DIFFERENCES IN BLOOD GLUCOSE LEVELS AND BODY MASS INDEX AMONG FEMALE STUDENTS OF THE UNIVERSITY OF TUZLA

Belmin Bujaković, Jasmin Zahirović, Emin Mujezinović, Lejla Goletić, Nevres Muminović, Merima Aljić

Faculty of Physical Education and Sports, University of Tuzla, Bosnia and Herzegovina

Abstract
This research is aimed at the importance of the value of a healthy lifestyle, especially among the younger population (students), and as an indicator of the level of health, the optimal level of sugar in the blood and the normality of the Body Mass Index represent an established prerequisite for longer-term life and cell health. The researchers used the Mann-Whitney U test for differences between a total of 73 female students of the University of Tuzla (N-35 *Faculty of Physical Education and Sport,* N-38 *Law).* The research showed that the students of the Faculty of Physical Education and Sports who have a significantly higher number of physical activities in their daily activities have lower body mass index values and that showed a statistically significant difference between the students of these two faculties at the significance level of 99% (p<0.01) , also in the blood sugar level between these two groups of students, a statistically significant difference was shown at the level of 99% (p<0.01), and in this area of research, the female students of the Faculty of Physical Education and Sports have lower values (MEAN = 4.989 mmol/l) from students of the Faculty of Law (5.545 mmol/l). It is important to note that in both groups in both researched areas the results are in the normal criterion ranges, and based on the values of arithmetic averages, it can be seen that female students of the Faculty of Physical Education and Sports have lower values of blood glucose and body mass index, which would could lead to a connection with the specifics of the study programs, for example the scope of daily movement activities.

Keywords: BMI, insulin, health

INTRODUCTION

Monitoring blood glucose levels and body mass index (BMI) is an important aspect of research on the health of young adult populations. Blood glucose, as a key indicator of metabolic health, is directly linked to diet, physical activity levels, and the presence of stress. BMI, on the other hand, helps assess body weight relative to height and provides insight into potential obesity or undernutrition. Female students, as a specific population, are often exposed to irregular eating habits, reduced physical activity, and high stress levels due to academic obligations. Such factors can negatively affect their metabolic health, increasing the risk of developing metabolic syndrome and other health complications. The aim of this study is to determine the differences in blood glucose levels and BMI among female students of the University of Tuzla. Special focus was placed on analyzing differences based on lifestyle and physical activity, as well as exploring potential correlations between BMI and blood glucose levels. A study (Brlečić and Ružić, 2014) confirmed that longer training durations lead to better glycemic regulation and reduced insulin requirements. Specifically, participants who exercised less than one hour a day experienced a 3.08% average reduction in blood glucose levels, while those who exercised more than one hour daily showed a 6.48% reduction. Regular exercise, proper nutrition, and an optimal sleep schedule are fundamental prerequisites for maintaining normal blood glucose levels, which, in turn, influence various factors that affect the overall condition and mood of participants. Elevated blood sugar levels above the normal range can indicate stress. Therefore, evaluating blood glucose levels can help students become aware of the negative consequences of stress and the importance of stress management (Sunil, K. J., 2016).

METHODOLOGY

Sample of Participants
This study was conducted with a sample of 73 female students from the University of Tuzla, aged between 18 and 25 years.

Inclusion criteria included:

- Healthy status of participants (no diagnosed chronic diseases),

- No use of medications that affect blood glucose levels,
- No pregnancy.

Instruments and Equipment

- Tanita scale**:** Used to measure body weight, body fat percentage, and muscle mass.
- Glucose meter**:** A portable device used to measure blood glucose levels using a capillary blood sample taken from the fingertip.

The participants visited the research center in the morning, fasting. The measurement procedure consisted of several steps:

1. Measurement of body weight and height using the Tanita scale and the Martin anthropometer, followed by the calculation of BMI.

2. Collection of a capillary blood sample from the fingertip for determining blood glucose levels.

Data Processing Methods

The Mann-Whitney U test was used to determine the differences in mean values between two distinct groups of female students for variables that do not follow a normal distribution.

RESULTS AND DISCUSSION

The results and discussion of the manifest variable BMI and the variable for assessing blood glucose levels were calculated and presented in tabular form using the Mann-Whitney test.

An analysis of the results Table 1. shows that the group of students from the Faculty of Law generally has a higher BMI and blood glucose levels compared to female students from the Faculty of Physical Education and Sports.

Table 1. Mean and Standard Deviation Values of Participants from Distinct Groups

Group	N	Mean	Standard Deviation
BMI			
FTOS (1)	35	20.89	2.20
Law Faculty (2)	38	24.10	4.14
GUK			
FTOS (1)	35	4.98	0.54
Law Faculty (2)	38	5.54	0.54
Total	73		

Table 2. Results of the Mann-Whitney Test for Assessing Partial Quantitative Differences Between Distinct Groups of Female Students

Variable	Mann-Whitney U	Asymp. Sig. (2-tailed)
BMI	306.500	0.000
GUK	297.500	0.000
Grouping Variable: FTOS 1 - Law Faculty 2		

An analysis of Table 2, showing the results of the Mann-Whitney test for the variables BMI and blood glucose (GUK), reveals statistically significant differences between the groups of female students in the mentioned variables at a significance level of $p < .01$.

Examining the results of longitudinal dimension, it is observed that students from the Faculty of Physical Education and Sports (FTOS) are, on average, 5 cm taller (favoring athletic body types), likely due to the sports orientation of these students. It was also noted that students from FTOS have, on average, 5 kg less body weight compared to students from the Faculty of Law, which is presumably the result of increased daily physical activity. These confirmed differences in height and body mass characteristics of the selected student groups led to a statistically significant difference in BMI ($p < .01$) between female students from the Faculty of Physical Education and Sports and those from the Faculty of Law in Tuzla.

However, this interpretation of the statistically significant difference in BMI between distinct groups should be observed with caution, as both groups of students have a BMI within the normal body weight range. According to standardized European results, a normal body weight BMI is between 18.5 and 24.9.

One of the objectives of this study was to determine whether there is a statistically significant difference in blood glucose levels between the two groups of students. The results showed that female students from the Faculty of Physical Education and Sports had a blood glucose level of 4.989 mmol/L, while students from the Faculty of Law had a blood glucose level of 5.545 mmol/L (normal glucose levels range from 3.9 to 6.1 mmol/L). Based on these results, it can be concluded that both groups of students have normal blood glucose levels, and thus the observed statistically significant difference in this parameter can only be conditionally concluded.

Although both groups of students fall within the normal range for blood glucose levels, based on the mean values, it is evident that students from the Faculty of Physical Education and Sports have lower blood glucose levels, which could be linked to the specific nature of their study programs and the volume of daily physical activity.

This is supported by many previous studies that show that physical activity lowers blood glucose levels. One such study is by Bruce A. Buckingham (2003), titled "Impact of Exercise on Overnight Glycemic Control in Children with Type 1 Diabetes," which examined the effect of physical activity on blood glucose regulation overnight. In five hospitals, 50 subjects with type 1 diabetes (aged 11 to 17 years) were tested over two consecutive days. One day involved afternoon physical exercise on a treadmill, while both days included regular blood glucose measurements. The study revealed that during physical exercise, blood glucose levels dropped in nearly all subjects. Glucose levels were significantly lower between 10 PM and 6 AM on the day of physical activity compared to the day without exercise. This study confirmed that exercise effectively helps regulate blood glucose, and that exercise makes it easier to lower blood glucose levels, resulting in reduced insulin doses compared to days without exercise.

CONCLUSION

In a sample of 73 female students from the University of Tuzla, the confirmed differences in the height and mass characteristics of the selected groups of students resulted in a statistically significant difference in BMI ($p < .01$), confirming a difference in BMI between students from the Faculty of Physical Education and Sports and those from the Faculty of Law in Tuzla. This research also confirmed a difference in blood glucose levels between students from the Faculty of Physical Education and Sports and those from the Faculty of Law. The data obtained from the blood samples of the same participants can serve as valuable evidence for raising awareness about the importance of physical activity and practicing healthy eating habits, not only during the student years but throughout life. Continuous monitoring of symptoms caused by high blood glucose levels (fatigue, lethargy, drowsiness) is crucial for preventing more serious consequences. It is important to note that the selected categories of students are in the chronological age group characterized by accelerated metabolic processes and a fast-paced modern lifestyle, which makes

this study valuable and suggests similar research in   older age groups.

REFERENCES

1. Brlečić, H., Ružić, L. (2014). Effects of Aerobic and Anaerobic Physical Activity on Reducing Insulin Dosage in Diabetic Patients. *Croatian Journal of Sports Medicine*, 29, 60-66.
2. Buckingham, B. A. (2003). Diabetes Research in Children Network (DirecNet) Study Group. The Accuracy of the GlucoWatch® G2™ Biographer in Children with Type 1 Diabetes: Results of the Diabetes Research in Children Network (DirecNet) Accuracy Study. *Diabetes Technology & Therapeutics*, 5(5), 791-800.
3. Sunil, K. J. (2016). The Effect of Exam Stress on Blood Sugar Levels in Medical Students. *CHRISMED Journal of Health and Research*, 3(4), 268-272.
4. Šabanović, M., Beganli, A., Mulavdi, N., Đaković, M. (2012). The Impact of Diet and Physical Activity on Body Mass Index in Adolescents. *Food in Health and Disease: Scientific and Professional Journal for Nutrition and Dietetics*, 1(1), 10-21.

Correspodending author:
Belmin Bujaković
Faculty of Physical Education and Sports,
University of Tuzla, Bosnia and Herzegovina
e-mail: belmin.bujakovic@untz.ba