA      | 0.053   | 1.974  | 0.991–3.934 |
| Prior Hb level examination                    | 0.103   | 0.541  | 0.234–0.950 |
| Student’s self-efficacy to consume IFA       | 0.145   | 1.724  | 0.828–3.587 |
0.23–0.78, OR = 2.12, CI = 1.29–3.48, OR = 6.55, CI = 3.77–11.4, OR = 6.39, CI = 3.72–10.9, OR = 0.53, CI = 0.32–0.86, OR = 9.5, CI = 5.4–16.8, OR = 3.88, CI = 2.2–12.4 respectively).

Determinant factor of school going girl adolescent adherence to consume WIFAS

The multivariate analysis showed the most important factors which determined a high school girl’s adherence were school organizing students to take IFA tablets at school (OR = 7.2, CI = 3.6–14.6, p = 0.000), the student’s motivation (OR = 5.3, CI = 2.5–11.3, p = 0.000), and the teacher educating students about anemia and IFA (OR = 2.3, CI = 1.2–4.6). Meanwhile, the student’s knowledge, self-efficacy, and prior Hb level examination were confounding factors (see Table 5).

DISCUSSION

Adolescent nutrition is an emerging priority in the national development agenda in Indonesia. Nevertheless, the awareness of adolescent nutrition is still low among policy maker decision, particularly stakeholder from outside of health sector. This is caused by adolescent nutrition is new topic in global attention (15). Meanwhile critical factor contributing to the success of the school based WIFAS were the synergi among the difference departments within the state and the involvement of all stakeholder concerned, timely and quality communication, provision of strong technical and supervisory support to the implementing school. The successful implementation of WIFAS programme at the school level needs to involve two sectors which are health and education. The Ministry of Health should supervise the procurement and distribution of IFA supplies and perform coordination with other sectors. The education agencies are to implement the program with support from the school community, particularly the school teachers (16).

This study found that the school’s role in implementation by making one day in the week as WIFAS Day to promote IFA consumption is important. This strategy addressed the problem of forgetfulness and can improve the students’ compliance and awareness of anemia (17) by intermittent dosing (18) thus instead of giving it daily it is then given weekly with the same efficacy (6).

The school’s role in implementing weekly iron folic acid supplementation program was crucial, because in Indonesia majority of adolescent girls rarely have access to preventive health services, yet over 86% were enrolled at secondary schools (19). According to the social ecology model theory, institutional level, in this case, was the school which has influence towards behavior, life style, and health (20). A systematic review of a school based programme implementing iron and folic acid supplementation program reported a 33% reduction in anemia risk (16).

School community readiness is needed to implement iron folic acid supplementation program effectively because not every school community could organize to take IFA together nor to educate their students to consume IFA regularly. Only 36.5% of students stated that their school organizing to take IFA together, and 49.6% of class teachers did not talk about anemia and IFA benefits in class. Kheirouri and Alizadeh found that many teachers were not interested in taking an iron supplement with their students (21). There were reports that teachers behavior and beliefs had both direct and indirect impacts on the students’ outcome.

Anderman et al. (2009) revealed that high school students learn more health knowledge from their regular classroom teachers compared to other health education program (22, 23). The social ecological model and social cognitive theory explained that teachers could influence their students’ nutritional behavior through role modelling (24). Teachers as front liners to implement IFA and to improve student’s adherence to consume IFA have to be trained before program implementation.

Building the teacher’s capacity to educate students to consume WIFAS is essential. However, many teachers did not have adequate knowledge, motivation, and self-efficacy to educate their students. Therefore, it is important to ensure the teacher understood anemia and its effect on high school girl’s performance and overall wellbeing and motivate teachers to educate their students about anemia and the benefits of consuming IFA supplements (19). Khammarmania et al. (2016) found that factors related to high school girl’s low consumption of IFA at Zahedan were side effects of IFA, influence from family, doctors, and friends, unmotivated to consume IFA, forgetfulness, sick, and unsupportive schools in implementing WIFAS (10).

This research found that high school girl’s adherence was only 37.2%. Without good adherence to the recommended dosage, the expected improvement in iron status will not be achieved (25). There are several stages until our bodies are deficient in iron. Initially, iron stores in the body decrease. With decreasing iron, the production of hemoglobin and red blood cells decreases. Iron nutrient anemia can cause a decrease in physical abilities, work productivity, and thinking ability. Besides nutritional anemia can also cause a decrease in antibodies so that they can get sick because of an infection (26).

The results of this study found most respondents did not adhere because they thought it was unnecessary to consume IFA (36.1%). This is similar to Indonesia’s basic health research data (2018), which found 26.1% of adolescent girls stated that it was not neccessary to consume IFA. This showed that the respondents’ awareness of anemia was low, and it was related to knowledge on anemia and benefits of IFA. This study found that 54.7% of high school girls had poor knowledge about anemia and benefits of IFA. Also, the majority of respondents did not know about their Hb level (44.5%). Statistical analysis found that knowledge was a factor related to high school girl’s adherence to consume IFA besides age, motivation, orior Hb level, school organizing to take IFA together, and teacher educating about anemia and IFA to the students.

The adherence to consume WIFAS was the key factor...
to decrease anemia prevalence (27, 28). Many studies found that iron folic acid supplementation program was not effective to improve anemia status because of the low adherence to consume iron tablets (5, 28). Briawan et al. found that the prevalence of adolescent girl’s anemia decreased only 3.4% in iron folinic supplementation program due to low adherence to consume IFA (29).

Sub optimal adherence is attributed to side effects and forgetfulness, which might be reduced by intermittent dosing (18). Thus instead of giving it daily, it is given weekly with the same efficacy (6). School based WIFAS program was a cost effective measure to tackle adolescent girls anemia and need efforts to improve their adherence to consume IFA.

The majority of students stated that there was no media health education about anemia and IFA at their school (93.8%). The use of social media is an effective approach to provide education on nutrition and has a potential to motivate adolescents in increasing their knowledge, awareness, attitude and general behavior for preventing anemia and improving their overall nutritional status (17).

Prior Hb level examination was one of the related factors to IFA consumption adherence because the result could be an indicator and to improve awareness of anemia risks. But in Iran, Kheirolif and Alizadeh (21) found that there was no significant relation between a student’s self assessment of body iron status and their adherence to consume IFA.

According to the World Health Organization, iron deficiency anemia is estimated to be the single largest global cause of morbidity and mortality in adolescent girls, which was expressed as disability adjusted life years (30) Iron deficiency anemia is related to decreased academic potential, productivity, and well being and increased maternal and infant morbidity and mortality (17) Therefore the World Health Organization recommended weekly iron folinic acid supplementation (WIFAS) to reduce anemia in adolescents (10–19 y old) and women of reproductive age, in regions where anemia is a public health concern including Indonesia. Indonesia’s Health Ministry updated its national program for anemia prevention and control in adolescent girls and reproductive age women in 2016 to align more closely with the WHO guideline (19).

Overall, we found that the knowledge and the adherence to consume weekly iron folinic acid supplementation among high school student girl at Depok city are low. We have confident and expectation that this study will contribute to focusing on school readiness to organize iron folic acid drinking day as well as student’s motivation and class teacher role in educate students about anemia and IFA benefit.

**CONCLUSIONS**

Weekly iron folic acid supplementation program is proposed as a preventive long term approach to improve iron status and also to reduce the prevalence of adolescent anemia. Benefits of WIFAS included improvement of adherence to consume IFA and to minimize forgetfulness. Schoolgoing girl’s adherence is still a challenge to reduce anemia prevalence. This study found that the determinants of a high school girl’s adherence to consume iron folic acid were student’s age, knowledge, motivation and self efficacy, prior Hb level examination, school organizing taking IFA together, and teacher educating the benefits of the iron tablet to students. The multivariate analysis found that the most important factors which determined the high school girl’s adherence were school organizing student to take together the iron tablets at school, student’s motivation and teacher educating students about anemia and IFA, meanwhile the student’s knowledge, self efficacy, and prior Hb level examination were confounding factors. Therefore, the school community readiness is an important aspect to implement effective weekly iron folic acid supplementation program.

**Disclosure of state of COI**

The writer hereby declares there is no conflict of interest.

**Acknowledgments**

The author would like to express their sincere gratitude to the Lembaga Pengelola Dana Pendidikan (LPDP) Indonesia for funding this study. Health District Office of Kota Depok and Education Branch Regional Office for permitting the study.

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