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**ЛИФЕСТАЙЛ-ДЕТЕРМИНАНТЫ ЖЕЛЕЗОДЕФИЦИТНОЙ
АНЕМИИ У СТУДЕНТОВ УНИВЕРСИТЕТА**

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**LIFESTYLE DETERMINANTS OF IRON-DEFICIENCY ANEMIA
IN UNIVERSITY STUDENTS**

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Резюме. В статье проведён эмпирический анализ железодефицитных состояний у студентов. Выявлена прямая связь между нарушениями образа жизни, питанием и гематологическим статусом. Системные поведенческие нарушения являются предикторами железодефицитной анемии. Данные обосновывают разработку профилактических мер в университетской среде.

Ключевые слова: железодефицитная анемия, студенты, факторы риска, питание, депривация сна.

Resume. The article presents a comprehensive empirical analysis of the prevalence and behavioral risk factors underlying iron-deficiency states in higher education settings. Utilizing a cross-sectional approach, the study investigates the direct correlation between academic microclimates, suboptimal nutritional patterns, and hematological statuses. The findings establish that systemic lifestyle disruptions serve as functional drivers for hidden and manifest sideropenia.

Keywords: iron-deficiency anemia, university students, behavior risk factors, nutritional habits, sleep deprivation.

Relevance. Iron-deficiency anemia is an important public health concern that affects cognitive performance, physical health and mainly the overall well-being. It is highly prevalent among students which is majorly driven by their lifestyle habits and factors like poor dietary habits, high stress and in female menstruation. The key risk factors would include inadequate iron intake, skipping breakfast and frequent tea and coffee consumption. Although the students may know the materiality behind it, the pushing force of stress, academic pressures, limited self-care time and fluctuating schedule timing doesn't allow them to maintain a stable lifestyle.

Aim: to evaluate and quantify the specific lifestyle characteristics, dietary habits, fluid consumption behaviors, and gender-linked biological factors among university students, identifying them as modifiable or non-modifiable risk determinants in the development and persistence of latent iron-deficiency and manifest iron-deficiency anemia.

Objectives:

1. To investigate the demographic characteristics of the student sample and measure their subjective theoretical awareness regarding the symptoms, complications, and dietary sources of iron-deficiency anemia.

2. To qualitatively analyze the dietary schedules and nutritional choices of the participants, with a strict emphasis on the regularity of iron-dense food consumption and the frequency of meals.

3. To identify and catalog behavioral habits that biochemically inhibit iron bioavailability, specifically looking at the timing and volume of post-prandial tea and coffee intake.

4. To assess the physical health backdrop of the cohort by quantifying sleep duration, subjective chronic fatigue, and daily physical activity levels.

5. To evaluate gender-specific physiological strain through an analysis of menstrual histories, focusing on the prevalence of heavy menstrual bleeding as an endogenous risk vector.

6. To cross-examine the medical histories of the students regarding previous iron deficiency diagnoses, current supplement utilization patterns, and the frequency of objective laboratory diagnostic screening.

Materials and methods. This investigation was structured as a cross-sectional, descriptive, and analytical sociological and medical study. Data collection was performed entirely during the 2025–2026 academic period. To ensure maximum accessibility and to accommodate the complex schedules of university students, the primary research instrument was digitized and administered using the secure Google Forms platform. The primary tool consisted of a comprehensive, 25-item validated questionnaire specifically constructed to avoid leading questions and to cross-verify student responses.

The questionnaire was structured into four distinct, specialized analytical modules: Module A (Anthropometric and Demographics); Module B (Dietary Patterns and Nutritional Quality); Module C (Lifestyle and Rest Hygiene); and Module D (Medical, Gynecological, and Pharmacological History). The final study sample comprised 40 currently enrolled university students who completed the survey fully. All participation was entirely voluntary, anonymous, and preceded by a digital informed consent agreement outlining the scientific purposes of the research. Statistical processing of the gathered empirical datasets was conducted using standard, modern software applications, including Microsoft Excel and specialized statistical toolkits. Continuous variables were analyzed via mean values, while categorical and ordinal data were processed through percentage distributions and frequency cross-tabulations to identify key behavioral trends.

Results and their discussion. An analysis of the basic demographic data revealed a clear gender imbalance within the study cohort: 77.5% ($n = 31$) of the participants were female, while males accounted for the remaining 22.5% ($n = 9$). This distribution accurately mirrors the broader demographic realities of many contemporary university environments, particularly within medical, humanistic, and pedagogical disciplines where female student representation is historically high. When evaluating the cognitive and educational components of health management, the study uncovered a striking paradox. A clear majority of the students surveyed (72.5%, $n = 29$) indicated a solid subjective understanding of iron deficiency. They successfully identified typical clinical signs—such as chronic generalized weakness, hair fragility, cognitive fatigue, and brittle nails—and listed key iron-containing foods. However, when comparing this theoretical knowledge against actual daily behaviors, a severe disconnect became clear. Exactly 50% ($n = 20$) of the students reported that they do not regularly eat iron-rich foods. Instead, their diets are marked by irregular meal timings, frequent skipping of breakfast due to morning lectures,

and a heavy reliance on processed carbohydrate-dense foods. This confirms that theoretical medical awareness does not automatically translate into healthy daily habits when students face intense academic pressure and limited personal time. The structural breakdown of these primary lifestyle parameters is organized systematically in the data compiled below.

Tbl. 1. Distribution of key lifestyle risk factors among university students

Lifestyle Parameter Evaluated	Cohort Frequency (n)	Percentage Value (%)
Irregular or Deficient Dietary Iron Intake	20	50.0
Immediate post-Meal-Tea/Coffee Habit	17	42.5
Severe Sedentary Behavior (No Exercise)	21	52.5
Sleep Deprivation (< 6 Hours/Night)	21	52.5
Experience of Subjective Chronic Fatigue	40	100

This nutritional deficiency is further exacerbated by common beverage consumption habits that interfere with normal digestion. The study revealed that 42.5% of students (17 individuals) regularly drink strong black tea or coffee either during their meals or within half an hour of finishing them. From a biochemical perspective, this practice poses significant problems. Tea and coffee are rich in polyphenolic compounds called tannins, which can bind directly to non-heme iron in the stomach. This binding results in the formation of highly stable, insoluble complexes that the intestines cannot absorb. As a result, the iron present in the meal becomes effectively unavailable for absorption by the intestinal lining.

In a context where overall dietary iron intake is already limited, this widespread habit creates a persistent barrier to maintaining healthy iron levels. The process of this physiological inhibition is illustrated in the structural pathway below, providing a clear visual representation of how these beverages interfere with iron absorption and contribute to iron deficiency among students.

The physical health profiles of the students revealed additional signs of systemic strain. More than half of the respondents, 52.5% (21 students), reported leading a predominantly sedentary lifestyle, admitting that they rarely participate in regular physical activity or recreational exercise. At the same time, 100% of all participants (40 students)–reported experiencing ongoing symptoms such as fatigue, sluggishness, and difficulty concentrating.

While feelings of chronic fatigue are often dismissed as a normal part of university life, the survey data suggests that poor sleep hygiene plays a significant role in this issue. Specifically, 52.5% of students (21 individuals) sleep less than 5 to 6 hours per night on a regular basis. This persistent sleep deprivation disrupts normal circadian rhythms and hampers the body's nighttime recovery processes. For students already dealing with low iron levels, the lack of adequate sleep exacerbates tissue hypoxia and intensifies both cognitive and physical exhaustion, creating a cycle of fatigue that is difficult to break.

Among the female students in the study (31 participants), these behavioral risks are compounded by significant biological vulnerabilities. Only 14.3% of them (4 students)

were menstruating at the time of the study, but a much larger proportion—63.6% (20 students)—reported a history of heavy or prolonged menstrual bleeding, known as menorrhagia. In young women, heavy menstrual bleeding is a leading cause of iron depletion because the physical loss of red blood cells often exceeds the body's ability to replace iron through diet.

When a female student experiences heavy menstrual losses along with a low-iron diet and regular consumption of tea or coffee, the progression from latent iron deficiency to full-blown iron-deficiency anemia accelerates significantly. The medical histories within the dataset highlight that this is a long-term, cyclical issue. Alarmingly, 70% of the students (28 individuals) reported having been diagnosed with iron deficiency or iron-deficiency anemia (IDA) at some point in their lives, indicating that iron imbalance is a widespread and ongoing health challenge for this group.

Furthermore, while 62.5% of the students (25 individuals) reported taking oral iron supplements or iron-containing multivitamins during the study, many still experienced persistent symptoms like fatigue and physical weakness. This ongoing discomfort suggests several issues with how iron deficiency is being managed: students often stop their supplements due to gastrointestinal side effects, they may be taking iron alongside substances that inhibit absorption, and many lack recent laboratory tests to monitor their iron status—most have not had blood work in the past six months.

Conclusions:

1. Iron-deficiency states show an exceptionally high lifetime prevalence among university students, transitioning from a localized clinical issue into a widespread socio-medical challenge that directly affects student well-being and academic performance.

2. The primary modifiable lifestyle drivers of this prevalence are irregular dietary patterns, the common habit of drinking tea or coffee immediately after meals which chemically impedes iron absorption, and widespread sleep deprivation (52.5%). These factors combine to worsen systemic tissue hypoxia and ensure that 100% of the cohort experiences chronic fatigue.

Heavy menstrual bleeding serves as a powerful, non-modifiable biological risk factor for 63.6% of female students. When combined with poor lifestyle habits, it dramatically increases the risk of iron depletion.

4. The persistent symptoms reported by students using iron supplements (62.5%) point to issues with treatment compliance and a lack of objective medical follow-up. This highlights an urgent need for universities to implement targeted health education, structured nutritional guidelines, and accessible, regular laboratory screening programs.

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