



## STUDY AND COMPARATIVE ANALYSIS OF BODY WEIGHT INDICATOR DATA IN WOMEN STUDENTS

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### ABSTRACT

The aim of the study is to establish the indicators of body weight in female students from the Thracian University of Stara Zagora and to compare the results of similar studies in students from other Bulgarian universities. Methods: review and analysis of the main theoretical formulations and the available literature on research on anthropometric indicators and the body mass index (BMI) calculated on this basis, in 150 female students; implementation of anthropometric studies of students on morphological indicators; statistical processing of results; comparative analysis. The results show that the students participating in our study have an average height of 1.63 cm and an average body weight of 59.89 kg. With the body mass index, the values  $BMI = kg/m^2$  range between a minimum of  $15.95 kg/m^2$  and a maximum of  $41 kg/m^2$ . Conclusions: the comparative analysis of the various scientific studies reveals a significant difference in the established indicators of body weight and body mass index. The study of female students from the Thracian University in the city of Stara Zagora found that the relative share of those registered with normal body weight is almost preserved. In recent years, however, the relative share of overweight students has increased significantly.

Key words: students, BMI, obesity, anthropometric research, physical development

### INTRODUCTION

The global prevalence of overweight and obesity among students and the associated risks of disease in young people necessitate the search for ways to correct these negative trends. The research and analysis of the current indicators of the physical development of the students would help to make the necessary scientifically substantiated changes in the normative standards in the higher educational establishments. This would lead to the improvement and more effective functioning of the system of physical education in universities, as one of the ways to influence the above-mentioned negative processes of physical development in students. Research and publications in the presented issues

have a number of authors (2, 15, 7-14, 18, 19). In our country after 1998. women in the 19–29 age group have a “dual disease burden” pattern of nutritional status (4). By increasing the BMI, increases and the risk of chronic diseases such as cardiovascular diseases, diabetes and others. (1, 4, 17).

The aim of the study is to establish the indicators of body weight in female students from the Thracian University of Stara Zagora and to compare the results of similar studies in students from other Bulgarian universities.

### TASKS

- Review and analysis of the main theoretical statements and the available literature on research on anthropometric indicators (height and weight) and the body mass index (BMI) calculated on this basis, in female students aged 19-30 years.

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- Implementation of anthropometric studies of students on morphological indicators - height, weight.
- Statistical processing of results
- Comparative analysis.
- Graphic analysis

The contingent of the study are 150 female students with an average age of 20.18 years from the first and second year of the Faculty of Economics, Faculty of Agriculture and Faculty of Veterinary Medicine of the Thracian University of Stara Zagora. The testing was conducted in the 2018/2019 school year.

## RESULTS

	N	Mean	Minimum	Maximum	Range	Std. Deviation
Body weight	130	59,895	42,0	106,3	64,3	11,83
Height (m)	130	1,6288	1,46	1,83	0,37	0,062
BMI	130	22,56	15,95	41	25,05	4,21

**Figure 1.** Main morphological features in female students - height and weight at the Thracian University

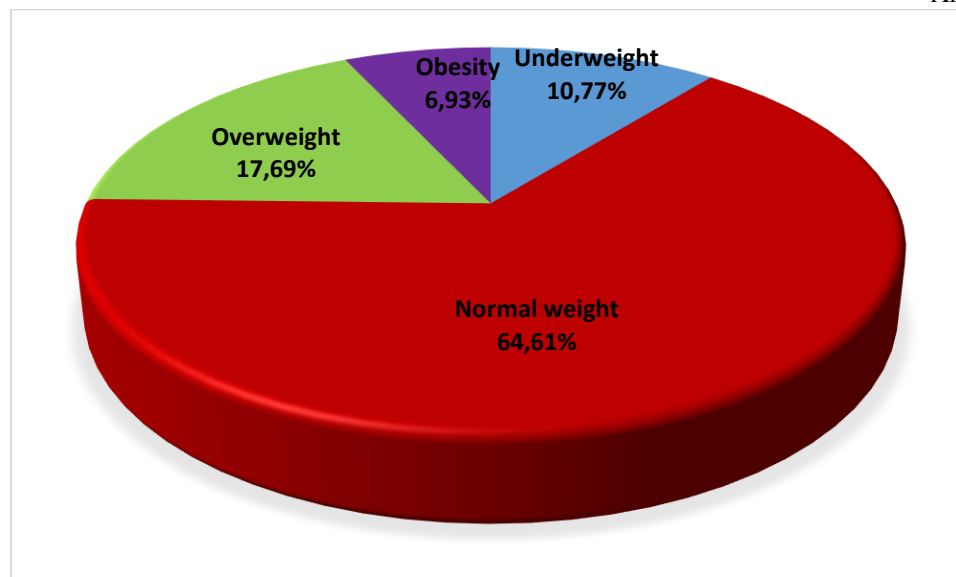
The analysis shows that the students participating in our study had an average height of 1.63 cm and an average body weight of 59.89 kg (Figure 1). In order to supplement the information about the physical development of the observed students, in addition to these important indicators, the so-called body mass index. The results show that the assessment of this index ranges between a minimum of 15.95 kg / m<sup>2</sup> and a maximum of 41 kg / m<sup>2</sup>. The reported average values of 22.56 kg / m<sup>2</sup> are within the normal body weight (**Figure 1**). According to the established norms, the registered minimum values of the body mass index in the studied students show a degree of severe malnutrition to moderate malnutrition. The observed maximum values of the body mass index give alarming information about the degree of obesity, reaching the second and third degree.

## METHODS

A standard method of anthropometry was used to register the basic data on indicators "height" and "weight" of the subjects (Slanchev, P., 1992 (18)). For a more complete picture of the degree of nutrition of the study population, a body mass index (BodyMass Index - BMI) was calculated. The calculation of the body mass index (BMI) is based on the ratio of height (cm) and weight (kg), and is recommended as a method by the World Health Organization (19) The mathematical-statistical data processing is done with the software product IBM SPSS Statistics Subscription and includes variation, comparative and graphical analyzes.

**Table 1.** Body Mass Index according to the World Health Organization, 1995

Condition	Body mass index
Severe malnutrition	< 16,0
Average malnutrition	16 — 16,99
Mild malnutrition	17 — 18,49
Underweight	< 18,5
Normal weight	18,5 — 24,99
Overweight	≥ 25,0
Pre-obesity	25 — 29,99
Obesity	≥ 30,0
Obesity I degree	30 — 34,99
Obesity II degree	35 — 39,99
Obesity III degree	≥ 40,0



**Figure 2.** Relative shares of the degree of nutrition of students (women) at the Thracian University

The detailed analysis of the results shows that 64.61% of the examined persons are of normal weight (**Figure 2**) and this is the largest relative share. Registered overweight students account for 17, 69%, and 6.93% are even now obese.

It can also be seen that 10.77% of the students in the study group are underweight. Their future professional realization also depends on these important characteristics of physical development and attention should be paid to this very worrying fact.

## DISCUSSION

The average value of BMI among female students in our study is 22.56, which is close to the results of the Medical University of Pleven for 2012 - 21.8., Registered in 2013 for the Medical University of Pleven. (4)

The relative share of overweight among female students aged 19–29 years (17.69%) of the survey is close to the National Survey of 18.1% in 2004 (women 19–29 years) and significantly higher than published data for (10.9%) in the study of V. Birdanova et al. (4).

The results of the survey found a lower relative share (10.77%) of underweight students than those found in women (17.3%) in the national survey (NP) of nutrition and nutritional status of the Bulgarian population, conducted in 2004, for

the group 18 –29 years. The relative share of underweight women in our study is lower compared to results (17.3%) published in 2013 for the Medical University of Pleven. (4)

Mavrudiev, P (16) in 2018 conducted a study of female students from the National Sports Academy, which shows that future physical education teachers have an average height of 165.28 cm and a weight of 57.66 kg. The body mass index (21.07 kg/m<sup>2</sup>) calculated on this basis allows the average level of nutrition of the examined persons to be referred to the zone of normal body weight. The detailed analysis of the research of the mentioned author confirms this finding for 77% of the studied students. For comparison, in our study the relative share of people with normal body weight was significantly lower 64.61%. Mavrudiev, P. (16) registered that 7% of future physical education teachers are overweight, and the relative share of those underweight is 16%. The described results in relation to the results of our study clearly show that the subjects at the Thracian University tend to increase body weight (**Figure 2**).

The study of G. Dyakova (6) at the Thracian University in 2009-2011, following the anthropometric indicators and BMI of 1352 female students, shows that 62.1% are of normal weight and this is close to the results obtained by us. Below the norm are 17.7%, which is a

significantly higher relative share compared to our study and shows that the body weight indicator tends to increase. The author of the above study published relative proportions for overweight - 12.9%, and for obesity - 7.3%, which demonstrates that in recent years female students from Thracian University have gained weight, which can be seen in **Figure 2**.

Anthropometric characteristics in a number of studies show that higher body mass and visceral fat indices are a prerequisite for health risks. In accordance with literature data (2, 10) in studies of risk factors for lifestyle, it is strongly stated that BMI is significantly and directly related to systolic and diastolic levels of BP.

The relative share of overweight and obesity among students in Europe in recent years has ranged between 20.5-30%, according to data published by European universities in Spain, Italy, the Czech Republic, Greece, Serbia and others. (5, 3, 9). This proves the significant prevalence of this problem among students. This fact is worrying, given that overweight and obesity would be a difficult factor and a serious problem of modern society in the performance of future professional duties. In summary, it can be argued that there is a tendency to increase body weight based on the described results.

## CONCLUSION

- The comparative analysis of the various scientific studies reveals a significant difference in the established indicators of body weight and body mass index in female students.
- The study of female students from the Thracian University in the city of Stara Zagora found that the relative share of those registered with normal body weight has almost been preserved. In recent years, however, the relative share of overweight students has increased significantly.

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