

ORIGINAL ARTICLE

**The Relationship between Body Mass Index and Urinary Creatinine
in Adolescent Girls**

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Abstract: Adolscent girls phase (12-21 years) is a very important individual development segment, beginning with the maturation of physical and reproductive organs that characterize women of childbearing age. Body mass index (BMI) is one of indicator used to see women of childbearing age status related to pregnancy. Kidney damage causes an increase in urinary creatinine but high urinary creatinine does not necessarily indicate kidney damage. Our objective is to determine the relationship between BMI and urine creatinine in adolscent girls in several Medan health schools. We performed an observasional study with cross sectional design of 56 participants 19-21 old girls. 24 hours urine creatinine concentration was measured using jaffe reaction method. The highest average BMI value (21.10 kg/m² is the normal category (75%), mean urine creatinine concentration (1263,86 mg/24 hour) is also normal category. Data analysis with spearman correlation between BMI and 24-hour urine creatinine level was not statistically different (p = 0.140). High BMI values tend to have high 24-hour urine creatinine levels too, but statistically there was no significant relationship between 24-hour urine creatinine levels and BMI values in this study.

Keywords: Urinary creatinine, BMI, Late adolescence

INTRODUCTION

Urinary creatinine concentration are between 1.1 - 1.64% per day. Normally, urine creatinine excretion varies every day, the cause is largely unknown (Heymsfield et.al, 2009). Previous results have found that creatinine and albumin are biomarkers of acute and chronic kidney disease with more accurate examination of 24-hour urine measurements.²⁵

Adolscnt girls belongs to women of childbearing age. Nutritional status of woman can be used to see their health. The nutritional status can be assessed from the body mass index (BMI) value. Increased BMI has been shown to increase the risk of developing chronic kidney disease. Another study stated that body mass index had a significant correlation with glomerular filtration rate in obese students at Sam Ratulangi University medical school.⁴

This study aims to determine the relationship of body mass index with adolscnt girls urine creatinine in several health schools in the city of Medan, North Sumatera.

METHODS

This study was used a cross sectional design in a group of adolescent girls aged 18-21 years with a consecutive sampling method.

This research was conducted from January to July 2018 in 3 (three) health colleges registered at Kemenristek Dikti (STIKES Binalita TA Sudama, STIKES Widya Husada, and STIKES Audi Husada).

There are 56 people selected subjects who met the criteria and they were given an explanation about this study, measured their height and weight, and were required to put their urine for 24 hours into a labeled container. A 24-hour urine sample of all study subjects was taken to the integrated laboratory of Poltekkes

Kemenkes Medan and creatinine levels were measured. The 24-hour urine creatinine examination was analyzed by photometer 5010+ with the principle of reaction.

This research has passed the ethical review from the health commission ethics institute of the Poltekkes Kemenkes Medan.

RESULTS

Frequency distribution of subjects based on the characteristics of age, religion, institution, and BMI in table 1.

Table 1. Distribution of Research Subjects Based on Subject Characteristics.

Characteristics	N	%
Age (years)		
19	1	1,8
20	28	50
21	27	48,2
Religion		
Islam	46	82,1
Kristen	10	17,9
Institution		
STIKES Binalita		
Sudama	15	26,8
STIKES Widya		
Husada	18	32,1
STIKES Audi		
Husada	23	41,1
BMI		
Underweight	3	5,4
Normal	42	75
Overweight	5	8,9
Obese	6	10,7

Based on the most frequency distribution, age 20 years (50%), Islamic religion (82.1%), STIKES Audi husada (41.1%), and normal BMI (75%).

The results of mean creatinine levels for the underweight group was 647,97; normoweight was 1971,74; overweight was 3502,96; and obese 2120,96.

Table.2. Distribution of 24-hour Urine Creatinine Levels

BMI	Mean of Urine Creatinine	SD	n	p
Underweight	647,97	461,47	3	0,00
Normal	1971,74	1601,70	42	
Overweight	3502,96	978,98	4	
Obese	2120,96	1005,08	7	

Table.3. Analysis of Spearman about Correlation Between BMI and Urinary Creatinine

Variable		BMI	Urinary Creatinine
BMI	Correlation Coefficient	1	0,241
	Sig.(2 tailed)		0,073
	N	56	56
Urinary creatinine	Correlation Coefficient	0,241	1
	Sig.(2 tailed)	0,073	
	N	56	56

There is no significant relationship between urine creatinine level and BMI ($p > 0.05$), with a correlation coefficient of 0.241.

DISCUSSION

Statistical analysis performed by the Kruskal wallis test showed significant results with a value of $p < 0.05$. The differences in urine creatinine levels in each subjects were strongly influenced by 24-hour urine volume. The 24-hour urine volume is influenced by the amount of fluid intake for 24 hours, the amount of muscle mass and the type of activity in 24 hours.

Research on Stener-Asidu et.al. in 101 male and female athletes at the University of Ghana stated physical exercise changed the amount of muscle mass in which the research subjects most BMI values were normal.¹ In addition, the 24-hour urine volume that were different from each subjects was also greatly affected the 24-hour urine creatinine

levels. This 24-hour urine volume is different from each subjects due to the differences in type and duration of physical activity. The results showed that there was no significant relationship between BMI and urine creatinine levels. This outcome may be due to differences in the number of frequency distributions of subjects based on the BMI category, where groups with normal BMI were more numerous than others, so statistically results were not different. The results showed that large and fluid intake for 24 hours. This is in accordance with Baxmann et.al's research, 2008 which stated that the mean values of serum and urine creatinine differed significantly between groups with moderate/intense physical activity and mild activity groups.⁵ BMI values tended to have a large 24-hour urine creatinine level.

CONCLUSION

Large BMI values tend to have a large 24-hour urine creatinine level, but statistically do not have a significant relationship.

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