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Basal Calorie Requirement (KKB), Belly Fat and Cell Age on Body Mass Index (BMI) in Early Detection of Adolescent Stunting

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Abstract

Adolescent nutritional status can be calculated based on Body Mass Index (BMI). data Riskesdas 2018shows that 25.7% of adolescents aged 13-15 years and 26.9% of adolescents aged 16-18 years with short and very short nutritional status. In addition, there are 8.7% of adolescents aged 13-15 years and 8.1% of adolescents aged 16-18 years with thin and very thin conditions. Poor food consumption in adolescents can cause an imbalance between energy intake and output which can lead to stunting. This study aims to determine the description of Body Mass Index (BMI) and its relationship to Basal Calorie Needs (KKB), Belly Fat and Cell Age in the adolescent group using the Bioimpedency Analysis (BIA) tool. This research design uses a quantitative descriptive approach. The quantitative approach will use a cross-sectional design which will measure BMI, KKB, abdominal fat and cell age at the same time. The sample of this research is the early teens of RT 02 RW 01 Kudaile Village with a total of 44 respondents. Data analysis was carried out using SPSS while the tests carried out were *Chi Square and T Test* so that they could determine the relationship between BMI and KKB, BMI with abdominal fat and BMI with cell age. The results of the study based on Body Mass Index (BMI) were 59.09% in the normal category while 22.73% were overweight and 18.18% were underweight, the average KKB of the respondents was 1197.64 kcal and 70.45% had normal belly fat. and 29.55% had abnormal abdominal fat, 79.55% had younger cell ages and 20.45% had cells older than their chronological age. Underweight adolescents with cell age older than their chronological age can be detected to implement changes in behavior and healthy lifestyles.

Keywords : BMI, KKB, Belly Fat, Cell Age

1. Introduction

Nutritional problems are related to a person's health problems. Imbalance of intake with body needs can result in less or more nutrition. Technological developments in the fields of technology and education make it easier for humans in general to bring changes, especially the behavior of consuming instant food to save time in everyday life. A person is definitely more likely to like a fast activity than a long one.[1]

The phase of rapid growth and development is owned by adolescents where this period also requires large amounts of nutrition to balance daily calorie needs. Consumption of food that is not appropriate with low calories makes the body become unbalanced, resulting in a lack of nutrition for adolescents so that growth and development becomes stunted (*stunting*).[2]

Nutritional status in adolescents is calculated by Body Mass Index (BMI). Riskesdas 2018 data shows that 25.7% of adolescents aged 13-15 years old and 16-18 years old are 26.9% with short or very short nutrition. Other data contained 8.7% of adolescents with very thin conditions.[3] Siswianti's 2012 research on the relationship between body weight, body fat, nutritional status, maternal age at menarche and age at menarche in students at SDN Cikaret 01 Cibinong Bogor found a relationship between percent body fat, nutritional status and age of menarche.[4] Meanwhile, according to Auliyah's research in 2012 the Relationship between BMI, Body Fat, Physical Activity, Other Factors with Central Obesity The results showed that there was a relationship between BMI, body fat and physical activity with central obesity.[5] According to Ramadhani 2013, cell age affects BMI because with increasing age, humans rarely exercise. When a person rarely exercise, the weight tends to increase and affect BMI.[6]

Nafilah's 2014 research amounted to 23.8% of adolescents in the overweight category, 5.9% obese and 5.9 underweight. The percentage of body fat is 8.9% underfat, 12.9% overfat and 12.9% obese.[7] Based on a preliminary study conducted in RT 02 Kudaile that conducted in RT 04 Kudaile Village, 3 out of 8 teenagers were classified as underweight based on BMI < 18.5.

2. Methods

The research design uses a quantitative descriptive approach, using adesign *cross-sectional* where measurements of Body Mass Index (BMI),will be carried out *Basal Calorie Needs (KKB),*abdominal fat and cell ageat the same time. The sample of this research is early teens (aged 11-16 years) RT 02 RW 01 Kudaile Village with a total of 44 respondents. Data analysis was carried out using SPSS while the tests carried out were *Chi Square and T Test* so that they could determine the relationship between BMI and KKB, BMI with abdominal fat and BMI with cell age.

3. Results and Discussion

a. Results

Table 1.1
Distribution of Respondents Based on Body Mass Index (BMI)

IMT	the number of	percentage
≤ 18.4	8	18.8
18.5-25	26	59.09
≥ 25.1	10	22.73
Total	44	100

Based on table 1.1 states that the distribution of respondents based on the largest BMI is 26 respondents (59.09%) with normal BMI (18.5-25), 10 respondents (22.73%) *Obesity* and 8 respondents (18.18%) thin.

Table 1.2
Distribution of Respondents Based on Basal Calorie Needs (KKB)

variables	Mean	SD	Minimal-maximum	95% CI
KKB	1374	242,144	1078-2047	1316.16-1455.18

Based on table 1.2 states that the average KKB of the respondents is 1374 Kcal (95% CI 1316.16-1455.18) with a Standard Deviation of 242.144.

Table 1.3
Distribution of Respondents Based on Belly Fat

Lemak Viceral	the number of	Persentase
≤ 3	31	70.45
> 3	13	29.55
Total	44	100

Based on table 1.3 states that the distribution of respondents based on the percentage of belly fat is 31 respondents (70.45%) have a percentage of belly fat less than equal to 3, while 13 respondents (29.55%) have a percentage of belly fat more th

Table 1.4
Distribution of Respondents by Cell Age

Usia Sel	the number of	Persentase
≤ age	35	79.55
> age	9	20.45
Total	44	100

Table 1.4 states that the distribution of respondents based on cell age is 33 respondents (78.6%) who have cell age younger than or equal to chronological age, while 9 respondents (21.4%) have cell age older than their chronological age.

Table 1.8
Distribution of Respondents Based on BMI and KKB

IMT	Mean	SD	SE	P Value	N
Normal	1339.42	183.376	37.926	0.216	26
abnormal	1431.29	270.462	70.110		16

Based on table 1.8, it states that the average BMR with a normal BMI is 1349.42 with a standard deviation of 193.386, while the average BMR with an abnormal BMI is 1441.19 with a standard deviation of 280,442. With a p value of 0.216 at 5% alpha, it means that there is no significant difference in the average BMR between respondents with normal and abnormal BMI.

Table 1.9
Distribution of Respondents Based on BMI and Belly Fat

belly fat	IMT				Total		P Value
	Normal		abnormal				
	n	%	N	%	n	%	
≤ 3 (normal)	23	74.2	8	25.8	31	100	0.126
> 3 (abnormal)	5	38.5	8	61.5	13	100	
total	28	63.6	16	36,4	44	100	

Based on table 1.9 states that the distribution of respondents based on belly fat with BMI obtained that there are as many as 23 (74.2%) respondents with belly fat less than 3 have normal BMI while 5 (38.5%) respondents have belly fat more than 3 have BMI normal. At P value 0.126, it can be concluded that there is no difference between normal and abnormal BMI for abdominal fat.

Tabel 2.0
Distribution of Respondents Based on BMI and Cell Age

Usia Sel	IMT				Total		OR 95% CI	P value
	Normal		Tidak					
	n	%	N	%	n	%		
≤ usia kronologis	28	80	7	20	35	100	1.435	0.00
> usia kronologis	3	33.3	6	66,7	9	100		
Jumlah	31	70.5	13	29.5	44	100		

Based on table 2.0 states that the distribution of respondents based on cell age with BMI obtained that there are as many as 28 (80%) respondents with cell age younger or equal to their chronological age have normal BMI and 3 (33.3%) respondents have cell age is older than chronological age with normal BMI. At P value 0.00, it can be concluded that there is a difference between normal BMI and abnormal BMI with respect to the age of the respondent's cells.

b. Discussion

Body Mass Index (BMI)

BMI is a measure of nutritional status from the ratio of weight and height. As for how to calculate it by dividing weight (in kilograms) by height (in meters squared). The BMI of respondents is categorized according to the Indonesian Ministry of Health, namely thin (<18.4), Normal (18.5 – 25), and obese (>25).

Based on table 1.1, it is stated that the distribution of respondents based on the largest BMI is 26 respondents (59.09%) with normal BMI (18.5-25), 10 respondents (22.73%) *obese* and 8 respondents (18.18%) thin. This is in line with the results of the study Suryana (2017) regarding the Relationship of Physical Activity with BMI and Body Composition that 64.6% of respondents have a normal BMI, *underweight and* 13.8%13.8% obesity. [8]

Relationship between BMI and Basal Calorie Needs (KKB)

KKB is the minimum energy requirement to carry out vital body processes. Factors that can affect KKB are gender, age, body size, body composition, health level, body temperature, activity, nutritional status, smoking habits, and pregnancy and breastfeeding. Based on the results of the study, it was stated that the average KKB of the respondents was 1374 Kcal (95% CI 1316.16-1455.18) KKB with a normal BMI was 1339.4 with a standard deviation of 183,376 while KKB with an abnormal BMI was 1431.29 with a standard deviation of 270,462. With a p value of 0.216 at 5% alpha, it means that there is no significant difference in the average KKB between respondents with normal and abnormal BMI.

The theory states that KKB is influenced by gender, age, body size, health level, body temperature, activity, hormone secretion, nutritional status, smoking, and pregnancy and breastfeeding. So by knowing BMI and KKB a person can control their weight. KKB can also be used to determine the calories needed/day. [9]

Relationship between BMI and Abdominal Fat Composition

The human body has a composition of fat and non-fat.[10] Fat is widely distributed more than 50% in the subcutaneous tissue, the other in the abdominal cavity by 45% which is called abdominal fat and 5% in the intramuscular tissue.[11] The belly fat is fat in the abdominal area.[12]

The results showed that there were 23 (74.2%) respondents with belly fat less than 3 having normal BMI, while 5 (38.5%) respondents with belly fat more than 3 having normal BMI. At

P value 0.126, it can be concluded that there is no difference between normal and abnormal BMI for abdominal fat.

According to the theory, belly fat affects body weight. BMI is an indicator of nutritional status from the calculation of height and weight, so belly fat as a component of the body that can affect BMI. The results of this study indicate that there is no relationship between BMI and abdominal fat values and the cause is due to the limitations of the study sample.

Relationship between BMI and Cell Age Cell

age is the age of body cells that describes how old a person looks. Cell age can be different from its chronological age (age date of birth). The causes include stress, chemicals, lack of rest, unhealthy living.

The results showed that the distribution of respondents based on cell age with BMI obtained that 28 (80%) respondents with cell age younger or equal to their chronological age had normal BMI and 3 (33.3%) respondents had cell age older than chronological age with normal BMI. P value 0.00 there is a difference between normal BMI and abnormal BMI with respect to the respondent's cell age.

This is in line with the research of Djuartina, Tena et al about the factors that cause differences in biological age and chronological age in the elderly, there is a strong relationship between biological age and BMI (p = 0.012). [13]

In this study, it was found that 79.5% of respondents had a cell age younger than or equal to their chronological age. This can be because this research was conducted on adolescents aged 11-16 years at a very young age. Only adolescents with abnormal belly fat had a cell age older than their chronological age.

4. Conclusion

There was no significant difference between BMI, KKB, and belly fat, but there was a significant difference between BMI and cell age in the adolescent group.

Recommendations based on the results of the study found that BMI, KKB and abdominal fat in adolescents who are *overweight* and obese or have cell age older than their chronological age can be used as behavior modification and healthy lifestyles as a screening for adolescents who are *overweight,* obese and older cell age. older than the chronolog.

5. Acknowledgments

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