



## Prevalence of Overweight and Obesity among Students of University in Pristina/Kosovska Mitrovica, According to Different Anthropometric Indices

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(Received 10 Aug 2019; accepted 24 Aug 2019)

### Dear Editor-in-Chief

Obesity is a chronic metabolic disorder that manifests by excessive fat accumulation in the body and weight gain (1). The fat distribution in the body determines whether there is a health risk due to obesity (2). Measurement of fat accumulation in the abdominal area is considered as an imperative for detection of health risk due to obesity (2). The waist circumference (WC) and the waist-to-height ratio (WHtR) have proven to be better predictors of obesity-related disease risk compared to the Body Mass Index (BMI) (3). The dramatic trend of obesity is recorded worldwide (1). About 60% to 85% of obese during adolescence remained obese in adulthood (4). College time can contribute to the development of obesity among young (5). In Belgrade University students in Serbia, the prevalence of overweight and obesity was 13% (6). So far, there were no studies on the assessment of the obesity among Serbian students in northern Kosovo. Therefore, this study aimed to determine the prevalence of overweight and obesity related to health risks among students of the University of Pristina/Kosovska Mitrovica according to different anthropometric indices.

This cross-sectional study included students of the first and third year of the University of Pristina/Kosovska Mitrovica who came to Student Health Center for regular health check-ups during 2016-2018.

All students provided written consent for participation in the study. Measurement of body height and body mass was performed for all students. Using the standard Quetelet formula, the BMI was calculated: Body mass in kg/(body height in m<sup>2</sup>). Bio-electrical Impedance Analysis was used for assessing body *fat* percentage (BF%). Measurement of WC (cm) was done using an inextensible anthropometric tape placed in the middle between the upper border of the hip and the lowest border of the rib. The WHtR was calculated by dividing the WC with body height. For the purpose, cut-off points of anthropometric indices above were used; there is a risk for health (BMI  $\geq 25$ ; BF%  $\geq 25$  for male and  $\geq 32$  for female; WC  $> 94.1$  cm for male and  $> 80.1$  cm for female; WHtR  $\geq 0.51$ ). The aim was to create two groups of students: overweight/obesity group with increased obesity-related disease risk and normal weight/underweight group without obesity-



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related disease risk. Chi-square test was used to estimate differences in overweight/obesity prevalence. Correlation between BMI and other anthropometric indices was tested by the Pearson's correlation coefficient. Receiver Operating Characteristics (ROC) analysis was used to test the relation between WC, WHtR and general obesity defined by BMI cut-off point  $\geq 25$ .

The study included 3072 students (42.3% male and 57.7% of female), aged 19 to 23 years. The overweight/obesity prevalence obtained according to BMI (21.3%) and BF% (22.7%) were higher compared to the prevalence obtained according to WC (11.7%) and WHtR (9.7%). The high-

est overweight/obesity prevalence among female students (28.1%) was measured according to BF%, and the lowest (5.7%) according to WHtR. Among male students, the highest overweight/obesity prevalence (31.4%) was obtained according to BMI and the lowest (12.2%) according to WC. There was no significant difference between the prevalences of the general type of overweight/obesity, measured by BMI and BF% (Table 1). After stratification by gender, a significant difference in the overweight/obesity prevalence's was observed between the indices for general obesity as well as abdominal obesity.

**Table 1:** Difference in prevalences of the different types of overweight/obesity according to different anthropometric indices, by gender

Gender	Obesity type	Anthropometric index	Prevalence (%)	P-value
Total	General obesity	BMI	21.3	0.186
		BF%	22.7	
	Abdominal obesity	WC	11.7	0.011
		WHtR	9.7	
Male	General obesity	BMI	31.4	0.001
		BF%	15.5	
	Abdominal obesity	WC	12.2	0.034
		WHtR	15.1	
Female	General obesity	BMI	13.9	0.001
		BF%	28.1	
	Abdominal obesity	WC	11.4	0.001
		WHtR	5.7	

The significant correlation was found between BMI and other anthropometric indices (BF%  $r=0.441$ ,  $P=0.001$ ; WC  $r=0.811$ ,  $P=0.001$ ; and WHtR  $r=0.866$ ,  $P=0.001$ ). The results of the ROC analysis showed significant higher specificity and positive predictive value, and lower sensi-

tivity and negative predictive value of WHtR compared to WC only among female students. Generally, the WHtR was verified as a more suitable index for the obtained overweight/obesity prevalence according to BMI in our sample (Table 2).

**Table 2:** The validity of WC and WHtR in the diagnosis of abdominal overweight/obesity, by gender

Gender	Anthropometric index	Senzit.	Specif.	+PV	-PV	P-value
Male	WC	37.50	99.44	96.8	77.7	0.529
	WHtR	44.85	98.54	93.4	79.6	
Female	WC	65.59	97.31	79.8	94.6	0.024
	WHtR	38.46	99.61	94.1	90.9	

The results of our study pointed out the high prevalence of overweight/obesity related to health risks among students of our University. In addition, BMI limitations in estimating obesity-related disease risk could be overcome by using WHtR. The establishment of a Counseling Center for Nutrition and Dietetics within the Student Center in order to prevent and treat obesity and obesity-related diseases is imposed as an imperative.

### Conflict of interest

The authors declare that they have no conflict of interest.

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