INTAKES OF CALCIUM, IRON, FIBER, AND NUTRITIONAL STATUS OF ADOLESCENTS

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ABSTRACT

Adolescence (10-18 years old) is the age that is very vulnerable of nutritional status. This is because in adolescence, growth and development during the ages need more requirement on nutrition. This study is to analyze the intakes of calcium, iron, fiber, and the nutritional status of adolescence foster children of LKSA Widhya Asih Badung. This research was conducted using crossectional design. Sampling is done by nonprobability sampling through saturation sampling totaling 32 people. The data of nutritional status was analyzed based on body weight and height by calculating Body Mass Index (BMI) according to age. In the other hand, the data of calcium, iron and fiber intakes were obtained by interview using questionnaire and FFQ-SQ form (Food Frequency Questionnaire-Semi Quantitative). The result of this study shows that most of the respondent have less calcium and iron intakes, while the fiber intake is sufficient with their normal nutritional status. There is a relationship between calcium and fiber intake with the nutritional status of adolescence in LKSA Widhya Asih Badung.

Keywords: *Nutritional intake, nutritional status, adolescence*

INTRODUCTION

Adolescent is a key phase of human development. It is a transition period from childhood to adulthood. Such period occurs between twelve to nineteen years of age. All adolescent must enjoy good health and well being. Adolescent girls are the vital bridge between the present and future generation. Therefore adolescent nutrition and health care is a major concern all over world. In South Asia, a high prevalence of under-nutrition among adolescents has been observed. Under-nutrition and overweight is a global problem, especially overweight and obesity spreading even to developing world, where it is an increasing threat to health. One third of all deaths globally already stem from ailments linked to excess weight and low consumption of food [1].

Globally, there are 1.8 billion children and adolescents ages 5–19 years; nearly 90 percent live in low- and middle-income countries (LMICs). The prevalence and consequences of malnutrition and inadequate intake of nutrients leading to increased risk of morbidity and mortality are well studied for children in their first 1,000 days. Little information about the prevalence and consequences of malnutrition is available for children and adolescents ages 5–19 years, although they constitute 27 percent of the population in LMICs [2].

Based on the data of Baseline Health Research 2013, the prevalence of wasting in adolescents at the age of 16–18 nationally is 9,4% (1,9% severe thin and 7,5% wasting) and the prevalence of overweight is 7,3% (overweight 5,7% and obesity 1,6%). Bali is one of the provinces with the obesity prevalence is above the national prevalence. Overweight prevalence is 11,2% (overweight 8,6% and obesity 2,6%) and the prevalence of wasting is 5,6% (severe thin 0,3% and wasting 5,3%) [3].

Based on Baseline Health Research 2013, Denpasar city is the region with the lowest prevalence of normal nutritional status in adolescent at the age of 16–18 accounted for 75,6% [4]. The number of adolescents in the city of Denpasar is 13.600. The number of adolescents who take part in nutrition screening activity is 13.269 people. The result of nutrition screening of adolescent in the city of Denpasar in 2018, showing

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that adolescent with overweight nutritional status numbered 599 people, obesity 87 people, severe thin 6 people, and wasting 343 people [5].

LKSA Widhya Asih Badung was founded in 1981. The number of adolescent in LKSA Widhya Asih Badung 32 people, consisting of Men = 11 people and women = 21 people. Based on preliminary test, all of orphanage children of LKSA Widhya Asih Badung categorized as adolescent at the age of 15-18 years old, and shows that the number of overweight adolescent is 21,8%, wasting: 6,25% and obesity 3,2%. Economic factor of the orphanage is the reason why the children experience malnutrition as the orphanage depends on funding from donors which is impact to food supply for the children. Comparison of the number of Children greater than the number of caregivers and childcare about nutrition and health for each child is still lacking.

METHODS

Type of this research is observational research with cross sectional approach. Subject of the research was adolescents age 15–18. The research was done in LKSA Widhya Asih Badung. The sampling in this research was used *non probability sampling techniques* with saturation sampling of all the population totaling 32 people. The data of calcium, iron and fiber intake was obtained by recall interview of food intake 3 x 24 hours. The characteristic data was obtained from questionnaire, the data of nutritional status was obtained by body weight measurement using weight scales and height using mikrotoa. Kolmogorof Smirnov was used for normality test data in this method, while the data analysis was used *kendall tau b* correlation test to identified how big the relationship between two variables.

FINDINGS AND DISCUSSIONS

Age and gender can affect the education level, eating habits, amount of food intake, so that it can affect the nutritional status. According to Amiruddin, 2013, if the income rises, the amount and type of food will tend to improve. The income level also determines what types of food can be purchased. The higher the income the greater the percentage from the income used to buy fruit, vegetable, and various types of food. The effect of income improvement also affects the family access to adequate and quality health services.

Table 1 shows that 53,1% of female respondent at the age of 15 is 65,5%. Mostly the education level of parents of the respondent is Senior High School. 46,9% of respondent with father's profession as a farmer/planters and mother as housewife with the income less than Rp. 1,5 million / month.

Majority of the parent of respondent work as farmer and only a small portion are entrepreneurs, so this is also affect to the knowledge about nutrition. As a result, the society do not spend their wealth according to nutritional needs. Lack of nutritional knowledge cause low food expenditure budget and food quality and diversity. Many families buy more goods because of the influence of habits, advertisement, and the environment [7].

Tabel 1. Adolescent Characteristic of LKSA Widhya Asih Badung

Variable	n	Percentage
Age (Year)		
15	17	53,1%
16	1	3,1%
17	4	12,5%
18	10	31,3%
Total	**32**	**100%**
Gender		
Male	11	34,4%
Female	21	65,5%
Total	**32**	**100%**

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Father's Education Level		
Elementary School	2	6,3%
Junior High School	6	18,7%
Senior High School	20	62,5%
Diploma/Bachelor	4	12,5%
Total	**32**	**100%**
Mother's Education Level		
Elementary School	7	21,9%
Junior High School	7	21,9%
Senior High School	16	50%
Diploma/Bachelor	2	6,3%
Total	**32**	**100%**

Variable	**n**	**Percentage**
Father's Profession		
Entrepreneur	9	28,1%
Labor	2	6,3%
Farmer/Planters	15	46,9%
Private Worker	1	3,1%
Merchant	2	6,3%
Unemployment	3	9,4%
Total	**32**	**100%**
Mother's Profession		
Entrepreneur	8	25%
Merchant	2	6,3%
Housewife	15	46,9%
Labor	0	0%
Farmer/Planters	7	21,9%
Total	**32**	**100%**
Parent's Income (Rp)		
< Rp. 1,5 million	21	46,9%
1,5 million – 2 million	8	31,3%
2 million – 3 million	2	18,7%
>3 million	1	3,1%
Total	**32**	**100%**

Primary Data, 2019

Nutritional status assessment was done based on the result of body weight and height measurement adjusted for Body Mass Index (BMI) based on age, then obtained that distribution of nutritional status of orphan children with wasting category 2 persons (6,3%), normal category 22 persons (68,7%), overweight category 7 persons (21,9%), and obesity category 1 person (3,1%), as shown in Table 2. Nutritional status of a person is determined by nutritional consumption and body's ability to absorb these substances. Normal nutritional status shows that food quality and quantity has fulfilled the body's needs. A person who has less nutritional status or underweight has a risk of infectious diseases, while someone with overweight condition has a risk of degenerative diseases [8].

Tabel 2. Adolescent Nutritional Status in LKSA Widhya Asih Badung

No	**Nutritional Status**	**N**	**%**
1	Wasting	2	6,3%
2	Normal	22	68,7%
3	Overweight	7	21,9%
4	Obesity	1	3,1%
Total		**32**	**100%**

Primary Data, 2019

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Calcium intake of all adolescent included in the category of deficient, for the iron intake 78,1% of adolescent also in deficient category, while the fiber intake of adolescent included in the category of sufficient (Table 3). Calcium intake of the foster children included in the category of deficient due to lack of consumption of food source that contain of calcium such as milk, cheese, yolk, green vegetable, nuts, and prawn. Calcium deficiency in infancy can cause growth disruption especially the growth of abnormal bones, bent and brittle bone. If this continues and there is no attempt to improve the food sources that contain calcium, it will have an impact on osteoporosis dan osteomalation [9].

Tabel 3. Calcium, Iron, and Fiber Intake of Adolescents in LKSA Widhya Asih Badung

Micro Nutrient	Category	N	%
Calcium	Deficient	32	100
	Sufficient	0	0
	Total	**32**	**100**
Iron	Deficient	25	78,1
	Sufficient	7	21,9
	Total	**32**	**100**
Fiber	Deficient	0	0
	Sufficient	32	100
Total		**32**	**100%**

Primary Data, 2019

Deficient of iron intake is cause by lack of consuming the source of animal proteins, nuts, green vegetable, and some fruits. Generally, people who have adequate protein intake also have sufficient iron intake. Low and poor bioavailability of iron intake results in iron anemia especially for female adolescent [10]. Fiber intake of all adolescents is sufficient. This is because almost every day they consuming various types of vegetables such as cabbage, spinach, and swamp cabbage (Table 4).

Table 4. Asossociate of Ca, Fe, and Fiber Intake With The Nutritional Status of Adolescent in LKSA Widhya Asih Badung Based On IMT/U

Nutritional Intake	Nutritional Status												p-value	Correlation coefficient
	Severe thin		Wasting		Normal		Over-weight		Obesity		Total			
	n	%	N	%	N	%	n	%	n	%	n	%		
Ca														
Deficient	0	0	2	6,3	22	68,8	7	21,9	1	3,1	32	100	0,040	0,357
Sufficient	0	0	0	0	0	0	0	0	0	0	0	100		
Fe														
Deficient	0	0	2	8	17	68	6	24	0	0	25	100	0,502	0,116
Sufficient	0	0	0	0	5	71,4	1	14,3	1	14,3	7	100		
Fiber														
Deficient	0	0	0	0	0	0	0	0	0	0	0	100	0,004	0,497
Sufficient	0	0	2	6,3	22	68,8	7	21,9	1	3,1	32	100		

There is an association between the calcium intake with nutritional status with the value p = 0,040 < 0,05 and with correlation coefficient 0,357, which mean that the relationship between calcium intake and nutritional status of foster children in LKSA Widhya Asih Badung is weak. Parama Research, 2018 shows that 78,7% of children have normal nutritional status and 60,7% of them have insufficient calcium intake [11]. In line with Davies's research, there is a negative relationship between calcium intake and body weight in all age groups. The calcium which is the micro nutrient plays an important role in regulating cell functions such as cell transmission, muscle contraction, and maintaining cell membrane permeability. Furthermore, calcium also regulates the work

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of hormones and growth factor and plays a role in the formation of bones and teeth. Therefore, lack of calcium intake can cause interference from the cellular level. If there is a lack of calcium intake in its infancy, it can cause growth disorder [12]

There is no relationship of iron intake and nutritional status with the value p = 0,502> 0,05 with correlation coefficient 0,116. Iron (Fe) is not directly related to nutritional status. 65,3% of adolescent respondent have normal nutritional status and 89,8% with less Iron (Fe) intake. The effect of iron deficiency will be seen over a long period of time on nutritional status anthropometrically. It is different with energy and protein intake [13].

There is a correlation between fiber intake with the nutritional status with the value p = 0,004< 0,05 with the correlation coefficient 0,497, it means that there is strong relationship between fiber intake with the nutritional status of orphan children of LKSA Widhya Asih Badung. In line with Dewi's research (2009), shows that there is a significant relationship between fiber consumption with nutritional status with *p-value* 0,000 (p < 0,05) [14]. In other research shows there is a relationship between fiber intake with nutritional status of adolescent with the value p = 0,01 and r = 0,340 [15]. Fiber is included in complex carbohydrates called non-starch polysaccharides. Vegetables intake which is included in complex carbohydrates which is often consumed by foster children can produce adequate fiber intake for the body [16].

CONCLUSION

Calcium and iron intake in micro nutrient of orphanage of LKSA Widhya Asih Badung categorized as insufficient namely < 70 % and sufficient fiber intake > 70%. There is a relationship between calcium and fiber intake with the nutritional status of orphanage of LKSA Widhya Asih Badung. Suggestion: high protein and iron menu modification is needed on menu program of LKSA Widhya Asih, also laboratory test for biochemical value of ferritin and calcium levels for the prevention of anemia and other growth disorders.

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