Prevalence of Anemia and Stunting in Early Adolescent Girls

Ni Wayan Dewi Tarini[1], Wayan Sugandini[2], Ni Komang Sulyastini[3]
Program Studi D3 Kebidanan Fakultas Olahraga dan Kesehatan
Universitas Pendidikan Ganesha
Singaraja, Indonesia
[1]dewitarini1975@yahoo.com, [2]sugandiniw@yahoo.com, [3]sulis_j3636@yahoo.com

Abstract—**This study aimed at determining the prevalence of anemia and stunting, focusing on the relationship between anemia and stunting in early adolescents. The design a cross-sectional study was applied by taking secondary data from the First Quarter Report of Youth Visits at Sukasada I Public Health Center in Buleleng in 2019. There were 94 out of a total of 564 early teenage girls were selected as the sample done through total random sampling. The data were analyzed using chi square. The results showed that the prevalence of anemia in early adolescents was 16.7% and the prevalence of stunting was 3.4%. The null hypothesis was rejected, which means that there is a possibility of anemia with stunting in early adolescents. It is suggested that early stunting in young women can be prevented through regulating a good diet and consuming iron supplement.**

Keywords—anemia; stunting; early teenage girls.

I. INTRODUCTION

Adolescence is the most difficult time for an individual to pass since it is the most critical period for development at a later stage of life to reach the adult stage [1]. Generally, adolescence is often interpreted as a transitional period marked by changes in biological, psychological, and social aspects [2]. Healthy teens will experience growth and normal development, which is in accordance to physical growth standards in adolescents in general and their age standards. Child growth in the third year is so fast and gradually decreases when they have become teenagers, at the time of school acceleration of growth will form a nearly horizontal curve [3].

Health problems of adolescent girls need attention from the Indonesian government. Adolescent girls are one group that is prone to suffer from malnutrition, menstruation, anemia and infectious diseases. Infectious diseases caused by environmental factors and poor sanitation that causes the immune system to decline and stunted growth is known as stunting [4].

Anemia is a lack of hemoglobin (Hb) in the blood caused by insufficiency of nutrients needed for the formation of hemoglobin. Normal Hb levels in adolescent girls are 12 gr / dl. Adolescence are said to be anemic if the Hb level is less than 12 gr / dl [8]. Women are more prone to anemia compared to men. The need for iron as the micronutrient in women is 3 times greater than in men. Every month, women experience menstruation caused menstrual loss. That is why women need iron to recover their condition which is not experienced by men.

The increasing number of early adolescent girls in Indonesia currently experiencing stunting is a priority issue that must be promptly managed. Anemia is predicted as a contributor to stunting in the early adolescent girls group. Based on the results of study by reference [5], the prevalence of stunting in children aged 5-18 years were grouped based on the sex. The prevalence of stunting of boys was 40.2%, while the prevalence of stunting of girls was 30.7%. While the prevalence of anemia in the early adolescent girls group was 26.4%.

Stunting is an abnormal condition based on age, that is, the height is under minus two standard deviations (<-2 SD) from the WHO child growth standard nutritional status table [6]. Stunting in adolescents is a long-term result of consuming low-quality food intake and combined with morbidity, infectious diseases, and environmental problems. The impact of stunting can inhibit the growth of cognitive function, thus causing low IQ and economic issue. The long-term consequences of stunting also cause short stature, reduce work capacity, and increase the risk of poor reproductive performance [7]. Many causes of stunting include micronutrient deficiencies. One micronutrient that affects the nutritional status (stunting) is iron (Fe).

Considering that women have a high risk to suffer from stunting and anemia, this study was aimed to determine the prevalence of anemia and stunting in early adolescent girls, and analyze the relationship between the incidence of anemia and stunting.

II. METHOD

The purpose of this study was to determine the prevalence of anemia and stunting in early adolescent girls, and analyze the relationship between the incidence of anemia and stunting. The design of this study was a cross-sectional study by taking secondary data from the First Quarter Report of a Teenage Case Visit at Sukasada I Public Health Center in Buleleng in 2019, which included data on girls in grades 4, 5 and 6 of 20 elementary schools in the working area of the Sukasada I Public

397

Health Center who experienced anemia, as many as 94 people out of a total of 564 people of the number of early adolescent girls. The sample selection was done by total sampling, namely 94 girls who have anemia. The data were analyzed using chi square.

III. RESULTS AND DISCUSSION

A. Research result

The incidence of anemia in early adolescent girls in the working area of Sukasada I Public Health Center is explained in the following graph.
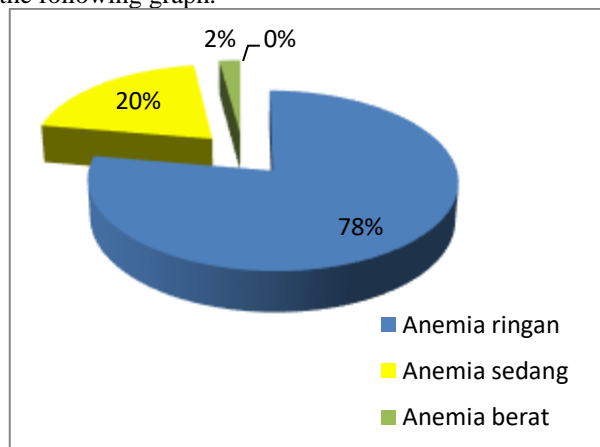

Fig.1. Graphic of anemia occurrence in early adolescent girls in the working area of Sukasada I public health center in first quarter in 2019.

The incidence of anemia in early adolescent girls in the working area of Sukasada I Public Health Center in the first quarter in 2019 was 78% of cases of mild anemia.

The incidence of stunting in early adolescent girls in the working area of the Sukasada I Public Health Center is illustrated in the following graph.
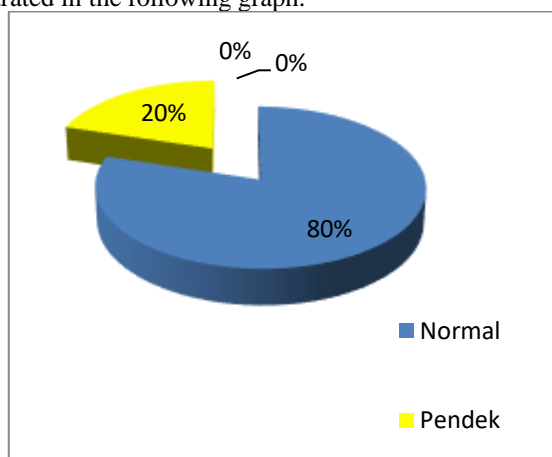

Fig.2. Graphic of stunting incidence in early adolescent girls in the working area of sukasada i public health center in first quarter in 2019

A total of 19 cases of stunting were found in the early adolescent girls group in the working area at Sukasada I Public Health Center. The study was conducted on 94 early adolescent

girls who had anemia from 20 elementary schools in the working area of Sukasada I Public Health Center.

A cross tabulation of the incidence of stunting in early adolescent girls who have anemia in the working area of Sukasada I Public Health Center in the first quarter in 2019 is illustrated in Table I.

TABLE I. CROSS TABULATION OF STUNTING EVENTS IN EARLY ADOLESCENT GIRLS WITH ANEMIA IN THE WORKING AREA OF SUKASADA I PUBLIC HEALTH CENTER IN FIRST QUARTER IN 2019

Anemia	Stunting		Total
	Normal	Short	
Mild Anemia	69	4	73
	73,4%	4,3%	77,7%
Moderate Anemia	6	13	19
	6,4%	13,8%	20,2%
Severe Anemia	0	2	2
	0%	2,1%	2,1%
Total	75	19	94
	79,8%	20,2%	100%

A total of 13 cases of early adolescent girls with anemia in the working area of Sukasada I Public Health Center in first quarter in 2019 experienced stunting. The results showed that the prevalence of anemia in early adolescent girls in the working area of Sukasada I Public Health Center was 16,7 %, lower when it is compared to the basic health research in 2013 data and the stunting prevalence of 3.4%, far lower than the basic health research in 2013 data. Value X2 = 45,101 at df = 2, and p = 0,000 so that H0 is rejected, which means there is a relationship between anemia and stunting in early adolescent girls.

B. Discussion

Adolescence is the most difficult time for an individual to pass, the most critical period for development at a later stage of life to reach the adult stage [9]. Generally, adolescence is often interpreted as a transitional period marked by changes in biological, psychological, and social aspects. A healthy adolescent will experience growth and development in normal, which is in accordance with physical growth standards in general adolescents and their age standards. Child growth in the third year is so fast and gradually decreases when it becomes a teenager or school period. At the time of school growth acceleration will form a nearly horizontal curve [3].

Adolescence is a period of physical and mental growth and development as well as activities that cause an increased need for nutrient intake [9]. Physical changes due to growth that occur will affect the health status and nutrition. Inadequate need for intake of nutrients in adolescents results in the emergence of nutritional problems both over nutrition and under nutrition. Nutritional problems commonly found in adolescence include anemia, obesity, and chronic lack of energy, deviant eating behavior such as anorexia, nervosa and bulimia [10].

Anemia is one of the main nutritional problems in Indonesia, especially iron deficiency anemia which is quite prominent in adolescents, especially teenage girls. Many

nutritional problems that occur in teenage girls are lack of iron or anemia. Anemia is a continuation of the impact of macro nutrient deficiencies namely carbohydrates, proteins, fats and micronutrient deficiencies namely vitamins and minerals. The impact of anemia on teenage girls is stunted growth, the body during infancy is easily infected, resulting in poor body fitness, and decreased enthusiasm for studying at school. Teenage girls more often experience anemia, this is due to the reproductive age of teenage girls need iron supply three times more than young men, because teenage girls experience menstruation every month. This is exacerbated by the consumption patterns of adolescent girls who very concern with their body thus they have diet with less iron intake [8].

Adolescent girls are more susceptible to anemia because adolescents are in a period of growth that requires more nutrients, including iron. In addition, the monthly menstrual cycle is one of the factors causing teenage girls to be exposed to iron deficiency anemia. In addition, teenage girls are very concerned about their body so much thus they concern on food consumption such as having vegetarian diet [9].

Reference [7] states that anemia is a condition where there are insufficient amount of red blood cells to meet the physiological needs of the body. A person's physiological needs vary based on age, sex, place of residence, smoking behavior and stage of pregnancy. The cause of anemia is generally due to iron deficiency, folic acid deficiency, vitamin B12 and vitamin A. Acute and chronic inflammation, parasitic infections, congenital abnormalities that affect hemoglobin synthesis, lack of red blood cell production can cause anemia. The problem of anemia, which is iron (Fe) deficiency, becomes a nutritional problem, especially in adolescents, especially in adolescent girls because teenage girls experience menstruation. Reference [11] mentions that vitamin C and animal protein contain iron-binding amino acids to increase iron absorption. Reference [10] mentions the lack of vitamin B12, folic acid, vitamin C and iron can cause the formation of red blood cells is ineffective, causing anemia.

Menstruation is one of the factors that cause malnutrition, because during menstruation the blood will continue to come out, so that, it requires intake of nutrients, especially iron to help produce hemoglobin in the body. Nutritional status in adolescents is a reflection of the onset of the occurrence of malnutrition in early childhood. In middle-income countries, adolescents are a period of decreased malnutrition from early childhood, whether it is stunting or previous anemia caused by micronutrient deficiencies [12].

Stunting is strongly associated with intellectual development disorders during childhood and short stature in adulthood. These results emphasize the need to prevent growth retardation through promotion of pre-pregnancy and breastfeeding care, and control of infectious diseases [11]. Stunting is an abnormal condition based on age, that is, the height is below minus two standard deviations (<-2 SD) from the WHO child growth standard nutritional status table. The impact of stunting can inhibit the growth of cognitive function,

thus causing low IQ and reduced economic potential. The long-term consequences of stunting also cause short stature, reduce work capacity, and increase the risk of poor reproductive performance [7].

Stunting in adolescents is a long-term outcome of chronic consumption of low quality diets combined with morbidity, infectious diseases, and environmental problems [5]. Many causes of stunting include micronutrient deficiencies. One micronutrient that affects the nutritional status (stunting) is iron (Fe). Iron deficiency affects the rate of growth and development of adolescents, by inhibiting linear growth [11] [8]. Iron is one of the essential micronutrients for the human body which is the most micro minerals which are 3-5 grams. There are several opinions by experts about the role of iron (Fe), namely as an enzyme component as well as a cytochrome component that influences growth. One of them is as a component of the enzyme ribonucleotide reductase which is able to participate in DNA synthesis that works indirectly on tissue growth that can affect growth. In addition, iron as a component of cytochrome that can participate in the production of Adenosine Triphosphate (ATP) and protein synthesis that can affect tissue growth [12].

Stunting is a condition of failure to achieve physical development measured by height according to age [7]. Unbalanced food intake will be related to nutrients contained in food such as carbohydrates, proteins, fats, minerals, vitamins and micronutrients, which are one of the risk factors associated with stunting.

Stunting in adolescents occurs because of nutritional problems when toddlers or pre-school. Malnutrition that occurs in infancy which indicates stunting will generate in stunted growth and development of adolescents. The long-term impact of stunting on adolescent girls' health is in the form of short stature, increased risk of obesity, and decreased reproductive health, while the impact on developmental terms is a decrease in achievement and learning capacity, as well as decreased ability and work capacity [7].

Based on the results of research conducted in the working area of Sukasada I Public Health Center in the first quarter of 2019, there were 13 cases of stunting in young girls who experienced moderate anemia from a total of 19 stunting events that occurred in the region. The high rate of stunting in early adolescent girls is inseparable from the patterns of eating consumption of adolescent girls is one of the causes of deficiency of Fe intake, because young women tend to want to maintain body shape, thus, limit the consumption of food lead to lack of nutrient intake. Lack of food intake can cause iron reserves in the body are not balanced with the need for iron for the synthesis of the formation of hemoglobin (Hb). As the results, if it happens in a long time will cause Hb levels to continue to decrease and cause other nutritional problems, for example iron anemia and stunting [7]. Stunting is an indicator of chronic malnutrition that occurs due to deficiency of nutrient intake or infectious diseases that occur in a long time. This allows stunting become one of the factors causing anemia [6].

The amount of iron intake is a factor that also affects the incidence of anemia in teenage girls. the level of iron intake deficit (less), and also occurs due to lack of food consumption which can increase iron absorption so that iron needs are not met. This inadequacy is caused by the consumption patterns of Indonesian people who still use vegetables as the main source of iron. Vegetables are a good source of nutrients but difficult to absorb, while animal food is a good source of nutrients rarely consumed, especially by rural communities. Reference [8] states that meat, chicken and fish have a high iron content, cereals and nuts have a moderate iron content, and most vegetables that contain high oxalic acid such as spinach have a low iron content. The habits of the Indonesian people in consuming tea and coffee are also other factors that cause many people with anemia. Coffee and tea contain polyphenols (phenolic acids, flavonoids, and polymerization products) that affect the absorption of iron (inhibitors). Calcium found in processed milk and cheese can also be an iron absorption inhibitor. In addition to these things, young women often go on a diet (reduce eating) because they want to slim down and maintain weight. Iron absorption is maximized if it is facilitated by ascorbic acid (vitamin C), as contained in kiwi fruit, guava, and oranges.

The socioeconomic condition of the family has an influence on the pattern of macro food consumption, where if the family income is greater then the more diverse patterns of consumption of the community. Family income is a factor that affects the quality and quantity of food consumed by all family members. This will also affect the child's allowance and children's habits to eat. Reference [8] added that families with many members will influence food expenditure, where per capita income and food expenditure will decrease in line with the increasing number of family members.

Infectious diseases that increase the risk of anemia are Helminthiasis infections and Malaria because these diseases inhibit the formation of hemoglobin. Diarrhea and respiratory infections can also interfere with appetite so that it results in decreased nutritional consumption. Nutritional status is one of the parameters to measure health status, because nutritional status is a reflection of the accumulation of nutrient consumption from time to time. Nutritional status has a positive correlation with hemoglobin levels, where adolescent girls who have underweight / underweight nutritional status have a 1.4 times risk of suffering from hemoglobin or anemia compared to those who have normal nutritional status [10].

Human physical activity affects hemoglobin levels in the blood. Individuals who regularly exercise their hemoglobin levels will rise. This is because the tissue or cells will need more O2 when doing activities. But physical activity that is too extreme can trigger an imbalance between the production of free radicals and the body's antioxidant defense system, known as oxidative stress. In conditions of oxidative stress, free radicals will cause lipid peroxidation of cell membranes and damage the organization of cell membranes. Lipid peroxidation of cell membranes makes it easier for erythrocyte cells to undergo hemolysis, namely the occurrence of lysis in the erythrocyte membrane which causes Hb to be free and ultimately causes the Hb levels to decrease [13].

Adolescent requires sufficient iron to compensate for the increased nutritional needs caused by acceleration of growth. Iron affects the Hb levels of adolescent girls who are in growth, because of the increased need for iron in adolescent girls caused by menstruation. Blood that comes out during menstruation must be replaced with the formation or production of red blood cells (hemoglobin) by increasing iron intake as one of its main components. Low Hb can affects the level of adolescent cognitive development. Stunted cognitive development is one of the long-term effects short of stunting [7]. Impact of low iron (Fe) status can inhibit the growth of young women.

Stunting is a problem that is increasingly being found in developing countries, including Indonesia. The incidence of stunting is a result of inadequate food intake over a long period of time, poor food quality, increased morbidity or a combination of all these factors [10]. Efforts to prevent and control stunting require approaches from various aspects of life, because stunting prevention and control is not enough to improve nutrition interventions but there are other factors, namely sanitation and environmental hygiene factors. The low factor of sanitation and environmental hygiene is one indicator of Clean and Healthy Behavior. These factors can trigger disruption of the digestive tract, which makes energy unable to make growth in the body but the energy is switched to fight infection [1].

Prevention and treatment of anemia can be determined by paying attention to the factors causing it, if the cause is a nutritional problem, an assessment of nutritional status is needed to identify the nutrients that play a role in cases of anemia. Nutritional anemia can be caused by various important nutrients in the formation of hemoglobin. Iron deficiency that is common in the world is a major cause of nutritional anemia [8]. Lack of iron in food can cause anemia.

There are several efforts that can be done to prevent and overcome anemia due to lack of iron consumption. The first effort is to increase iron consumption from natural sources through education or nutrition counseling to the public, especially animal-source foods that are easily absorbed, as well as foods that contain lots of vitamin C, and vitamin A to help absorb iron and help the process of hemoglobin formation. Second, to fortify food ingredients, namely adding iron, folic acid, vitamin A, and essential amino acids to foods that are widely eaten by the target group. Third, carry out iron folate supplementation routinely for anemia sufferers for a certain period to increase the patient's hemoglobin level quickly [5].

Fortification is an attempt to replace lost nutrients and make staple foods far more nutritious without changing their taste or appearance. Iron fortification with iron can significantly prevent mental retardation that often occurs among adolescents who do not consume enough iron. Fortification will increase the productivity of adults, and help reduce the risk of anemia, and reduce the likelihood of death of pregnant women. Around the world, there are 57 countries which by law require fortification

of flour with iron and or folic acid. There are five countries that require fortification, including Indonesia. Other countries are Australia, Fiji, New Zealand and the Philippines [7].

One of the ways from the government in reducing the incidence of anemia, especially in teenage girls, is to give blood added tablets. This activity is an implementation of the Minister of Health Regulation No: 88 of 2014 concerning blood-tablecloth standards for women of childbearing age and pregnant women as well as a circular from the Director General of Public Health of the Republic of Indonesia Ministry of Health No: HK.03.03/V/ 0595/2016 concerning the administration of blood-added tablets. This effort is carried out as an effort by the government to develop human resources through the fulfillment of balanced nutrition for adolescents. The government's target as outlined in the Ministry of Health's strategic plan for 2015-2019 is the percentage of girls who get blood-added tablets in 2019 by 30% [5]. The added blood tablet contains 200 mg of iron in the form of ferrous sulfate / ferro fumarate or ferro gluconate and 0,25 mg of folic acid.

Nutrition education or education is an educational approach to produce individual or community behavior needed to improve food improvement and nutritional status. The hope is that people can understand the importance of food and nutrition, so they are willing to act and act according to nutritional norms. Comprehensive nutritional education, namely for anemic adolescents, teachers and parents, is given in the hope that the nutritional knowledge of adolescents, teachers and parents and adolescent eating patterns will change so that the intake of food, especially adolescent iron intake will be better. With better iron intake, hemoglobin levels will increase. Basically, nutrition education programs aim to change unhealthy behaviors into healthier behaviors, especially eating behavior. Several studies in various countries have found that nutrition education is very effective in changing children's knowledge and attitudes towards food, but it is less effective in changing eating practices. Knowledge is the result of sensing a particular object. The sensing process occurs through the five human senses, namely the sense of sight, hearing, smell and taste through the skin. Knowledge is a dominant factor that is very important for the formation of one's actions [5].

IV. CONCLUSION

Adolescence is a phase of growth where an individual develops from the time he first shows his secondary sexual signs to the time he reaches sexual maturity, with an age range of 10-19 years. In Indonesia, the understanding of adolescents is regulated in the Minister of Health regulation of the Republic of Indonesia number 25 of 2014, defined as a population in the age range of 10-18 years.

The health of teenage girls as a prospective mother and at the same time as the successor to the nation needs to be a major concern. This is also related to the target sustainable development goals that still need hard work to achieve, namely

the health of women giving birth. In the life cycle, the stages of adolescence, especially adolescent girls are very important, because during this period there is a process of growth and development, so that if this process takes place optimally it will produce healthy adolescent girls and ultimately will produce healthy prospective mothers as well. The United Nations Population Fund (UNFPA) states that when adolescent girls are given the opportunity to access their education and health, including reproductive health, it will create opportunities for adolescents to realize their potential, so young people can manage well their future self, family, and society.

Adolescent health problems need attention from the Indonesian government, especially teenage girls. Adolescent girls are one group that is prone to suffer from malnutrition, menstruation, anemia and infectious diseases. Infectious diseases caused by environmental factors and poor sanitation that causes the immune system to decline and stunted growth is known as stunting. Inadequate consumption patterns in early adolescent girls contributed to the high incidence of anemia in the group as occurred in the working area of Sukasada I Public Health Center. Whereas, in the first quarter in 2019, 94 early adolescent girls were anemic, 13 of them stunted (13,8%), with H0 rejected which means there is a relationship between the incidence of anemia and stunting in early adolescent girls.

In conclusion, preventing the occurrence of anemia can reduce the possibility of incidence of stunting in the early adolescent girl group in the working area of the First Quarter Report of a Teenage Case Visit at Sukasada I Public Health Center in Buleleng in 2019.

ACKNOWLEDGMENT

REFERENCES

[1] A. Proverawati and E.K. Wati. Nursing Nutrition and Health Nutrition. Yogyakarta: Yuha Medika, 2011.

[2] S. Azwar Preparation of Psychological Scale. Yogyakarta: Student Library, 2012.

[3] R.G. Soetjiningsih. Child Growth and Development Ed.2. Jakarta: EGC, 2013.

[4] A.D. Sediaoetama. Nutrition Award for Students and Professionals. Jakarta: Dian Rakyat, 2008.

[5] Ministry of Health of the Republic of Indonesia. Basic Health Research (RISKESDAS). Jakarta: Agency for Health Research and Development, 2013.

[6] World Health Organization. Malnutrition. Geneva: The Global Picture. WHO, 2004.

[7] World Health Organization. Nutrition Landscape Information System: Country profile indicators. Geneva, Switzerland: World Health Organization, 2012.

[8] S. Almatsier. Basic Principles of Nutrition. Jakarta: PT Gramedia Pustaka Utama, 2009.

[9] H.R. Hasdianah, S. Sandu, P. Yuli. Utilization of Nutrition, Diet and Obesity. Yogyakarta: Nuha Medika, 2014.

[10] R. S. Gibson, Principles of Nutritional Assessment. Second Edition. New York: Oxford University Press Inc, 2005.

[11] S. Moehji. Tackling Malnutrition. Jakarta: Sinar Santi, 2004.

[12] D. Kartono, M. Soekatri. AKG Macro and Micro Minerals. National Widyakarya Food and Nutrition VIII. Jakarta: LIPI, 2004.

[13] M.J. Gibney, M. Barrie. J. Margetts, M. Kearney and A. Lenare. Public Health Nutrition. Jakarta: EGC Medical Book, 2009.