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M. S. S. Weerasinghe

Scientific supervisor: Associate Professor, Ph. D A. V. Litvinchuk

Educational Establishment
"Gomel State Medical University"
Gomel, Republic of Belarus

BIOCHEMISTRY OF OBESITY: A NEW WAY TO CLASSIFY METABOLIC DISEASES

Introduction

Obesity is a medical condition where excess body fat accumulates to the point where it can seriously impact our health. Think of it as our body's storage system for triacylglycerols (a type of fat) going into overdrive, simply because the energy we're putting in is more than the energy we're burning.

This isn't just a personal struggle anymore; it's a global one. Obesity has grown into one of the most significant health crises of the 21st century, affecting people across all walks of life [1]. Tools like the Body Mass Index, or BMI, have been the go-to method for classifying who is and isn't obese [2]. But here's the thing: BMI is just a number based on height and weight. It tells us about size, but it doesn't tell us about the person.

To truly understand obesity, we have to zoom in, way in, to the microscopic level. The real story of obesity is a biochemical one. It's about what happens when our body's energy management system–a delicate balance of hormones and signals – starts to fail. It involves glitches in how we process fats, a state of constant, low-grade inflammation, and hormonal chaos, all originating from the very fat tissue we're trying to understand [3]. This isn't just "lazy" fat; it's dysfunctional fat. This dysfunctional tissue actively contributes to a cascade of serious health issues, from insulin resistance to other metabolic problems, through a web of complex molecular interactions [3].

The problem with our old way of thinking – simply looking at body size – is that it misses all of this crucial, underlying complexity. It lumps everyone with a high BMI into the same category, even though the "why" behind their condition could be completely different. This one-size-fits-all approach has been a major roadblock in developing truly personalized and effective treatments. A powerful new wave of evidence is now showing us that we need to flip the script. Instead of classifying metabolic disease by a person's shape, we should be classifying it by the specific molecular and cellular malfunctions driving their condition [4].

Goal

To analyze lifestyle factors, including dietary patterns, physical activity, sleep duration, and stress levels and to identify specific biochemical markers that can differentiate subtypes of metabolic dysfunction in obese patients.

Material and methods of the research

An anonymous online questionnaire survey was conducted. This questionnaire consisted of the following questions: age, gender, country of origin, height and weight to approximately calculate the BMI, if the person taking the test was ever been obese if so when has this happened, how many meals do you typically eat, hours of sleep, if sugary-beverages and alcohol are typically used, and the average rate of stress over the past month.

The results of the research and their discussion

A total of 55 students responded to the survey, giving us a glimpse into their daily habits and lifestyles. When it came to height, the biggest group – 42.6% – fell into the 165–175 cm range,

followed by 24.1% in the 175–185 cm bracket. Weight distribution was a bit more spread out: the most common category was 60–70 kg (29.6%), closely trailed by 50–60 kg (22.2%) and 70–80 kg (20.4%). This variety points to a pretty diverse mix of body types among the students. On the medical history front, responses were mixed–most said they didn't have any diagnosed condition related to weight, though a few mentioned specific ages or events (like "after pregnancy"), which might hint at when weight issues or diagnoses first came up.

When it comes to eating habits, a solid majority (55.6%) said they eat three meals a day, which is often seen as the standard. But a notable chunk – 20.4% – only eat one or two meals, and 13% have irregular eating patterns, both of which can sometimes be linked to metabolic issues or weight gain. As for intermittent fasting, more than half (55.6%) said they never do it, while 37% do it every now and then. Only a small handful practice it regularly or daily, so it doesn't seem to be a common or consistent trend in this group.

Sugary drinks are a known culprit when it comes to extra calories and weight gain, and the numbers here reflect that. About 42.6% of students said they have them one to two times a week, and 13% have them three to six times a week. Another 20.4% drink them occasionally, while 13% have one every day. Only 11.1% said they never touch the stuff. So, overall, more than 88% of students are consuming sugary drinks at least now and then.

Alcohol was also fairly common – the largest group (66%) said they drink occasionally, while 11.3% said they drink rarely. A small percentage drink weekly, and just over 20% said they never drink. Even though most students described their drinking as "occasional," it's still worth noting as a source of extra calories that can add up over time.

In terms of physical activity, nearly half (48.1%) said they live a sedentary lifestyle, and another 40.7% said they're only lightly active. Only 7.4% reported moderate activity, and no one said they do heavy manual labor. That paints a picture of a largely inactive student group – something that's a known risk factor for obesity and related health concerns.

Sleep patterns also stood out. The most common sleep duration was six to eight hours (42.6%), which is right in the recommended range for young adults. But a sizable 38.9% said they only get four to six hours of sleep, and 13% said they get as little as two to four hours. Chronic short sleep can mess with hormones in ways that ramp up appetite and cravings for high-calorie foods, so that's definitely a red flag.

Lastly, stress levels over the past month were pretty high. The largest group (44.4%) rated their stress as "High," and another 18.5% said it was "Very high." Only 9.3% reported low or very low stress. With so many students dealing with high stress levels, it raises concerns about emotional eating, poorer food choices, and potential weight gain down the line.

Conclusions

The data gathered from this survey highlights some worrying trends among the student population. A significant number of respondents lead sedentary lives, many are not getting enough sleep, and stress levels are remarkably high. These are not minor issues; they are well-established risk factors that lay the groundwork for obesity and related health problems down the line.

When it comes to eating habits, the picture is somewhat mixed. It is encouraging that the majority of students maintain a regular pattern of three meals per day. However, this is offset by the frequent consumption of sugar-sweetened beverages and alcohol among most respondents. Additionally, a considerable minority have irregular eating schedules, which can be just as detrimental to metabolic health as poor food choices.

Taken together, these factors create a concerning profile. A sedentary way of life, combined with chronic stress and inadequate sleep, does not simply add up – it multiplies the risk. This combination creates an internal environment where weight gain and metabolic disturbances are far

more likely to occur. These findings make a strong case for universities to take action. Implementing wellness programs that encourage physical activity, teach practical stress management techniques, educate students on the importance of sleep, and promote healthier dietary options is not just a good idea – it is a necessary step to protect student health and well-being.

LITERATURE

1. Obesity and overweight fact sheet // World Health Organization. – URL: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight (date of access: 18.03.2026).

2. Beyond BMI: a comprehensive approach to pediatric obesity assessment / N. C. Ayuzo Del Valle [et al.]. // Frontiers in Pediatrics. – 2025. –Vol. 13. – P. 1597309.

3. CD9 regulates macrophage-mediated remodeling of adipose tissue in obesity / J. Chini [et al.]. // JCI Insight. – 2026. – Vol. 11. – P. 193837.

4. Stefan, N. Metabolic dysfunction-associated steatotic liver disease: heterogeneous pathomechanisms and effectiveness of metabolism-based treatment / N. Stefan, H. Yki-Järvinen, B. A. Neuschwander-Tetri // The Lancet Diabetes & Endocrinology. – 2025. – Vol. 13. – P. 134–148.