Міністерство охорони здоров'я України
Національний медичний університет
імені О. О. Богомольця

Ministry of Health of Ukraine
Bogomolets National Medical University

USMYJ

НАУКОВО-ПРАКТИЧНЕ ВИДАННЯ

УКРАЇНСЬКИЙ НАУКОВО-МЕДИЧНИЙ МОЛОДІЖНИЙ ЖУРНАЛ

THEORETICAL AND PRACTICAL EDITION

UKRAINIAN SCIENTIFIC MEDICAL YOUTH JOURNAL

№3 (164) 2026

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Науково-практичне видання

УКРАЇНСЬКИЙ НАУКОВО-МЕДИЧНИЙ МОЛОДІЖНИЙ ЖУРНАЛ

Засновник і видавець:
Національний медичний університет імені О.О.Богомольця (ROR ID: 03edafd86)

Орган управління:
Міністерство охорони здоров'я України

Індексація:
Google Scholar, Index Copernicus, WorldCat (OCLC)

Періодичність: 4 рази на рік
Реєстраційне свідоцтво: КВ № 17028-5798ПР

Статус видання:
включено до переліку фахових видань України (наказ МОН України від 11.06.2026 № 928)

Наукові напрями публікацій (спеціальності):

- І1 — Стоматологія
- І2 — Медицина
- І3 — Педіатрія
- І4 — Медична психологія
- І6 — Технології медичної діагностики та лікування за спеціалізаціями
- І7 — Терапія та реабілітація за спеціалізаціями
- І9 — Громадське здоров'я

Рекомендовано до друку:

Вченою радою НМУ імені О.О. Богомольця (протокол №5 від 28.05.2026 р.)

Редакція Українського науково-медичного молодіжного журналу, науковий відділ НМУ, бульвар Тараса Шевченка, 13, м. Київ, 01601, Україна

Вебсайт журналу: www.mmj.nmuofficial.com
E-mail: usmyj@nmu.ua
Вебсайт установи: www.nmuofficial.com

Друк:
ТОВ «505», м. Житомир, вул. М. Бердичівська, 17а
Тел.: +38 (063) 101-22-33,
E-mail: polygraphyinzt@gmail.ua
Свідоцтво суб'єкта видавничої справи:
ДК № 5609 від 21.09.2017 р.

Вихідні дані:
Підписано до друку: 31.03.2026 р.
Формат: 60×84/8. Друк: офсетний. Папір: офсетний
Тираж: 50 прим. Замовлення: № Ж-2025/17.06

ISSN 2786-6661 (Print)
eISSN 2786-667X (Online)
UDC: 378.6:61:001.891](477.411)(050)

РЕДАКЦІЙНА КОЛЕГІЯ

Головний редактор:
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Заступник головного редактора:
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Голова редакційної колегії:
Юрій Кучин

Відповідальний секретар:
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Правові положення:

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До друку приймаються наукові матеріали, що відповідають вимогам видання.

Scientific and Practical Edition
UKRAINIAN SCIENTIFIC MEDICAL YOUTH JOURNAL

Founder and Publisher:
Bogomolets National Medical University
(ROR ID: https://ror.org/03edafd86)

Governing Body: Ministry of Health of Ukraine

Journal's indexing:
Google Scholar, Index Copernicus, WorldCat (OCLC)

Publication frequency: 4 issues per year
Registration Certificate: КВ № 17028-5798ПР

Journal status:
Included in the list of professional scientific publications of Ukraine (Order of the Ministry of Education and Science of Ukraine dated 11.06.2026 № 928)

Scientific fields (specialties):

I1 — Dentistry
I2 — Medicine
I3 — Pediatrics
I4 — Medical Psychology
I6 — Medical Diagnostic and Treatment Technologies (by Specialisation)
I7 — Therapy and Rehabilitation (by Specialisation)
I9 — Public Health

Recommended for publication:
Academic Council of Bogomolets National Medical University (Protocol №5, 28.05.2026)

Editorial office: Ukrainian Scientific Medical Youth Journal, Research Department Bogomolets National Medical University
13 Taras Shevchenko Blvd., Kyiv, 01601, Ukraine

Journal website: www.mmj.nmuofficial.com
E-mail: usmyj@nmu.ua
University website: www.nmuofficial.com

Printed by:
LLC "505", 17a M. Berdychivska St., Zhytomyr, Ukraine
Tel.: +38 (063) 101-22-33
E-mail: polygraphyinzt@gmail.ua
Certificate of publishing entity:
ДК № 5609 dated 21.09.2017

Publication details:
Signed for print: 31.03.2026
Format: 60×84/8, Printing: offset, Paper: offset
Circulation: 50 copies. Order No.: Ж-2025/17.06

ISSN 2786-6661 (Print)
eISSN 2786-667X (Online)
UDC: 378.6:61:001.891](477.411)(050)

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Likewise, exosome research has opened new perspectives in neurology, where access to pathological tissue is often limited. Neuron-derived and glia-derived extracellular vesicles have been proposed as potential sources of biomarkers for neurodegenerative disorders, including Alzheimer's disease and Parkinson's disease. Notably, exosomal cargo may contain disease-associated proteins such as phosphorylated tau and amyloid-β, which are implicated in the pathogenesis of neurodegeneration. Consequently, exosome-based liquid biopsy offers a unique opportunity to identify pathological processes during preclinical or early clinical stages, when therapeutic interventions may be most effective. Nevertheless, challenges related to biomarker specificity, isolation techniques, and validation across diverse patient populations still need to be addressed before routine clinical implementation becomes feasible.

Beyond their diagnostic utility, liquid biopsy technologies also contribute significantly to patient safety. By reducing reliance on invasive procedures, they minimize the risks of bleeding, infection, procedural complications, and patient discomfort. In addition, their minimally invasive nature facilitates repeated testing, allowing clinicians to monitor disease evolution and therapeutic response more effectively. Therefore, liquid biopsy aligns closely with contemporary principles of precision medicine, preventive healthcare, and value-based care. At the same time, further harmonization of laboratory protocols, quality-control procedures, and regulatory frameworks will be essential to ensure reproducibility and clinical reliability.

Conclusions. Liquid biopsy and exosomal biomarkers represent an emerging paradigm in the diagnosis and monitoring of noncommunicable diseases. Their ability to provide minimally invasive access to clinically relevant molecular information offers substantial advantages for early detection, risk assessment, and personalized disease management. Furthermore, these technologies contribute to improving patient safety by reducing the need for invasive diagnostic interventions. Although additional standardization and clinical validation are required, current evidence indicates that liquid biopsy and exosome-based diagnostics are likely to become integral components of future precision medicine strategies in oncology, cardiology, and neurology.

Keywords: Liquid Biopsy; Exosomes; Biomarkers; Precision Medicine; Early Diagnosis.

THE PREVALENCE OF SELF-MEDICATION AMONG UNIVERSITY STUDENTS AND ITS POTENTIAL IMPACT ON PATIENT SAFETY

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Introduction. Self-medication is one of the most pressing issues in modern healthcare, directly affecting patient safety. Among students, there is a persistent trend toward the uncontrolled use of medications. Prolonged safety restrictions, air raid alerts, and the unique challenges of studying during wartime significantly limit young people's ability to seek qualified medical care in a timely manner. A combination of factors such as time constraints, financial difficulties, and a high level of trust in information from the Internet creates conditions for the irrational use of medications. This clinically manifests as risks of developing antibiotic resistance, the occurrence of adverse reactions, and complications in the course of existing diseases. A comprehensive assessment of students' behavior in conjunction with an analysis of medication errors is essential for developing preventive recommendations.

The aim of this study was to assess the prevalence of self-medication among high school students, identify the key reasons for avoiding doctor visits, and analyze the potential risks to patient safety.

Materials and Methods. An anonymous survey of 76 respondents was conducted using a specially designed questionnaire (Google Form). Students from five higher education institutions in Ukraine, representing various fields of study, participated in the survey.

Results. The main sample by age distribution consisted of individuals aged 18 – 20 (42.1 %) and 21 – 25 (47.4 %), while the 26 – 30 age group accounted for only 10.5 %. Regarding gender specific — women significantly outnumbered men (63.2 %), while men accounted for 36.8 %. By field of study, respondents were distributed as follows: medical/pharmaceutical — 42.1 %, humanities — 19.7 %, technical/natural sciences —

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31.6 %; students from other universities also participated, accounting for 6.6 %. The distribution by year of study showed the highest participation among third-year students (30.3 %), fourth-year students (23.7 %), and second-year students (23.7 %). The study looked at four key aspects: how frequently people self-medicate, why they choose not to consult a healthcare professional, what sources they rely on for medication information, and how well they adhere to patient safety recommendations.

An assessment of the frequency of taking medications without a doctor's prescription (excluding vitamins) over the past year revealed a critically high prevalence of self-medication: 2.8 % of students take medications frequently (monthly or more often), and 53.9 % take them occasionally (once every few months). Very rarely (1 – 2 times a year), 40.8 % of respondents resort to self-medication, and only 2.6 % indicated that they had never done so.

The main factors driving young people to forego a doctor's visit in favor of self-treatment were:
- financial reasons (higher cost of consultations or prescription medications) — 31.6 %;
- mild clinical symptoms ("I don't think the problem is worth a visit") — 28.9 %;
- distrust of doctors or the current healthcare system — 14.5 %;
- lack of time due to long wait times or a demanding academic schedule — 11.8 %;
- previous successful treatment experience for the same health disorder — 10.5 %;
- security restrictions (pandemic, air raid alerts) — 2.6 %.

When selecting sources of information for verifying medications during self-prescribing, a wide range of priorities was observed: 28.9 % of students trust advice from a pharmacist at a pharmacy, 21.1 % rely on advice from parents or friends, and 13.2 % conduct direct searches on Google and medical websites. The rate of social media use (TikTok, Instagram, Telegram) was 22.4 %, while 14.5 % rely on their own past experience.

An analysis of the patterns of self-prescribing revealed the following characteristics of students' subjective choices:

1) Priority drug categories: cold and cough remedies (lozenges, syrups, teas) lead the way at 28.9 %, followed by sedatives or sleep aids at 19.7 %, pain relievers and fever reducers (ibuprofen, acetaminophen) — 13.2 %. Digestive aids (sorbents, enzymes) are chosen independently by 15.8 % of respondents, antibiotics — 10.5 %, and antiallergic drugs — 11.8 %.
2) Risks of antibiotic resistance: despite their prescription status, 39.5 % of students have purchased antibiotics without a prescription several times, and 7.9 % do so regularly; only 52.6 % of respondents take antibiotics exclusively as prescribed by a doctor.
3) Behavioral risks and compliance: a low level of familiarity with medication instructions was observed. Only 13.2 % always read them very carefully. Meanwhile, 48.7 % pay attention exclusively to the dosage, 34.2 % read the instructions only if unusual symptoms arise, and 3.9 % do not read them at all. In addition, 26.3 % of students often stop taking pills on their own before the end of the course if symptoms disappear, and 28.9 % do so occasionally, depending on the medication. Only 44.7 % of respondents strictly follow the recommendations.
4) Drug interactions and first-aid kit safety: 45.3 % of respondents combine several medications at once to quickly relieve various symptoms without checking for compatibility, while 22.7 % do so only rarely. Additionally, it should be noted that 26.3 % of respondents admitted to taking medications past their expiration date simply because they were in their home first-aid kit.

A self-assessment of health literacy revealed that 75.0 % consider their level of knowledge to be "average." A high level (clear understanding of risks and interactions) was reported by 13.2 %, and a low level by 11.8 %. At the same time, 64.5 % are aware that self-medication poses a very serious threat (risk of complications, resistance). 60.0 % of respondents have personally experienced side effects (of these, 52.0 % noted that the symptoms resolved on their own, while 8.0 % were forced to see a doctor). If self-medication proves ineffective within 3–4 days, 30.3 % of respondents seek medical help, while 46.1 % switch to a different medication on their own, 10.5 % look for advice online, and 13.2 % continue to wait for the current medication to take effect.

Conclusions. The study demonstrated that self-medication is widespread among high school students (98.2 % of them practice it frequently or occasionally). It is accompanied by serious violations of patient safety: 47.4 % purchased antibiotics without a prescription, 86.8 % do not read the instructions thoroughly, and 55.2 % do not follow the prescribed treatment duration. The identified trends of high trust in pharmacists and search engines rather than doctors justify the need to implement targeted educational programs to improve medical literacy among young people.

Key words: self-prescribing, high school students, patient safety, antibiotic resistance, compliance.

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