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Original Research Article

The impact of iron supplementation toward hemoglobin levels on teenage girls in Bangli regency, Bali, Indonesia

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ABSTRACT

Background: The prevalence of anemia in teenage girls in Indonesia was 33.1%. Department of health's data in 2009, showed that 33.7% of teenage girls suffered anemia and the prevalence of anemia in Indonesia amounted to 57.1% suffered by teenage girls. Assorted studies showed the negative impact of anemia due to iron deficiency of nutrients to the growth and development of children and adolescents. Anemia in children and adolescents will lead to growth and development that are not optimal and reduce learning achievement because easy to get tired, loss of passion and cannot concentrate. Besides that, iron deficiency anemia will also cause low of Intelligent Quotient (IQ) as well as a decrease in the learning ability. One of the efforts to control anemia in teenage girls is to provide iron supplementation.
Methods: The method used in this research was the one group pretest-posttest design. The study was conducted on all the teenage girls who were in 7 juniors high school (SMP) in Bangli regency with total of 1556 respondents. The criteria used for adolescents was when Hbg <12 g/dl then it is called anemia.
Results: The average prevalence of anemia among teenage girls in Bangli regency was 36.8%. The highest incidence number of anemia in teenage girls in SMP 4 Tembuku by 66.7% and the lowest incidence of anemia in SMP 3 Susut by 22.4%. That iron supplementation in teenage girls suffered anemia had a significant impact on the reduction of anemia incidence in teenage girls. The average reduction in the incidence of anemia in teenage girls was 24.9%.
Conclusions: Iron supplementation at a dose twice a week for 3 consecutive months can decrease the prevalence of anemia in teenage girls as much as 24.9% with an increase in hemoglobin levels ranged from 1.42 to 2.20 g/dl. Statistically, showed that iron supplementation had a significant impact on the reduction of anemia incidence in teenage girls.

Keywords: Iron supplementation, Indonesia, Hemoglobin levels, Teenage girls

INTRODUCTION

Adolescence is transition from childhood to the adulthood. In this time, there will be rapid physical change. Teenage girls will begin to experience menstruation, breast starts growing, and weight and height will increase significantly. In term of age, World health organization (WHO) defined that teenage is human who is 12 till 24 years old, while the range of adolescence is divide into three groups that are early adolescence in 12-15 years old, middle adolescence in 15-18 years old, and late adolescence in 18-24 years old.[1,2]

WHO said nutritional problem in adolescents is often neglected, whereas adolescents are the human resources that must be protected because they have enormous potential to improve the quality of the nation. Anemia caused due to deficiency of nutrients iron (Fe) is one of the main nutritional problems in Asia, including in Indonesia. In children of school age, the highest prevalence of anemia was found in Southeast Asia with an estimated 60% of children suffer from anemia.[3]

The prevalence of anemia in teenage girls in Indonesia was 33.1%.[4] Department of health's data in 2009, showed that 33.7% of teenage girls suffered anemia and the prevalence of anemia in Indonesia amounted to 57.1% suffered by teenage girls.[5,6] Results of research found a significant difference of the prevalence of anemia in teenage girls living in villages and in cities, 31.6% of teenage girls who live in the village have anemia while the incidence of anemia in teenage girls who live in the city only 10%.[7] The study of teenage girls in middle school found that 59.3% suffered anemia.[8]

Various studies showed the negative impact of anemia due to iron deficiency of nutrients to the growth and development of children and adolescents. Anemia in children and adolescents will lead to growth and development that are not optimal and reduce learning achievement because easy to get tired, loss of passion and cannot concentrate. Besides that, iron deficiency anemia will also cause low of Intelligent Quotient (IQ) as well as a decrease in the learning ability.[9-12]

One of the efforts to control anemia in teenage girls is to provide iron supplementation. Brabina and Brabin recommend a program of prevention of anemia with iron supplementation more targeted to teenage girls than in children, adult women or pregnant women. This is because supplementation to teenage girls will give greater impact on reproductive health and the success of reproductive process compared with supplementation only during pregnancy.[13] Indonesian pediatric association recommend iron supplementation in adolescents aged 12-18 years are given three consecutive months every year at a dose of 60 mg of elemental iron plus 400 mcg of folic acid for 2 times a week.[14]

METHODS

The method used in this research was the one group pretest-posttest design. The study was conducted on all the teenage girls who were in 7 juniors high school (SMP) in Bangli regency with total of 1556 respondents (280 respondents in SMP 1 Tembuku, 204 respondents in SMP 2 Tembuku, 140 respondents in SMP 3 Tembuku, 174 respondents in SMP 4 Tembuku, 400 respondents in SMP 1 Susut, 242 respondents in SMP 2 Susut, 116 respondents in SMP 3 Susut). The criteria used for adolescents was when Hbg <12 g/dl then it is called anemia.[15] The level of hemoglobin was done by using digital hemoglobin (hemoglobin testing system quick-check) with brand easy touch. This tool was selected because it was easy to operate and practical to conduct research in the field and the results was standardized and there was no difference between digital methods and cyanmethemoglobin methods. Posttest was done after adolescence get iron supplementation for three months consecutively as much as once a day. The dose of iron tablet given is 60 mg with 400 mcg folic acid.

RESULTS

From the research that have done, obtained that the average prevalence of anemia among teenage girls in Bangli regency was 36.8% with the following details (Table 1).

Table 1: Incidence number of anemia in teenage girls in bangli regency.

School	Anemia Status	Frequency distribution	
		F	%
SMP 1 Tembuku	Anemia	129	46,1
	Non-anemia	151	53,9
SMP 2 Tembuku	Anemia	58	28,4
	Non-anemia	146	71,6
SMP 3 Tembuku	Anemia	37	26,4
	Non-anemia	103	73,6
SMP 4 Tembuku	Anemia	116	66,7
	Non-anemia	58	33,3
SMP 1 Susut	Anemia	135	33,8
	Non-anemia	265	66,2
SMP 2 Susut	Anemia	82	33,9
	Non-anemia	160	66,1
SMP 3 Susut	Anemia	26	22,4
	Non-anemia	90	77,6

Obtained information, the highest incidence number of anemia in teenage girls in SMP 4 Tembuku by 66.7% and the lowest incidence of anemia in SMP 3 Susut by 22.4%.

Table 2: Incidence number of anemia in teenage girls before and after iron supplementation.

School	Before iron supplementation		After iron supplementation	
	F	%	F	%
SMP 1 Tembuku	129	46,1	33	11,8
SMP 2 Tembuku	58	28,4	8	3,9
SMP 3 Tembuku	37	26,4	8	5,7
SMP 4 Tembuku	116	66,7	23	13,2
SMP 1 Susut	135	33,8	53	13,3
SMP 2 Susut	82	33,9	58	24,0
SMP 3 Susut	26	22,4	2	11,7

In the following Table, we will clarify the change of prevalence number of anemia in teenage girls after being given iron supplementation at a dose of 2 times a week

for three consecutive months as recommended by the Indonesian pediatric association in 2011 (Table 2).

From Table 2 shows that iron supplementation in teenage girls suffered anemia had a significant impact on the reduction of anemia incidence in teenage girls. The average reduction in the incidence of anemia in teenage girls was 24.9%. The highest decrease of anemia incidence was in SMP 4 Tembuku with decrease percentage 53.5% and the lowest decrease was in SMP 2 Susut with the decrease percentage of incidence number was 9.9%. The average increase in levels of hemoglobin after iron supplementation twice a week for three consecutive months in Susut regency was 1.42 g/dl and the Tembuku regency was 2.20 g/dl.

DISCUSSION

Subjects in this study were teenage girls who were in the junior high school (SMP). The subjects of this study included into early adolescence with age range 12-15 years old. The average age of menarche (first menstruation) in Indonesia was the age of 12-15 years old, but the average age of menarche in teenage girls in Bali was 13-14, which reached 40.5%[(16)]. Therefore, the teenage girls will miss average iron 1.3 mg per day during menstruation. In addition, the excretion of iron also occurs through the feces (stool) which is equal to 0.6 mg.[17-20] Teenage girls will menstruate every month which means losing blood regularly in considerable amounts, also needs of Fe will increase because of the growth of physical, mental and intellectual. If the iron loss is not resolved properly, the teenage girls will be in to anaemic conditions.

Adolescence is known as one period of human life that has some uniqueness. This is because of the transitional period between childhood and adulthood. Adolescents have the task of development, one of them is the adolescents will be able to prepare entering the period of marriage and prepare what is needed in the household life. One that must be done by the teenage girls is to realize the developmental task preparing to become a mother.[21]

Indonesian pediatric association recommend iron supplementation in adolescents aged 12-18 years old are given three consecutive months every year at a dose of 60 mg of elemental iron plus 400 mcg of folic acid for 2 times a week. Iron supplementation two times a week for 11 weeks may increase hemoglobin levels in blood of 2.28 g/dl.[22] Weekly supplementation for 12 weeks may increase hemoglobin levels in the blood of 1.82 g/dl.[23] Iron supplementation in teenage girls who have got anemia can increase hemoglobin levels in the blood of 1.11 g/dl compared if iron supplementation given to teenage girls who are not anaemic, hemoglobin levels rise only 0.4 g/dl.[24]

Giving iron supplements twice a week in adolescent's effective in increasing hemoglobin levels. Average increase of hemoglobin in a day is about 0.25 to 0.4 mg/dl during the first 7-10 days. Then hemoglobin levels will increase of 0.1 mg/dl/day within 3-4 weeks.[25-27]

CONCLUSION

Iron supplementation at a dose twice a week for 3 consecutive months can decrease the prevalence of anemia in teenage girls as much as 24.9% with an increase in hemoglobin levels ranged from 1.42 to 2.20 g/dl. Statistically, showed that iron supplementation had a significant impact on the reduction of anemia incidence in teenage girl.

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