



SCREENING OF OBESITY AS A MAJOR RISK FACTOR FOR THE DEVELOPMENT OF METABOLIC SYNDROME AMONG SOFIA UNIVERSITY “ST. KLIMENT OHRIDSKI” STUDENTS

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ABSTRACT

Obesity is a chronic disease that can seriously damage health, worsen quality of life and reduce its duration. In recent decades, globally there has been a large increase in the incidence of overweight and obesity in all age groups. Therefore, the PURPOSE of this study was to screen the overweight and obesity among students of Sofia University “Kliment Ohridski”. METHODS: To assess the severity and extent of obesity and/or overweight, we used the Body Mass Index (BMI) as a generally accepted indicator. The RESULTS show a high incidence of overweight and obesity among university students. CONCLUSIONS: The study’s data confirm the trend for the ever-increasing number of young people who are overweight and/or obese. To raise a healthy and capable generation, the author recommends a targeted State policy that would lead young people to a healthy lifestyle that includes regular physical activity, a healthy eating pattern, enough sleep, low stress levels.

Key words: obesity, Body Mass Index, physical activity, sport classes, university students

INTRODUCTION

In 2000, the World Health Organization (WHO), in its report "Obesity: Prevention and Management of the Global Epidemic, described obesity as a "chronic disease" (1). In recent decades, numerous epidemiological studies have shown a large increase in the incidence of overweight and obesity worldwide, in the different age groups. Despite the relevant organizations' attempts and recommendations for reducing the prevalence of obesity and accompanying diseases, it remains a global medical and social problem. The World Health Organization (WHO) defines obesity as one of the most significant problems of global health, the incidence of which is increasing steadily – more than three times in the last 30 years. More than 1.5 billion are overweight people worldwide, of whom more than 400 million are obese (1). We are witnessing the first ever outbreak without the

presence of an infectious causative agent. One in three residents of the European Union is obese, and the forecast is that by 2030 every second European will have this disease (1).

The latest figures from the World Health Organization (WHO) show that 61.7% of Bulgarians are overweight or obese. This category includes all people aged 18 and older with a Body Mass Index (BMI) equal to or greater than 25. The proportion of people in Europe who are obese is 58.67% and 59.35% in the European Union, the WHO figures show (2). Our country is also ahead of trends in obesity. About 13% are people in the world with this health problem, in Europe – 23.3%, and in our country the share is 25% of the population 18 years and older. The situation is similar in Bulgarian children, where according to data of the World Obesity Federation (SFA), the share is 13.6%, with boys with obesity between 5 and 9 years reaching 17.1% and girls up to 10.2% (3).

According to the 2014 Annual Report on Youth in Bulgaria, overweight were 22.9%,

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including 19.4% of the population aged 15-29 with pre-obesity and 3.4% obese Class I (4).

Obesity develops as a result of the interaction of various factors – hereditary predisposition, improper nutrition of the mother during the intrauterine development of the fetus and then the child, harmful eating habits, sedentary lifestyle, stress.

In her study, D. Despotova (2020) reported a high incidence of overweight and obesity in University “St. Kliment Ohridski” students (23.33%), and a total of 74.45% of the surveyed, had physical activity below the WHO recommended frequency for persons, aged 18 to 64. She established that 82.35% of overweight and 75% of obese students had low physical activity, indicating that reduced physical activity was one of the main factors for them being overweight and obese (5).

According to Marekov, M. et. al. (2000) in over 95% of cases obesity is exogenous. This type obesity is due to high-energy intakes and sedentary lifestyle, combined with insufficient physical activity. It is the basis of the increasing incidence of arterial hypertension and type 2 diabetes mellitus in childhood and adolescent age (6).

WHO (1999), defined Metabolic Syndrome as glucose intolerance, impaired glucose tolerance (IGT) or diabetes mellitus (DM), and/or insulin resistance, together with two or more of the components listed below:

1. Raised arterial pressure, i.e., $\geq 140/90$ mm of Hg
2. Raised plasma triglyceride (≥ 150 mg/dl) and/or low HDL-C (< 35 mg/dl in men and < 39 mg/dl in women)
3. Central obesity, i.e., waist/hip ratio (WHR) > 0.9 in men and > 0.85 in women and/or Body Mass Index (BMI) > 30 kg/m²
4. Microalbuminuria, i.e., urinary albumin excretion rate ≥ 20 μ gm/minute or albumin/creatinine ratio ≥ 30 μ gm/mg (7).

The incidence of metabolic syndrome increases in parallel with the frequency of type 2 diabetes mellitus. This fact is associated with an increase in the incidence of obese people due to hypodynamia, intake of high-energy foods and increased stress. Obesity is not always combined with metabolic syndrome or type 2 diabetes mellitus. There are also

"healthy" individuals with high BMI, in which no metabolic changes are detected (8).

Obesity is of great importance to public health due to its relationship with a number of medical complications that lead to increased morbidity and mortality. Numerous studies have shown that with an increase in BMI, blood pressure rises progressively in both men and women. Arterial hypertension increases the risk of cardiovascular disease, myocardial infarction and stroke (9-11).

Quality of life deteriorates in overweight and obese people (12, 13). Obesity and its accompanying complications cause significant social, economic and psychological damage to individuals, families and society in general. Obesity affects the economic and social development of countries and accounts for 6% of health spending in the European region. According to the WHO, due to high morbidity, disease and mortality, 2.8 million people around the world are dying, as a result of obesity.

A number of studies have shown that the most effective treatment for overweight and obesity are programs involving diet treatment, increased physical activity, behavioral therapy, medication treatment, surgical methods and a multidisciplinary team. Building a healthy and resilient organism is a result of leading a healthy lifestyle, including regular physical activity, a healthy eating pattern, sufficient sleep and low stress levels. Prevention of obesity should begin as early as infancy, with an important role played by family, medical professionals and educators in building and strengthening healthy lifestyle habits. Strategies for the prevention of overweight and obesity should focus on environmental factors – a healthy model of nutrition and regular physical activity (14-16).

Screening for overweight and obesity should start at childhood, and when established, the cases need to be included in intensive behavioral change programs in order to normalize body weight. Screening of overweight and obese people is of particular importance in order to reduce mortality from cardiovascular and cerebrovascular complications and prolong their lives. I. Petkov (2007) notes the importance of primary and secondary prophylaxis in obese people. The

goal of the primary is to prevent obesity, and of the secondary is to prevent relapses and emerging complications (17).

The immobilization of humanity globally puts on the agenda the need to educate people about the health benefits, from regular physical exercise classes (18).

Hypodynamia, one of the main problems of modern society, is a major risk factor for many chronic diseases, in particular obesity. In this regard, sports activities should occupy an important place as a component of the education system. Physical education and sports provide harmonious physical development, help strengthen the body's natural defenses, prevent a number of diseases. Regular physical activity is a means of prevention and treatment of obesity, improves health and quality of life, and reduces the risk of ischemic heart disease, stroke, arterial hypertension, type 2 diabetes, osteoarthritis, spinal distortions, and depression. Sport and physical activity contribute to physical, mental and social health. According to B. Tumanova (2019): "Swimming is a sport that has been proven with its positive effect on a person's health and psyche in all age groups and with different disabilities" (19).

The subject "Sport" in the system for higher education in Bulgaria is the only one that have a direct relationship to strengthening health, improving the professional and general working capacity and compensating for the negative consequences of increased mental load of students (20).

University "St. Kliment Ohridski" of Sofia is the oldest and biggest in Bulgaria, and in its 16 faculties each academic year educates thousands of young people from all over the country. As professors in PE and Sport in this institution, we consider it very important the annual monitoring of overweight and obesity among students.

Regarding the above mentioned, the **aim** of the presented study was to screen overweight and obesity among Sofia university "St. Kliment Ohridski" students.

METHODS

WHO recommends for assessing obesity of people, aged 18 and over, to be used the BMI values set out in **Table 1**. Body Mass Index (BMI) is an indicator used to classify overweight and obesity.

$$BMI = \text{weight (kg)} / \text{height}^2 (\text{m}^2)$$

Table 1. Assessment of the Body Mass Index (BMI) and the risk of comorbidities (3)

classification	BMI (kg/m ²)	risk of comorbidities
underweight	< 18,5	low (but risk of other clinical problems increased) increased
normal weight	18.5 – 24.9	average
pre-obesity	25.0 – 29.9	increased
obesity class I	30.0 – 34.9	moderate
obesity class II	35.0 – 39.9	severe
obesity class III	≥ 40	very severe

We studied 269 young people, of which 141 female (52.42%) and 128 (47.58%) male university students, all in different programs and year of their Bachelor studies (**Figures 1, 2**). In order to calculate students' BMI, we measured their height (cm) and weight (kg). The study took place during 2020-2021 academic year.

RESULTS

Figures 1 and 2 show the gender and age distribution of the study's participants. As seen, men and women were almost equal number – 48% and 52% respectively, and 85.9% of them were between 19 and 22 years of age.

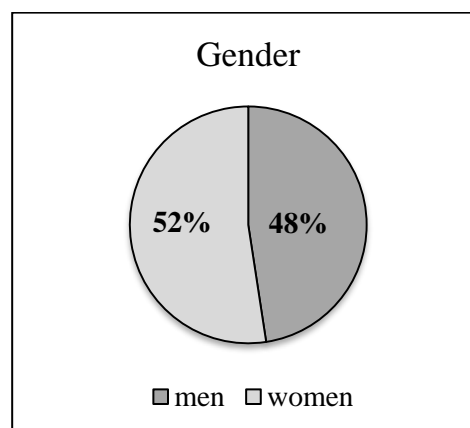


Figure 1. Distribution by gender

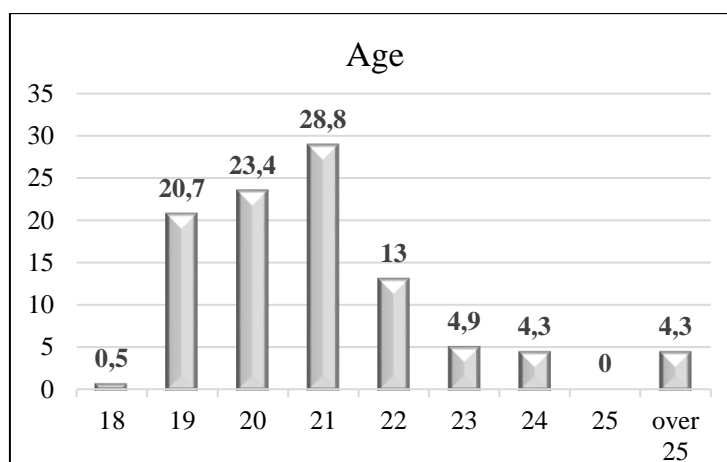


Figure 2. Distribution by age

Table 2 shows that 14.67% of the students surveyed, are overweight (pre-obese) and they belong to the category “people at increased risk of comorbidities”. Obese are 10.33%, of

which 4.35% class I and 5.98% class II, with moderate and severe risk of comorbidities. Overweight and obese are 25% of all participants (**Table 2**).

Table 2. Distribution as per estimated BMI - all participants (%)

Classification	Total %	risk of comorbidities
underweight	8.7	low (but risk of other clinical problems increased)
normal weight	66.3	average
pre-obesity	14.67	increased
obesity class I	4.35	moderate
obesity class II	5.98	severe
obesity class III	-	very severe
obesity total	10.33	
obesity and pre-obesity total	25	

Table 3. Distribution as per estimated BMI - by gender (%)

classification	%		risk of comorbidities
	men	women	
underweight	4.65	9.9	low (but risk of other clinical problems) increased
normal weight	65.12	66.67	average
pre-obesity	18.6	13.48	increased
obesity class I	4.65	4.27	moderate
obesity class II	6.98	5.68	severe
obesity class III			very severe
obesity total	11.63	9.95	
Obesity and pre-obesity total	30.23	23.43	

Table 3 shows the distribution of overweight and obese students by gender. Overweight (pre-obesity) are 18.6% of men, and obese are 11.63% of them, of which 4.65% class I, and 6.98% class II. Overweight and obese are 30.23% of male university students.

In women, the percentages are similar to those of men - 13.48% are overweight, and 9.95% are obese, of which 4.27% class I, and 5.68% class II. Overweight and obese are 23.43% of female university students (**Table 3**).

CONCLUSION

Our study reports a high incidence of overweight and obesity in Sofia University "St. Kliment Ohridski" students, in both women and men (25% in total). Regretfully, the trend from the studies cited above remains. To our opinion, the high frequency is due to the students' lifestyle – with an unhealthy model of nutrition and reduced physical activity, as well as their low health culture.

RECOMMENDATIONS

The obesity prevention should start in infancy with the important roles of family, medical professionals and teachers in building and strengthening habits of healthy lifestyle, healthy eating and physical activity. For this purpose, programmes, policies and good practices need to be set up as a State policy. School should promote and increase physical activity and sport classes per school year, and put any efforts for increasing the health culture of students. Higher education institutions should also promote physical activity and sports, by increasing the number of sport classes per academic year as well as disseminating information on the role of physical activity on health. This is the last stage of the educational process and the last chance for the sports pedagogues to cause, create and build at students a motivated interest, desire and readiness for an active lifestyle leading to the required degree of physical activity for maintaining good health for a life-time. This will lead to the necessary degree of physical activity in each individual, for maintaining good health, preventing a number of chronic diseases and reaching a high level of working capacity for life.

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REFERENCES:

1. WHO_TRS_894.pdf
2. <https://apps.who.int/iris/bitstream/handle/10665/332070/9789240005105-eng.pdf>
3. <https://data.worldobesity.org/country/bulgaria-31/report-card.pdf>
4. http://nism.bg/images/docs/2015/youth_report_2014-final.pdf
5. Despotova, G., Study on the Students' Subjective Assessment of their Physical Activity as a Means of Preventing Overweight and Obesity. In: Modern Trends of Physical Education and Sport, ISSN 1314-2275, University Publishing House "St. Kliment Ohridski", p. 180-187, Sofia 2020.
6. Marekov, M., et. al. Kinesitherapy in Internal and Nerve Diseases, Publishing House "Neofit Rilski", Blagoevgrad 2000.
7. WHO_NCD_NCS_99.2.pdf
8. Rakesh M. Parikh; Viswanathan Mohan. Changing definitions of metabolic syndrome. *Indian Journal of Endocrinology and Metabolism*. 2012: 16(1): 7–12. doi: 10.4103/2230-8210.91175; PMID: PMC3263200; PMID: 22276247
9. Guh, DP., et. al. The incidence of comorbidities related to obesity and overweight: a systematic review and meta-analysis. *BMC Public Health*, 2009: 9:88.
10. El-Atat, F., et. al. Obesity and hypertension. *Endocrinol Metab Clin North Am*. 2003: 32(4):823–854.
11. Gao, W., et al. The Interactive Association of General Obesity and Central Obesity with Prevalent Hypertension in Rural Lanzhou, 2016: 11(10): doi:10.1371/journal.pone.0164409, China.
12. Fontaine, KR., Barofsky, I., Obesity and health-related quality of life. *Obesity Reviews*. 2001: 2(3):173–182.
13. Kolotkin, RL., Andersen, J.R., A systematic review of reviews: exploring the relationship between obesity, weight loss and health-related quality of life. *Clin Obesity*. 2017: 7(5): 273–289.
14. Dashti, S., et. al. The preventive effect of physical activity on weight maintenance in overweight and obese women, *Clin Ter*, 2014: 165(3):155-161.

15. Hills, AP., Et. al. Physical activity and obesity in children. *Br J Sports Med*, 2011: 45(11):866-870.
16. Hwang, J., Kim, YH., Physical activity and its related motivational attributes in adolescents with different BMI. *Int J Behav Med*. 2013: 20(1):106-13.
17. Petkov, I., Theoretical basics and general methodology of kinesitherapy. Tip-top Press, ISBN-10: 954-89-64-88-0, Sofia 2007.
18. Ivanov, J., The educational component in the process of physical education in universities, Dissertation, Sofia 2006.
19. Tumanova, B., Organising swimming lessons for people with disabilities, *Trakia Journal of Sciences*, Vol.17, Suppl.1, doi: 10.15547/tjs.2019.s.01.112, ISSN TJS(print) 1313-7069, ISSN TJS(online) 1313-3551, pp:689-691, Stara Zagora 2019.
20. Rachev, K., et. al. Theory and Methodology of Physical Education, NSA Press, Sofia 1998.