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Study Characteristics of School Adolescent Girls on Iron Folic Acid Supplementation Program as the Prevention of Anemia in Adolescent

Studi Karakteristik Siswi Penerima Program Tablet Tambah Darah sebagai Upaya Pencegahan Anemia pada Remaja

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ABSTRACT

Background: Efforts to accelerate stunting reduction involve specific and sensitive nutrition interventions. School adolescent girls are the target group in reducing stunting through anemia prevention. Iron folic acid (IFA) supplementation program is the specific nutrition intervention to prevent anemia in adolescent girls.
Objectives: This research aims to study the characteristics of students who received the IFA supplementation program.
Methods: Research design was a cross sectional that involved 123 students from 12 public high schools in Cianjur District, West Java Province. Student's characteristics consist of knowledge on anemia and their adherence on IFA supplementation program. Data collection is carried out by self-administering questionnaires monitored by enumerator. Data is performed by using mean ± SD and n (%).
Results: Student's knowledge on anemia mostly (61.8%) were categorized as low, as 30.9% were moderate, and only 7.3% were high. Students (44.7%) knew how to detect anemia is by measuring blood hemoglobin levels. As of 59.3% and 51.2% students knew the main causes of anemia are inadequate iron intake and blood loss during menstruation. Approximately 60-80% students recognized the common symptoms and sign of anemia. Most students (76.8%) have received IFA on a weekly basis and 41.2% students acknowledge their adherence in the IFA consumption with aim to prevent anemia (85.1%), the rest 23.4% and 14.9% due to the advice by the teachers and health officers. Students who have no adherence were due to their fear on the side effects, the tablet taste, forgetfulness, and feeling healthy.
Conclusions: Iron folic acid supplementation program have been conducted and well targeted, however, student's understanding on the objectives, benefit, and their adherence is needed to be gained.

ABSTRAK

Latar Belakang: Upaya percepatan penurunan stunting melibatkan intervensi gizi spesifik dan sensitif. Remaja putri (siswi) sekolah merupakan kelompok sasaran dalam penurunan stunting melalui pencegahan anemia. Program Suplementasi Tablet Tambah Darah (TTD) merupakan intervensi gizi spesifik dalam pencegahan anemia pada remaja putri.
Tujuan: Penelitian ini bertujuan untuk mengkaji karakteristik siswi sebagai penerima program TTD.
Metode: Desain penelitian ini adalah cross sectional dengan melibatkan sebanyak 123 siswi dari 12 sekolah menengah atas negeri/sederajat di Wilayah Kabupaten Cianjur, Provinsi Jawa Barat. Karakteristik siswi terdiri dari pengetahuan siswi tentang anemia dan kepatuhan terhadap suplementasi TTD. Pengambilan data dilakukan melalui pengisian kuesioner secara mandiri oleh responden dengan pemantauan oleh enumerator. Data disajikan dalam rata-rata ± standar deviasi dan n (%).
Hasil: Pengetahuan siswi tentang anemia sebagian besar (61,8%) berada pada kategori rendah, 30,9% siswi berpengetahuan sedang, dan 7,3% siswi berpengetahuan tinggi. Siswi (44,7%) mengetahui cara untuk mendeteksi anemia adalah melalui pemeriksaan kadar hemoglobin dalam darah. Sebanyak 59,3% dan 51,2% siswi mengetahui penyebab anemia adalah kurang asupan zat besi dan kehilangan banyak darah akibat menstruasi. Sebanyak 60-80% siswi telah mengenali gejala dan tanda yang umum dari anemia. Sebagian besar siswi (76,8%) menerima TTD setiap minggu dan sebanyak 41,2% siswi mengakui patuh dalam mengonsumsi TTD dengan tujuan agar tidak anemia (85,1%), sisanya 23,4% dan 14,9% karena diarahkan oleh

Guru dan Petugas Puskesmas. Sebanyak 58,8% siswi tidak patuh dengan alasan takut terhadap efek samping, rasa tablet, faktor lupa, dan sudah merasa sehat.

Kesimpulan: *Program suplementasi TTD sudah berjalan dan tepat sasaran, namun pemahaman siswi terhadap tujuan, manfaat, dan kepatuhan terhadap suplementasi TTD perlu ditingkatkan.*

Kata kunci: Remaja putri, Anemia, Tablet tambah darah, Siswi sekolah, Stunting

INTRODUCTION

Efforts to accelerate stunting reduction involve specific and sensitive nutrition interventions. School adolescent girls are the target group in reducing stunting through anemia prevention and iron folic acid (IFA) supplementation program is one to resolving the problem. Globally, 124 out of 134 countries had moderate anemia prevalence. As of 35 countries had stunting, wasting and anemia. Micronutrient deficiencies are a major challenge in adolescent girls[1]. According to WHO, the number of non-pregnant women of reproductive age worldwide suffering from anemia increased from 464 million in 2000 to 578 million in 2016. The condition persists as a moderate to a severe public health problem in 141 countries. The regions of Africa and South-East Asia are reported to have the highest prevalence, at over 35%[2]. The Global Nutrition Report 2018 classifies Indonesia as experiencing two forms of malnutrition that are anemia and stunting. As many as 31.2% of women aged 15 to 49 years have been affected by anemia[3].

Recent published data by Ministry of Health in 2018[4], 2019[5], and 2021[6], prevalence of stunting was 30.8%, 27.67%, and 24.4%, respectively. Meanwhile, research data in various regions in Indonesia shows 32.4-61% of adolescent girls suffered from anemia[7], and it was an increase from 37.1% in 2013 to 48.9% in 2018[4]. Cianjur Regency in West Java Province is one of the 100 regencies in 2018 that become priority locations for the management of stunting[8]. The prevalence of stunted children in Cianjur Regency in 2013, 2016, and 2021 was 41.76%[8], 35.7%[4], and 33.7%[6]. Hence, an anemia prevention program in adolescent girls may promote the acceleration in reducing stunting prevalence.

The Weekly Iron and Folic Acid (WIFA) supplementation program is conducted to address problems of adolescent girls having a great owing to the rising prevalence of anemia. The WIFA approach entails 52 weeks of weekly IFA tablet distribution under supervision (a single tablet consists of 60 mg of elemental iron and 0.4 mg of folic acid), and it has been implemented by Indonesian Government since 2016[9]. The WIFA supplementation program is estimated to lead to an average 27% reduction of anemia among non-pregnant women, and is one of the core of primary interventions for preventing anemia that have a strong evidence based for effectiveness, with the potential to be scaled up to reach all women[2].

Schools have been identified as important delivery platforms for nutrition interventions among adolescents. A recent meta-analysis using data from 15 studies in 7 different countries showed that supplementation with iron and folic acid (IFA) tablets through school may reduce the prevalence of anemia among adolescent school girls. School-based delivery of iron/iron-folic acid supplementation alone or in combination with other micronutrient supplementation was associated with improved serum hemoglobin[10]. Study among school girls in Ghana also showed that school-based weekly IFA supplementation is effective in improving Hb and reducing anemia prevalence[11]. A study conducted by Briawan et al[12]. stated that the prevalence of IFA supplementation coverage, the percentage of adolescent school girls who received IFA supplement as a recommended scheme, and the adherence level in consuming IFA supplement in East Java and East Nusa Tenggara, Indonesia was still low. Based on Basic Health Survey in 2018, there were 80.9% of adolescent school girls who received IFA supplement. However, within a year of supplementation, the percentage of school girls consuming ≥ 52 tablets are only 1.4%[4].

Moreover, study by Permatasari, et al.[13] in Bogor City showed that the prevalence of anemia in adolescent school girls decreased after they were given an intervention in the form of iron-folic acid supplementation (60 mg elemental iron and 0.25 mg folic acid) for 16 week of administration. The most influential factor for increasing Hb levels in the study was the initial Hb status in which the subjects with anemia before the supplementation had a 3.52 times bigger chance of increasing Hb levels than the non-anemic subjects. However, the Iron-Deficiency Anemia Prevention and Control Program (IDAPCP) is still considered not effective because the adherence rate of IFA supplement consumption is still low although there is a decrease in the prevalence.

According to the background problem, this study is expected to gain valuable data regarding the characteristics of adolescent school girls who have received IFA supplementations. We aimed to analyze adolescent school girls' characteristics, knowledge and history in implementing the IFA supplementation. Therefore, the next strategy to resolve the constraints towards the program could be achieved.

METHODS

The study design was a cross sectional, conducted in 12 senior high school in Cianjur District, West Java Province, Indonesia from January to February 2020. Total 123 students (adolescent school girls) enrolled in this study has been participated in the iron folic acid (IFA) supplementation program which has launched periodically at school by Public Health Center. The data outcomes including household socio-economic, knowledge on anemia, history of receiving IFA supplementation and student's adherence towards the IFA supplementation. A quantitative validated questionnaire was modified from Briawan et al. (2018). Questionnaires were administered to selected student by trained enumerators[12].

The study protocol was approved by the

Medicine/Health Research Bioethics Committee, Faculty of Medicine, Universitas Islam Sultan Agung Semarang (No.004/I/2020/*Komisi Bioetik*). Written informed consent was obtained from all participants prior to enrolling to the study. This study was the preliminary results from the Pilot Study which compare the WIFA supplementation program between high and low stunting areas. Local enumerators were recruited and trained prior to doing data collection. Data was analyzed by using SPSS version 21 for Windows for statistical analysis. Data were presented as means and SD for continuous variables and as proportion for categorical data.

RESULTS AND DISCUSSION
Subject characteristics

Table 1 presented the characteristics of subjects in the family. Adolescent school girls were in the average age 17 years old. Most of their parents having their education in the primary and junior high school. Most of the mother were housewife, while the father worked as the daily labor, trader, and few of them has worked in private company or government. Study by Andriastuti et al.[14] concluded that the overall prevalence of anemia in children and adolescents with low socio-economic status at two schools in the suburb of Jakarta is lower than the national data that was 14.0%, and 62.9% were males and 37.1% were females. The prevalence of iron deficiency anemia in Korean adolescent girls was decreasing as household income increased. It is suggested that girls from higher socio-economic status consume more iron and vitamin[15]. However, in Indonesia, a study found no association between socio-economic status and the prevalence of ID and IDA[16].

Table 1. Subject's characteristics

Characteristics [a]			
Age	17±0.6	Years	
Family size	5±2	Person	
Mother's age	43.4±7	Years	
Father's age	47.8±6.8	Years	
Parent's education, n (%)		Mother	Father
	Having no education	2 (1.7)	2 (1.6)
	Primary school	58 (47.2)	54 (43.9)
	Junior high school	22 (17.9)	22 (17.9)
	Senior high school	25 (20.3)	31 (25.2)
	College	16 (13.0)	14 (11.4)
Parent's occupation, n (%)		Mother	Father
	Unemployed, housewife	81 (65.9)	0 (0)
	Government/military officer	13 (10.6)	8 (6.5)
	Private employee	6 (4.9)	21 (17.1)
	Daily labor	5 (4.1)	38 (30.9)
	Trader/entrepreneur	11 (8.9)	36 (29.3)
	Tailor	1 (0.8)	9 (7.3)
	Others	6 (4.9) [b]	11 (8.9) [c]

Note: [a] n = 123. Data is performed by mean±SD for student, mother, and father' age, and family size; Parent's education and occupation is performed by n (%); [b] freelance teacher (n=1, 0.8%), female migrant worker (n=5, 4.1%), [c] fatherless (n=5, 4.1%), farmer (n=4, 3.3%), retired military officer (n=1, 0.8%), male migrant worker (n=1, 0.8%).

Despite of the characteristic in family, it has been known that a socio-cultural milieu and local dietary habits which we did not analyze in this present study, those factors may influence girls and parents' decisions related to anemia and weekly iron folic acid supplementation. The anemia prevention may apply to those girls who get the support from their parents regarding their knowledge and practice on diet[17].

Knowledge on Anemia

Knowledge on anemia were analyzed by using the scoring system throughout the questions regarding the general knowledge, source of information on anemia, definition, causes, sign and symptoms, effect of anemia, and way to prevent anemia (**Table 2**). Most of students have known the term of anemia (99.2%). As many as 52.5% students obtained the information-related to anemia from teacher, 39.3% from health workers, 33.6% from parents/family, 31.1% through media, and 25.4% from their peer. Students' knowledge on anemia mostly (61.8%) were categorized as low, as 30.9% were moderate, and only 7.3% were high with the average score of knowledge was 58.7±15.0. Previous study showed a similar result that the majority of high school adolescent school girls at Depok City had poor knowledge about anemia and iron folic acid benefit (54.7%). Furthermore, the decision to consume IFA was affected by student's knowledge about anemia and IFA benefit (37.2%)[18]. It is suggested that the importance of knowledge and understanding of adolescent school girls towards anemia may promote the adherence and outcomes post IFA supplementation.

Table 2. Student's knowledge on anemia [a]

Indicators	Results	Indicators	Results
General knowledge		**Causes, sign/symptoms, effect, and way to prevent anemia** [b]	
Know the term of anemia:		Causes of anemia:	
Yes	122 (99.2)	Blood loss due to menstruation	63 (51.2)
No	1 (0.8)	Inadequate iron intake	73 (59.3)
Source of information:		Inadequate folic acid intake	13 (10.6)
Peer	31 (25.4)	Inadequate vitamin B_{12} intake	17 (13.8)
Teacher	64 (52.5)	Infectious disease (worm infestation, malaria)	10 (8.1)
Parents/family	41 (33.6)	Vegetarian	9 (7.3)
Health workers	48 (39.3)	Inadequate protein intake	43 (35)
Media	38 (31.1)	Lack of exercise [c]	28 (22.8)
Student's activity	1 (0.8)	Lack of fruit consumption [c]	55 (44.7)
Way to know individual with anemia by assessing their blood hemoglobin level:		Common sign/symptoms of anemia:	
True	55 (44.7)	Loss of eye pallor, pale nails/palms	78 (63.4)
False	68 (55.3)	Body thinness [c]	13 (10.6)
Level of knowledge on anemia:		Body fatness [c]	2 (1.6)
Low (score <60)	76 (61.8)	Dizziness	100 (81.3)
Moderate (score 60-80)	38 (30.9)	Weakness	81 (65.9)
High (score >80)	9 (7.3)	Fatigue	63 (51.2)
Mean±SD	58.7±15.0	Feeling of laziness	79 (64.2)
Effect of anemia:		The way to prevent anemia:	
Decrease learning achievement	43 (35)	Take an IFA supplement	112 (91.1)
Difficult to concentrate	94 (76.4)	Consume green leavy vegetables	89 (72.4)
Decrease work productivity	43 (35)	Consume fruits and vitamin C rich vegetables	74 (60.2)
Having LBW baby	30 (24.4)	Consume meat or liver	61 (49.6)
Prone to be infected	6 (4.9)	Consume deworm medication in every 6 months	11 (8.9)
Hypertension [c]	0 (0)	Drink plenty of tea [c]	21 (17.1)
Hypotension [c]	91 (74)	Frequently doing light exercise [c]	34 (27.6)
		Adequate sleep [c]	69 (56.1)

Note: [a] n=123; [b] Subjects may select more than one answer; [c] False indicators. Data presented as n (%), Mean±SD. LBW, low birth weight.

Lack of socialization about IFA and anemia to teachers and students, resulting to low knowledge of IFA and anemia as presented in quantitative key findings[19]. In this present study, only 31.1% students have obtained the information about anemia through media and it is in line with previous study that showed as many as 93.8% students did not expose by media health education about anemia and IFA at their school[18]. One strategy in increasing their knowledge, awareness, attitude and general behavior for preventing anemia and improving the overall nutritional status is by providing such an effective approach in education on nutrition towards the use of social media[20].

Students (44.7%) knew how to detect anemia is by measuring blood hemoglobin levels. As of 59.3% and 51.2% students knew the main causes of anemia are inadequate iron intake and blood loss during menstruation. Despite the true indicators, there were subjects who also chose the false indicator that is lack of fruit consumption and lack of exercise as the causes of anemia (44.7% and 22.8%). Approximately 60-80% students recognized the common symptoms and sign of anemia. The most symptoms of anemia that have been recognized were dizziness, weakness, feeling of laziness, loss of eye pallor, pale nails/palm, and fatigue. Moreover, most of students (74-76%) have identified the effect of

anemia were difficult to concentrate and hypotension. It is suggested that not all of the knowledge aspects towards anemia which had been well recognized and understood by the students. There was certain false indicator that still be chosen by the students. Nevertheless, most of students have known that taking an IFA supplement, consumes vegetables, fruits, and meat or liver were the way to prevent anemia.

Additionally, study in India found that age, breastfeeding, knowledge, self-efficacy to take iron supplements and outcome expectations around taking IFA were all significantly associated with intentions to take IFA yield the impact for future intervention. Age has a negative association with IFA intentions, targeting younger women could be more promising approach. While knowledge only had a minor association with intentions to take IFA (β =0.02, P<0.05)[21].

Students' history of WIFA supplementation

Table 3 showed the students' history of WIFA supplementation. Most of students (97.6%) know the IFA supplementation, and of those 76.8% have received IFA on a weekly basis and 41.2% students acknowledge their adherence in the IFA consumption with aim to prevent anemia (85.1%), the rest 23.4% and 14.9% due to the advice by the teachers and health officers. Students who

have no adherence were due to their fear on the side effects (47.8%), the tablet taste (46.3%, forgetfulness (43.3%), and feeling healthy (13.4%). Interestingly, not all students taking their weekly IFA supplement at school (60.2%), 25% stated that they consume IFA at home, and the rest 14.8% consume IFA both at school and home. However, this finding has no support data of monitoring the adherence if they chose to consume it at home.

A study in Bali have found a similar finding that there were various reason for non-adherence of WIFA supplementation due to bad taste, forgotten, losses, taken other drugs, and nausea[22]. Moreover, a previous study in East Java and East Nusa Tenggara have reported the low level of coverage and adherence of WIFA supplementation, and it was suggested that in order to prevent forgetfulness in taking IFA tablet, WIFA distribution and consumption should be conducted at school in the same time[23].

Table 3. Students' history of WIFA supplementation

Exposure/indicators	Results [a]
Know the IFA supplementation (n=123):	
Yes	120 (97.6)
No	3 (2.4)
History of receiving IFA supplementation	
Duration of time receiving IFA tablets at school (n=114):	
Less than a year	40 (35.1)
Within the last year	42 (36.8)
More than 1-2 year	32 (28.1)
Frequency of receiving IFA tablets (n=112):	
Every week	86 (76.8)
Every month	9 (8)
Every 3 month	1 (0.9)
Every semester	16 (14.3)
History of IFA consumption	
Taking the IFA tablet (n=114):	
Yes	108 (94.7)
No	6 (5.3)
Place to consume IFA tablet (n=108)	
School	65 (60.2)
Home	27 (25)
School and home	16 (14.8)
Adherence (n=114)	
Yes	47 (41.2)
No	67 (58.8)
The reason for adherence [b]:	
Teacher's advice	11 (23.4)
Recommendation from health workers	7 (14.9)
To prevent anemia	40 (85.1)
The reason for non-adherence [b]:	
Unpleasant taste of the tablet	31 (46.3)
Feeling healthy	9 (13.4)
Fear to side effect	32 (47.8)
Fear for having adverse health effect	2 (3)
Absence at school	3 (4.5)
Forgetfulness	29 (43.3)
Unnecessary	4 (6)
Dark-colored stool	1 (1.5)
Have no permission from family	1 (1.5)

Note: [a] Data presented as n (%); [b] Subjects may select more than one answer.

A good understanding of the consequences of anemia is expected to increase their awareness of anemia, hence may increase student's acceptance and adherence towards the WIFA supplementation. World Health Organization stated that the morbidity and mortality in adolescent girls could be attributable to iron deficiency anemia (IDA) as the single largest global causes[24]. Certain conditions that caused by IDA are decreased academic potential, productivity and well-being, and increased maternal and infant morbidity and mortality.[20] Therefore, in region where anemia as a public health concern, the intervention for weekly iron folic acid (WIFA) supplementation to reduce anemia in adolescents (10-19 y old) and women of reproductive age is prime of importance[25].

The findings within students who received IFA showed that the percentage of students with adherence in consuming IFA supplements was relatively low. It is

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possible that there might be certain obstacles in the process stage of the WIFA program implementation that might contributed to the adherence rate. Roles of teachers, parents, and health workers could be affected to the outcome, since the source of information related anemia were majority provided by the teachers (52.5%), health workers (39.3%), and parents (33.6%). A qualitative study at Pekanbaru City reported that there are still shortcomings in the procurement of information-education-communication media for the implementation, lack of coordination in implementing existing regulations[19].

We believed that certain factors may contributed to the successful IFA implementation program. A cluster randomized control trial in Odisha, India at 6-month follow-up showed that social norms can be improved and it is associated with positive behavioral changes that promote iron folic acid consumption. As many as 11.5% (n=419) subjects were women aged in 15-19 years old. The intervention arms (n=2060, 9.7% of them as adolescent group) were including the descriptive norms including people's perceptions about how many other people take iron folic acid, the injunctive norms including social pressures people feel to take iron folic acid, and the collective norms that means actual level of iron and folic acid consumption compared to the control group (n=2048, 11.6% of them as adolescent group). After the intervention, mean scores in self-reported iron and folic acid consumption increased from 0.39 to 1.62 (315% increased; $P<0.001$), while had decreased in the control arm from 0.39 to 0.31 (21% decrease; not significant). Those difference was statistically significant ($P<0.001$). It was suggested that the interventions to address anemia could be achieved by communicating the information about other's people consumption behavior to their targeted group, hence may show the improvement effect[26]. Moreover, it was similar with the findings from the Reduction in Anemia through Normative Innovation (RANI) project have demonstrated that iron folic acid supplementation significantly increased in the intervention arm and it was mediated through anemia-specific interpersonal communication. Practically, targeted interpersonal communication among participants may promote behavior change and it is beneficial strategy to increase iron folic acid use to reduce anemia[27].

CONCLUSIONS

Iron folic acid supplementation program have been conducted and well targeted, however, student's understanding on the objectives, benefit, and their adherence is needed to be gained. Information, education, and communication through related-nutrition program and related-sector could be a future strategy to improve the outcome in implementing weekly iron folic acid supplementation. In the future, several action research could be done in order to achieve the positive outcomes from IFA supplementations in adolescent school girls. Future work may emphasize the correlation between knowledge, attitude, and practice on IFA supplementation with the physical and clinical outcomes among adolescent school girls.

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