

# GEORGIAN MEDICAL NEWS

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ISSN 1512-0112

NO 2 (372) Февраль 2026

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ТБИЛИСИ - NEW YORK



ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии  
საქართველოს სამედიცინო სიახლენი

## GEORGIAN MEDICAL NEWS

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press.  
Published since 1994. Distributed in NIS, EU and USA.

**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии** - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News** – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

### WEBSITE

[www.geomednews.com](http://www.geomednews.com)

## К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html) В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются.**

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: [http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html)  
[http://www.icmje.org/urm\\_full.pdf](http://www.icmje.org/urm_full.pdf)

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned  
Requirements are not Assigned to be Reviewed.**

## ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგების ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

Hua-ting Bi, Wen-Wen Hao. CORRELATION BETWEEN PREOPERATIVE MACULAR THICKNESS AND POSTOPERATIVE VISUAL PROGNOSIS IN PATIENTS WITH DIABETIC CATARACT.....	6-9
Melik-Andreasyan G.G, Tkhruni F.N, Karapetyan K.J, Atoyan S.A, Aleksanyan N.J, Kotsinyan N. Yu, Israyelyan A.L. COMPARATIVE SUSCEPTIBILITY PROFILES OF CLINICAL AND REFERENCE BACTERIAL STRAINS ACROSS MULTIPLE ANTIBIOTIC CLASSES.....	10-16
Khrantsov D.M, Chernyshov O.V, Stoyanov O.M, Gryb V.A, Vorokhta Y.M. COGNITIVE RESERVE IN PATIENTS AFTER CORONAVIRUS INFECTION.....	17-22
Egzon Daku, Leon B. Hajdari, Bese R. Morina. OPTIMIZING SPINAL ANESTHESIA IN URGENT CESAREAN DELIVERY: THE TAYLOR APPROACH IN A PARTURIENT WITH CORRECTED SEVERE SCOLIOSIS AND PULMONARY COMPLICATIONS: A CASE REPORT.....	23-28
Ana Maisuradze, Ketevan Kiguradze-Gogilashvili, Flavien Fettak, Ketevan Oghiashvili, Vaja Maisuradze. CORRELATION BETWEEN RADIATION SAFETY TRAINING AND COMPLIANCE WITH RADIATION PROTECTION PRACTICES: A CROSS-SECTIONAL STUDY.....	29-32
Sarmad S. Salih Al Qassar, Omar Hussein Alluazy, Ahmed Khalaf Ali. A NOVEL NON-INVASIVE MODULATION OF ORTHODONTIC RELAPSE: INSIGHTS FROM A RABBIT MODEL.....	33-44
Fitim Alidema, Lirim Mustafa, Egzona Papraniku, Arieta Hasani Alidema, Mirlinda Havolli. BIOCHEMICAL ABNORMALITIES OF HEPATIC AND RENAL FUNCTION IN HOSPITALIZED PATIENTS RECEIVING PHARMACOLOGICAL THERAPY: A THREE-YEAR RETROSPECTIVE ANALYSIS.....	45-49
Sion Jo. DOUBLE LUMEN TECHNIQUE (DLT) - ENDOTRACHEAL TUBE GUIDED LEVIN TUBE INSERTION TECHNIQUE.....	50-53
Ellen Safadi, Aparna Baburaj, Sara Musa Abdalla Elamin, Marwan Ismail. ASSOCIATION OF DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES WITH PATIENTS' COMPREHENSION AND CONTENTMENT REGARDING INFORMED CONSENT IN A UNIVERSITY HOSPITAL SETTING: A CROSS-SECTIONAL STUDY.....	54-59
Ostemirkyzy Darika, Kapsalyamova Elmira, Daryono Hadi Tjahjono, Ustenova Gulbaram, Eva Susanty Simaremare. ISOLATION AND IDENTIFICATION OF $\beta$ -SITOSTEROL FROM <i>ZYGOPHYLLUM FABAGO</i> L. HERB USING SUBCRITICAL CO <sub>2</sub> EXTRACTION.....	60-66
Oleg Batiuk, Marharyta Shkabarina, Andrii Manko, Svitlana Cherneta, Iryna Bychuk. THE DYNAMICS OF PERCEPTIONS AND EVALUATION OF THE COMPONENTS OF THE IMAGE OF AN IDEAL TEACHER DURING THE COVID-19 PANDEMIC.....	67-75
Ghaith Wadhah Hamdoon, Aws Hazem Al-Numan, Nawar Yahya Ahmed, Rikan Sulaiman Jumaah, Mazin Mahmoud Fawzi, Banan Burhan Mohammed. UMBILICAL STUMP CARE IN NEWBORNS: IS BREAST MILK AS EFFECTIVE AS CONVENTIONAL METHODS.....	76-80
Sana Khamassi, Emna Bornaz, Nourhène Tayari, Amel Gamoudi, Kamilia Ounaissa, Haifa Abdesselem, Ichraf Ben Ammar, Bahija Riahi, Dorra Bousnina, Henda Jamoussi, Chiraz Amrouche. OVERWEIGHT AMONG TUNISIAN SCHOOL-AGED CHILDREN: PREVALENCE AND ASSOCIATED FACTORS.....	81-86
Tsisana Giorgadze, Tinatin Gognadze, Lasha Dolidze. CERTAIN PROPERTIES OF $\beta$ -GLUCOSIDASE FROM <i>YUCCA GLORIOSA</i> FLOWERS.....	87-92
Issenova Saule, Rakhimzhanova Adel, Shukirgaliyeva Marzhana. RISK MANAGEMENT AND HEALTH SUPPORT FOR PREGNANT WOMEN USING INOSITOLS.....	93-100
Lirim Isufi, Diellza Kelmendi, Adelina Ahmeti Pronaj. GENDER DIFFERENCES IN EMOTIONAL REGULATION AMONG ADOLESCENTS WITH ELEVATED ADHD SYMPTOMS: A SCHOOL-BASED STUDY.....	101-105
Ketevan Omiadze, Alikya Chipurupalli, Tea Abzhandadze. CHRONIC URTICARIA RELATED TO <i>HELICOBACTER PYLORI</i> INFECTION – A CASE REPORT.....	106-109
Dinara Aliyeva, Ildar Fakhradiyev, Marat Shoranov. IDEOLOGICAL FAULT LINES IN PHARMACEUTICAL POLICY OF KAZAKHSTAN: A Q-METHODOLOGICAL APPROACH.....	110-119
Ahmed Abdalla Jarelnape. ARTIFICIAL INTELLIGENCE UTILIZATION AND ITS ASSOCIATION WITH NURSING PRACTICE IN CARDIOLOGY AND INTENSIVE CARE UNITS: A CROSS-SECTIONAL STUDY.....	120-124
Jiaqi Liu, Yan Pan, Zuliang Yan, Hong Jiang, Hanglin Li, Ying Yu. GLOBAL, REGIONAL, AND NATIONAL BURDEN OF CHRONIC KIDNEY DISEASE DUE TO TYPE 2 DIABETES MELLITUS, 1990-2021, WITH FORECASTS TO 2035: A FORECASTING STUDY FOR THE GLOBAL BURDEN OF DISEASE STUDY 202.....	125-135

Ahmed Dallal Bashi, Noor Abdulmonim, Noor Salem, Saleh Nayf, Teba Ammar, Yosif Ismaeel. THE MOST COMMONLY PRESCRIBED MEDICATIONS BY PEDIATRICIANS IN MOSUL CITY .....	136-142
Lukina Veronika V, Katibgadzhiev Magomed A, Solovyov Andrey A, Kovalenko Polina S, Kuzmich Vitaliy V, Eremeeva Mariia V, Gaevskaya Rinata R, Kuznetsova Anna A, Aleksandrova Iuliia S, Bulia Mariam Z, Sadrutdinov Tatam D, Saitova Atikat S. COMPARATIVE EFFECTIVENESS OF CONSERVATIVE METHODS FOR ACCELERATING EPITHELIALIZATION IN ACUTE ANAL FISSURE.....	143-147
Yerzhan Sharapatov, Maida Tusupbekova, Yermek Turgunov, Yuriy Pak, Yersaiyn Zhiyenbayev, Kuandyk Beisenov. COMPARATIVE EXPERIMENTAL STUDY OF MORPHOLOGICAL CHANGES IN THE KIDNEY IN ACUTE OBSTRUCTIVE PYELONEPHRITIS MODEL: INFLUENCE OF INFECTION ROUTE.....	148-155
Aymar Kassa Boukat, Massine El Hamoummi, Yassine Sarboute, Beouiss Mohamed, Andemey Leyoubou Emilie, Edderaï Meryem, El Hassane Kabiri. POST-CT-GUIDED BIOPSY PNEUMOTHORAX, ACCORDING TO THE COAXIAL TECHNIQUE WITH AN 18-GAUGE NEEDLE: EPIDEMIOLOGICAL, DIAGNOSTIC AND THERAPEUTIC ASPECTS.....	156-161
Azamat K. Kairgali, Raisa A. Aringazina, Murat K. Jakanov, Abdolreza Haghpanah, Marat N. Sarkulov. THE EFFECT OF TRIVALENT CHROMIUM ON METABOLIC SYNDROME: A NARRATIVE REVIEW.....	162-169
Mohammed K.M Madi, Hannan Awad, Marwan Ismail, Maxmudjon Butaboyev, Jamoliddin Bobokalonzoda, Gaybiev Akmaljon Axmadjonovich, Elryah I Ali, Husham O. Elzein, Rasha Babiker, Amin SI Banaga, Salah Eldin Omar Hussein, Ayman H. Alfeel, Ahmed L. Osman, Asaad Babker. RETICULOCYTE SUBPOPULATION ANALYSIS AND ITS CORRELATION WITH IRON DEFICIENCY ANEMIA: A RETROSPECTIVE STUDY IN A PREDOMINANTLY FEMALE POPULATION.....	170-176
Zena S. Tawffiq, Inas H. Ahmed, Luma M. Al-Obaidy. PHYTOCHEMICAL SCREENING AND LIPID LOWERING EFFECTS OF <i>TERMINALIA CHEBULA</i> FRUIT EXTRACTS IN ALBINO WISTAR RATS.....	177-181
Azamat Shamsiev, Abdiqodir Shakhriev, Botir Yuldashev, Leyla Khakimova, Fariza Khalimova, Sagirayev Nodir Zhumakulovich. CLINICAL EFFECTIVENESS OF TRADITIONAL TREATMENT METHODS FOR GRADE III CHEMICAL ESOPHAGEAL BURNS IN CHILDREN.....	182-186
Plaurat Krasniqi, Leon B. Hajdari, Fatos Sada, Egzon Daku. POSTOPERATIVE MORPHINE USE IN ABDOMINAL SURGERY: CLINICAL INSIGHTS FROM A ONE-YEAR SINGLE-CENTER RETROSPECTIVESTUDY.....	187-193
Bashayr Z. Alamri, Reem F. Alnemari, Abduljawad S. Alharbi. UNDERSTANDING FACTORS CONTRIBUTING TO PATIENTS' NON-ADHERENCE TO A LIFESTYLE MODIFICATION PLAN: A CROSS-SECTIONAL STUDY AMONG VISITORS OF LIFESTYLE CLINICS IN KING ABDUL-AZIZ MEDICAL CITY, JEDDAH.....	194-201

## UNDERSTANDING FACTORS CONTRIBUTING TO PATIENTS' NON-ADHERENCE TO A LIFESTYLE MODIFICATION PLAN: A CROSS-SECTIONAL STUDY AMONG VISITORS OF LIFESTYLE CLINICS IN KING ABDUL-AZIZ MEDICAL CITY, JEDDAH

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### Abstract.

**Introduction:** The aim of this study is to understand the factors contributing to patients' non-adherence to lifestyle modification plans among visitors of the Lifestyle Clinics in King Abdul-Aziz Medical City, Jeddah. Adherence to these plans is crucial for improving health outcomes and preventing chronic diseases.

**Methods:** A cross-sectional study was conducted at the Lifestyle Clinics within the Primary Healthcare department of King Abdulaziz Medical City, Jeddah. Participants were adults referred for weight reduction. Data were collected using a questionnaire covering sociodemographic characteristics, adherence to lifestyle modifications, and barriers to adherence. The adherence level was assessed using a validated 13-item questionnaire, and the data were analyzed using IBM SPSS Statistics.

**Results:** A total of 380 participants were included, with a median age of 42 years (IQR: 32-50 years). Approximately 45.5% were adherent to the lifestyle modification plan, while 54.5% were non-adherent. Significant positive correlations were found between age and adherence (Correlation Coefficient = .205,  $p < .001$ ), with healthcare workers showing higher adherence levels ( $p=0.027$ ). Common barriers to adherence included lack of willpower (74.5%), energy (70.8%), and time (68.9%). Statistically significant associations were identified between lack of energy ( $p=0.019$ ) or time ( $p=0.023$ ) and non-adherence.

**Conclusion:** This study identified key factors associated with non-adherence to lifestyle modification plans, particularly younger age, non-healthcare occupations, and perceived barriers such as lack of energy and lack of time. Despite high levels of knowledge regarding healthy lifestyle practices, adherence remained suboptimal, highlighting the gap between awareness and behavioral implementation. Addressing practical barriers through targeted, behavior-focused interventions may improve adherence and long-term health outcomes.

**Key words.** Barriers to adherence, communication in healthcare, health education, lifestyle adherence, obesity, overweight, patient compliance.

### Introduction.

Adherence to lifestyle modifications recommended by healthcare professionals is well-acknowledged for its positive impact on individual well-being. Nevertheless, a significant challenge persists as individuals, particularly in regions like Saudi Arabia, often struggle with consistent implementation of these changes. Dietary modifications serve as a prime example of this issue. This is not merely an isolated observation but a legitimate concern. Commitment to these changes has been

shown to yield numerous benefits, including improved health, illness prevention, and a positive influence on public health [1]. However, the trend of non-compliance among patients, who often fail to heed the advice of their healthcare professionals, is concerning. This can lead to health complications and a reduced quality of life [2]. This pattern is evident at the Lifestyle Clinics at King Abdul-Aziz Medical City in Jeddah, underscoring the need to understand its root causes. A comprehensive understanding of these factors can aid healthcare institutions in crafting interventions tailored to individual patient needs, thereby increasing the likelihood of adherence to the management plan [3].

Importantly, adherence is largely contingent on a patient's comprehension of the importance of the suggested lifestyle changes. Evidence suggests that misunderstandings or comprehension gaps regarding these changes can hamper adherence [4]. It is therefore crucial for patients to be thoroughly educated and cognizant of the impact and benefits of their lifestyle choices in order to foster compliance. Socio-economic factors also play a significant role in shaping a patient's adherence to medical recommendations. Financial constraints, limited access to healthcare services, or societal norms may impede a patient's commitment to lifestyle changes [5]. Addressing these socio-economic challenges is pivotal in enhancing adherence outcomes.

Effective communication between patients and healthcare providers is also paramount for adherence outcomes. Clear, compassionate, and transparent communication fosters mutual trust and understanding, leading to increased adherence to medical guidelines [6]. Conversely, unclear or inadequate communication can foster doubts, mistrust, and lead to non-compliance. Moreover, deeply rooted cultural, religious, or societal beliefs can significantly influence how patients perceive and follow medical advice. While some beliefs align with medical guidance and motivate adherence, others can pose obstacles [7]. Cognitive influences on health-related actions cannot be overlooked. Wilson and Wolf (2009) emphasize the importance of working memory and its impact on how health items are designed. A thorough understanding of cognitive variables is essential to create interventions that resonate with patients and promote better adherence to lifestyle modifications [8]. A seminal study by Cline et al. (1999) investigated non-compliance with prescription medication and knowledge thereof in elderly patients with heart failure. The study underscored the complex interaction between patient comprehension, adherence, and cardiovascular health management [9]. Building on this context, the present study aims to provide insights and strategies to enhance visitor adherence, improve health outcomes, and

promote effective lifestyle change plans. The study's specific objective is to identify factors contributing to non-adherence of Lifestyle Clinics visitors to lifestyle modification plans in King Abdul-Aziz Medical City in Jeddah.

## **Materials and Methods.**

### **Study design:**

A cross-sectional study was conducted to examine factors associated with non-adherence to lifestyle modification plans. The study was carried out at the Lifestyle Clinics within the Primary Healthcare Department of King Abdulaziz Medical City, Jeddah, Saudi Arabia.

### **Participants:**

Participants were recruited from individuals attending the lifestyle clinics between March and April 2024. Eligible participants were adults aged  $\geq 18$  years who were referred for weight reduction during the study period. Exclusion criteria included individuals younger than 18 years, pregnant women, patients diagnosed with depression or other psychiatric disorders, those who had undergone bariatric surgery, and individuals receiving lifestyle counselling for conditions other than weight management.

### **Sample Size and Sampling:**

The required sample size was calculated using the RAOSOFT sample size calculator. Assuming an estimated population of 20,000 individuals attending National Guard primary healthcare centers, a 5% margin of error, 95% confidence level, and a 50% response distribution (to ensure maximum variability), the minimum required sample size was 377 participants.

Participants were recruited using a convenience sampling approach during routine clinic visits. All eligible individuals attending the lifestyle clinics during the study period were invited to participate. Recruitment was consecutive within the study timeframe to reduce selection bias.

### **Data Collection:**

Data were collected by senior preventive medicine residents using a structured questionnaire administered during clinic visits. The questionnaire included sections on sociodemographic characteristics, lifestyle behaviors aligned with the six pillars of lifestyle medicine as described by the American College of Lifestyle Medicine [10], adherence to lifestyle recommendations, and perceived barriers to adherence.

### **Measurement Tools and Validity Assessment.**

#### **Knowledge Assessment:**

Participants' knowledge regarding healthy lifestyle practices was assessed using a structured questionnaire developed by the research team based on commonly recommended lifestyle medicine guidance relevant to diet, physical activity, sleep, and stress management. The questionnaire included items on dietary fats, recommended daily intake of sugar and salt, recommended fruit and vegetable intake, weekly duration of moderate physical activity, recommended daily step count, sleep duration, the role of meditation and mental activities in stress reduction, and the general benefits of adopting a healthy lifestyle.

The knowledge items were primarily descriptive and were

included to characterize participants' awareness of healthy lifestyle recommendations rather than to generate a formal diagnostic knowledge scale. Responses were summarized using frequencies and percentages. Content validity was supported through expert review by clinicians familiar with preventive medicine and lifestyle counselling to ensure that the items were relevant, clear, and consistent with established health recommendations. Because the knowledge questionnaire was used for descriptive purposes and not as a psychometric scale, internal consistency analysis was not considered essential.

#### **Adherence Measurement:**

Adherence to lifestyle modification plans was assessed using a previously validated 13-item questionnaire developed by Dubasi et al. [11] to evaluate adherence to dietary and physical activity recommendations among individuals with lifestyle-related conditions. Each item was measured on a Likert-type scale reflecting frequency of adherence behaviors, with response options scored numerically from 1 to 5. The total adherence score was calculated by summing all item responses.

The possible total score ranged from 13 to 65, with higher scores indicating greater adherence to recommended lifestyle behaviors. For analytical purposes, adherence was examined both as a continuous variable and as a dichotomous variable. For categorical analysis, participants scoring at or above the sample median (43/65) were classified as adherent, while those scoring below the median were classified as non-adherent. This cutoff was used for analytical and interpretive purposes only, as the original instrument does not provide a validated clinical threshold for defining adequate adherence. Accordingly, this dichotomization reflects the relative distribution of adherence within the present sample rather than an externally validated standard of sufficient adherence.

Internal consistency reliability was assessed using Cronbach's alpha. The initial alpha coefficient including all 13 items was 0.68. Item-total correlation analysis revealed that the item assessing the number of daily meals had a weak correlation with the overall scale and reduced internal consistency. After removing this item, Cronbach's alpha increased to 0.70, indicating acceptable internal reliability for research purposes. The decision to exclude this item was based on statistical performance and improved scale coherence.

#### **Barriers to Adherence Assessment.**

Perceived barriers to adherence were assessed using items adapted from a previously published Saudi study conducted in primary healthcare settings [12]. The instrument included commonly reported barriers such as lack of energy, lack of time, lack of willpower, lack of resources, lack of social support, lack of skills, fear of injury, and lack of knowledge. Participants responded in a dichotomous (Yes/No) format to indicate whether each factor represented a personal barrier to adherence.

Content validity was supported by the adaptation of items from a previously validated instrument developed within a comparable Saudi primary care context. The selected barriers reflect theoretically recognized dimensions of adherence behavior, including motivational (e.g., willpower), structural (e.g., time, resources), physical (e.g., energy), social (e.g., support), and cognitive (e.g., knowledge) factors. Construct

validity is supported by the observed associations between specific barriers—particularly lack of energy and lack of time—and adherence outcomes in the present study, consistent with findings from systematic reviews examining determinants of adherence to lifestyle interventions.

### Statistical Analysis.

Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 29.0 (IBM Corp., Armonk, NY, USA).

Data were examined for completeness prior to analysis. Missing data were minimal (<1%) and were handled using listwise deletion without materially affecting sample size or results.

The primary outcome variable was the total adherence score, calculated by summing responses to 13 adherence items. Following internal consistency evaluation, the item assessing number of daily meals was removed due to low item–total correlation, resulting in an improved Cronbach’s alpha of 0.70, indicating acceptable internal reliability.

Adherence scores were analyzed primarily as a continuous variable. Due to non-normal distribution confirmed using the Shapiro–Wilk test, non-parametric methods were applied where appropriate. Continuous variables were summarized using median and interquartile range (IQR), while categorical variables were presented as frequencies and percentages.

For interpretability, adherence was additionally categorized into adherent and non-adherent groups using the sample median (43/65) as the threshold, given the absence of a validated clinical cutoff in the original instrument.

Spearman’s rank-order correlation was used to assess associations between continuous variables and adherence scores. Associations between categorical predictors and adherence status were evaluated using the Chi-square test. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for relevant binary comparisons.

To account for potential confounding, multivariable logistic regression analysis was performed with adherence status (adherent vs. non-adherent) as the dependent variable. Variables considered clinically relevant or statistically significant in univariate analysis were entered into the model, including age, healthcare worker status, lack of energy, and lack of time. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported. Multicollinearity among predictors was assessed prior to model estimation. A two-sided  $p$ -value < 0.05 was considered statistically significant.

### Ethical Considerations:

Data were collected from visitors after obtaining their approval and consent. Data were stored on the principal investigator’s computer and accessed only by the authors. No names or ID numbers were recorded in the data collection form to ensure privacy. The research was approved by the ethical and scientific committee of King Abdullah International Medical Research Center at King Abdulaziz Medical City.

### Results.

As presented in Table 1, gender was not significantly associated with adherence to lifestyle modification plans. A slightly higher proportion of males were adherent (56.7%) compared to females

(54.2%); however, this difference was not statistically significant (OR = 1.10, 95% CI: 0.72–1.68,  $p$  = 0.622), indicating comparable adherence patterns between sexes.

Healthcare worker status demonstrated a statistically significant association with adherence. Participants who were healthcare workers exhibited higher adherence rates (53.7%) compared to non-healthcare workers (41.2%). In unadjusted analysis, healthcare workers had 1.66 times higher odds of adherence relative to non-healthcare workers (OR = 1.66, 95% CI: 1.03–2.66,  $p$  = 0.027).

Smoking status was not significantly associated with adherence. Smokers demonstrated lower adherence (37.1%) compared to non-smokers (45.5%); however, this association did not reach statistical significance (OR = 0.71, 95% CI: 0.34–1.49,  $p$  = 0.343).

Similarly, employment status was not significantly associated with adherence. Adherence rates were comparable between employed (44.4%) and unemployed participants (45.3%), with no meaningful difference observed (OR = 0.96, 95% CI: 0.64–1.44,  $p$  = 0.879).

Overall, among the demographic and clinical characteristics examined, healthcare worker status was the only factor significantly associated with adherence in unadjusted analysis (Table 1), while gender, smoking, and employment status showed no statistically significant associations.

The distribution of information sources about lifestyle habits among the study participants was investigated. The most common source of information reported was social media, with 74.5% of participants indicating they obtain lifestyle habit information from this source. This was followed by the internet (44.7%), and consultations with doctors (36.1%). Other sources such as books and scientific journals (15.3%), gym coaches (21.1%), and personal study (10.3%) were less commonly reported. The detailed distribution of these sources is illustrated in (Figure 1).

As shown in Table 2, body mass index (BMI) categories were not significantly associated with adherence to lifestyle modification plans ( $p$  = 0.809).

Using participants with normal BMI as the reference group, no statistically significant differences in adherence were observed across BMI categories. Participants classified as overweight demonstrated slightly higher adherence rates (48.4%) compared to those with normal BMI (43.5%), corresponding to an odds ratio of 1.22 (95% CI: 0.70–2.13). Similarly, individuals with obesity class I showed comparable adherence (46.9%; OR = 1.15, 95% CI: 0.64–2.06), while those with obesity class II had adherence rates similar to the reference group (42.6%; OR = 0.96, 95% CI: 0.45–2.03).

Participants with obesity class III exhibited lower adherence (23.8%) compared to those with normal BMI; however, this association did not reach statistical significance (OR = 0.41, 95% CI: 0.13–1.26). The wide confidence interval likely reflects the small number of participants within this category.

Overall, although a trend toward lower adherence was observed among participants with more severe obesity, BMI was not significantly associated with adherence in unadjusted analysis (Table 2).

**Table 1.** Demographic and clinical characteristics associated with adherence to lifestyle modification plans.

Variable	Category	Adherent n (%)	Non-adherent n (%)	Crude OR (95% CI)	P-value
<b>Gender</b>	Male	93 (56.7%)	71 (43.3%)	1.10 (0.72–1.68)	0.622
	Female (ref)	117 (54.2%)	99 (45.8%)	1	
<b>Healthcare Worker</b>	Yes	58 (53.7%)	50 (46.3%)	<b>1.66 (1.03–2.66)</b>	<b>0.027</b>
	No (ref)	112 (41.2%)	160 (58.8%)	1	
<b>Smoking</b>	Yes	13 (37.1%)	22 (62.9%)	0.71 (0.34–1.49)	0.343
	No (ref)	157 (45.5%)	188 (54.5%)	1	
<b>Employment</b>	Employed	108 (44.4%)	135 (55.6%)	0.96 (0.64–1.44)	0.879
	Unemployed (ref)	62 (45.3%)	75 (54.7%)	1	

**Table 2.** Body mass index categories and adherence to lifestyle modification plans.

BMI Category	Adherent n (%)	Non-adherent n (%)	Crude OR (95% CI)	P-value
Underweight	3 (42.9%)	4 (57.1%)	0.93 (0.19–4.55)	0.809
Normal (ref)	37 (43.5%)	48 (56.5%)	1	
Overweight	59 (48.4%)	63 (51.6%)	1.22 (0.70–2.13)	
Obesity I	46 (46.9%)	52 (53.1%)	1.15 (0.64–2.06)	
Obesity II	20 (42.6%)	27 (57.4%)	0.96 (0.45–2.03)	
Obesity III	5 (23.8%)	16 (76.2%)	0.41 (0.13–1.26)	

**Table 3.** Perceived barriers to adherence and crude odds ratios for lifestyle modification adherence.

Barrier	Adherent n (%)	Non-adherent n (%)	Crude OR (95% CI)	P-value
<b>Lack of energy</b>	110 (40.9%)	159 (59.1%)	<b>0.59 (0.37–0.93)</b>	<b>0.019</b>
No lack of energy (ref)	60 (54.1%)	51 (45.9%)	1	
<b>Lack of time</b>	107 (40.8%)	155 (59.2%)	<b>0.60 (0.39–0.93)</b>	<b>0.023</b>
No lack of time (ref)	63 (53.4%)	55 (46.6%)	1	
Lack of willpower	119 (42.0%)	164 (58.0%)	0.66 (0.41–1.06)	0.072
No lack of willpower (ref)	51 (52.6%)	46 (47.4%)	1	
Lack of resources	75 (41.0%)	108 (59.0%)	0.75 (0.49–1.15)	0.156
Lack of social support	70 (43.8%)	90 (56.3%)	0.93 (0.60–1.44)	0.741
Lack of skills	80 (44.0%)	102 (56.0%)	0.94 (0.61–1.44)	0.769
Fear of injury	42 (42.4%)	57 (57.6%)	0.89 (0.54–1.47)	0.59
Lack of knowledge	57 (42.5%)	77 (57.5%)	0.88 (0.57–1.35)	0.524

**Table 4.** Correlation between age and adherence score.

Variable	Statistical Test	Correlation Coefficient (r <sub>s</sub> )	95% CI*	P-value
Age (years)	Spearman's rank correlation	<b>0.205</b>	0.108 – 0.296	<b>&lt;0.001</b>

**Table 5.** Multivariable Logistic Regression Analysis of Factors Associated with Lifestyle Adherence.

Variable	Adjusted OR (AOR)	95% Confidence Interval	P-value
Age (years)	1.03	1.01 – 1.05	0.003
Healthcare worker (Yes vs No)	1.32	0.85 – 2.05	0.213
Lack of energy (Yes vs No)	0.63	0.41 – 0.96	0.032
Lack of time (Yes vs No)	0.74	0.48 – 1.14	0.174

**Abbreviations:** AOR = Adjusted Odds Ratio; CI = Confidence Interval.

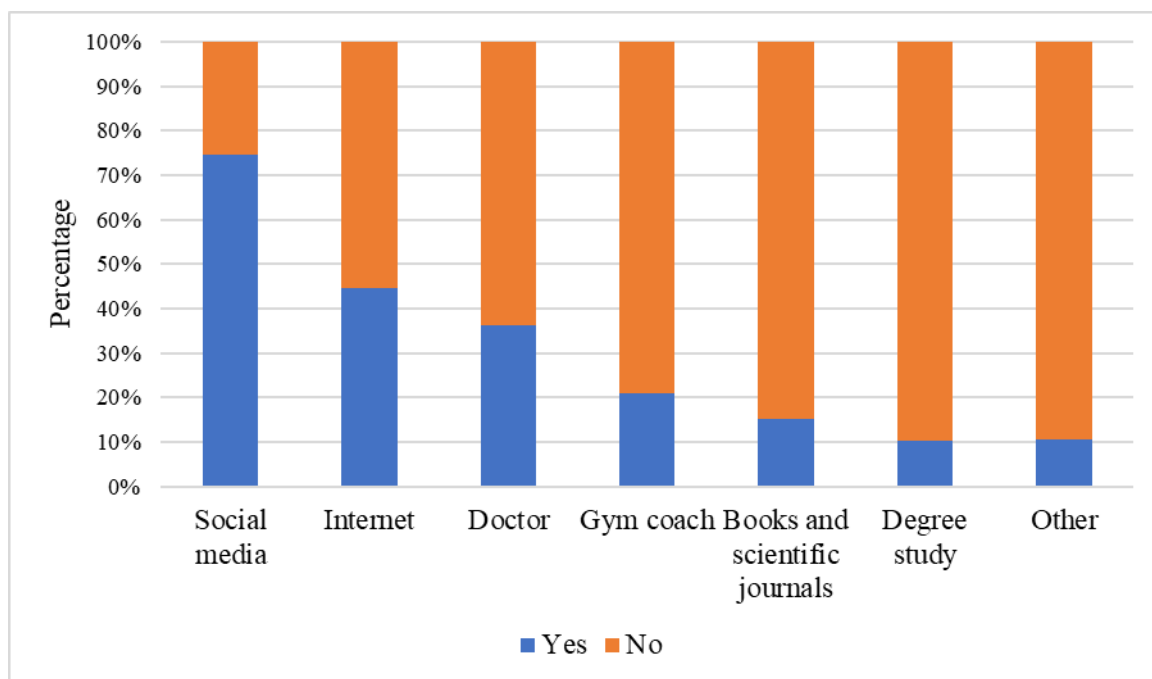
**Note:** Multivariable logistic regression model with adherence status (adherent vs non-adherent) as the dependent variable. Variables included in the model were age, healthcare worker status, lack of energy, and lack of time.

As shown in Table 3, several perceived barriers were evaluated in relation to adherence to lifestyle modification plans. Among these, lack of energy and lack of time demonstrated statistically significant associations with adherence.

Participants reporting lack of energy had lower adherence rates (40.9%) compared to those not reporting this barrier (54.1%). In unadjusted analysis, lack of energy was associated with a 41% reduction in the odds of adherence (OR = 0.59, 95% CI: 0.37–0.93, p = 0.019).

Similarly, participants reporting lack of time showed lower adherence (40.8%) compared to those without this barrier (53.4%). Lack of time was associated with 40% lower odds of adherence (OR = 0.60, 95% CI: 0.39–0.93, p = 0.023).

Although lack of willpower was the most frequently reported barrier, it was not significantly associated with adherence. Participants reporting lack of willpower had lower adherence (42.0%) compared to those not reporting it (52.6%); however, the association did not reach statistical significance (OR = 0.66,



**Figure 1.** Sources of information about lifestyle habits among the participants.

95% CI: 0.41–1.06,  $p = 0.072$ ).

Other barriers—including lack of resources, lack of social support, lack of skills, fear of injury, and lack of knowledge—were not significantly associated with adherence (all  $p > 0.05$ ). The corresponding crude odds ratios were close to unity, indicating limited evidence of meaningful associations in unadjusted analyses.

Overall, among the barriers examined, lack of energy and lack of time emerged as the only factors significantly associated with reduced adherence to lifestyle modification plans in crude analysis (Table 3).

Age demonstrated a statistically significant positive correlation with adherence score (Spearman's  $r_s = 0.205$ , 95% CI: 0.108–0.296,  $p < 0.001$ ), indicating that older participants tended to have higher adherence levels. Although statistically significant, the correlation strength was small to moderate in magnitude (Table 4).

To account for potential confounding between demographic characteristics and perceived barriers, multivariable logistic regression analysis was performed with adherence status (adherent vs. non-adherent) as the dependent variable (Table 5). After adjustment, age remained significantly associated with adherence (AOR = 1.03, 95% CI: 1.01–1.05,  $p = 0.003$ ), indicating that older participants were more likely to adhere to lifestyle modification recommendations. Healthcare worker status was not significantly associated with adherence after adjustment (AOR = 1.32, 95% CI: 0.85–2.05,  $p = 0.213$ ). Among the perceived barriers examined, lack of energy remained independently associated with lower adherence (AOR = 0.63, 95% CI: 0.41–0.96,  $p = 0.032$ ), while lack of time was no longer statistically significant after adjustment (AOR = 0.74, 95% CI: 0.48–1.14,  $p = 0.174$ ). These findings suggest that age and reduced physical capability, reflected by lack of energy,

may play independent roles in influencing adherence to lifestyle modification plans.

### Discussion.

Adherence to lifestyle modification plans is a fundamental component of preventing and managing chronic diseases, yet maintaining sustained behavioral change remains challenging in clinical practice. In the present study, more than half of the participants (54.5%) were classified as non-adherent despite receiving care within a structured lifestyle clinic. This finding is consistent with previous studies that have documented substantial levels of non-adherence to recommended lifestyle behaviors among individuals with chronic conditions and those participating in lifestyle intervention programs [13-15]. The persistence of non-adherence even within specialized clinical settings suggests that access to counseling alone may not be sufficient to ensure consistent implementation of recommended lifestyle behaviors.

Age demonstrated a significant positive association with adherence in both correlation and multivariable analyses, indicating that older participants were more likely to adhere to lifestyle recommendations. Similar findings have been reported among individuals with chronic diseases, including patients with type 2 diabetes, where older age has been associated with greater adherence to lifestyle and treatment recommendations [13,16]. Several explanations may account for this pattern. Older adults may perceive themselves as being at greater risk for complications related to chronic diseases, which may increase motivation to follow medical advice. Additionally, accumulated health experiences and increased interaction with healthcare systems may improve understanding of the long-term benefits of lifestyle modification.

Healthcare workers initially demonstrated higher adherence levels compared with non-healthcare participants in unadjusted

analysis; however, this association did not remain statistically significant after adjustment for potential confounders. Healthcare professionals may benefit from increased exposure to health education and preventive medicine practices. Nevertheless, previous studies have shown that professional knowledge does not always translate into personal health behaviors, indicating that awareness alone may not guarantee behavioral change [17]. Employment status was also not significantly associated with adherence in this study. Evidence from previous research has shown mixed results regarding the influence of occupational status on lifestyle behaviors, as employment may either facilitate or hinder adherence depending on workload, time availability, and work environment [18-21].

Perceived barriers played an important role in adherence behavior in the present study. Participants reporting lack of energy and lack of time were significantly less likely to adhere to lifestyle modification plans. These findings are consistent with systematic reviews that identify fatigue, time constraints, and competing responsibilities as major barriers to maintaining lifestyle interventions among individuals with obesity and other chronic conditions [23-26]. Such barriers may limit the ability of individuals to engage consistently in recommended behaviors such as regular physical activity or dietary planning, even when they possess adequate knowledge regarding healthy lifestyle practices.

The observed relationships between perceived barriers and adherence can be interpreted using the Capability–Opportunity–Motivation–Behavior (COM-B) framework of behavior change. This theoretical model proposes that health behaviors are influenced by an individual's physical and psychological capability, the opportunities available within their environment, and their level of motivation to perform the behavior [27-29]. Within this framework, lack of energy may represent a limitation in physical capability, while lack of time reflects restricted opportunity to engage in lifestyle behaviors. Interestingly, although lack of willpower was frequently reported among participants, it was not significantly associated with adherence in the present analysis. This finding suggests that structural or contextual constraints may exert a stronger influence on behavior than perceived motivational deficits alone.

Another important finding of this study is the apparent gap between knowledge and behavioral implementation. Participants demonstrated high awareness of several healthy lifestyle practices, including recommended dietary intake, sleep duration, and stress management strategies. Despite this knowledge, adherence to lifestyle modification plans remained suboptimal. Similar discrepancies between awareness and actual behavior have been documented in previous studies examining health knowledge and lifestyle practices among adult populations [30-33]. These findings indicate that educational interventions alone may not be sufficient to produce sustained lifestyle change unless they are accompanied by strategies that address behavioral and environmental barriers.

Social media emerged as the most frequently reported source of lifestyle information among participants. Digital platforms are increasingly used to disseminate health information and influence health-related behaviors. Previous research has shown

that social media and other digital communication technologies can affect physical activity behaviors, dietary choices, and general health awareness [22,24]. However, the reliability and quality of health information available through such platforms may vary considerably. Therefore, integrating digital health resources with clinician-guided education may improve the accuracy of information and enhance the effectiveness of lifestyle counseling.

Although body mass index was not significantly associated with adherence in the present study, a trend toward lower adherence among individuals with severe obesity was observed. Individuals with advanced obesity may face additional physical and psychological challenges that affect their ability to sustain lifestyle changes. Previous research has indicated that obesity-related physical limitations, reduced exercise tolerance, and behavioral barriers may negatively influence adherence to lifestyle interventions [25].

Several limitations should be considered when interpreting these findings. First, the cross-sectional design prevents the establishment of causal relationships between the identified factors and adherence behavior. Second, the use of convenience sampling from a single tertiary healthcare institution may limit the generalizability of the findings to the broader population. The study population may also include individuals with greater exposure to health information, including healthcare workers, which may influence adherence patterns. Third, the reliance on self-reported questionnaires introduces the possibility of recall bias and social desirability bias. Finally, categorizing adherence using the sample median may limit comparability with studies that apply externally validated adherence thresholds.

Despite these limitations, this study provides valuable insights into factors influencing adherence among individuals attending lifestyle clinics in Saudi Arabia. The findings emphasize the importance of addressing practical barriers, particularly time constraints and reduced physical energy, when designing lifestyle intervention programs. Interventions that combine behavioral support, individualized counseling, and context-specific strategies may enhance adherence and promote more sustainable lifestyle modification. Improving adherence to lifestyle recommendations remains an essential component of reducing chronic disease risk and improving long-term health outcomes [32-35].

## **Conclusion.**

More than half of participants were non-adherent to their lifestyle modification plan despite demonstrating high levels of knowledge regarding healthy lifestyle practices. Significant associations were identified between non-adherence and perceived barriers such as lack of energy and lack of time, as well as demographic factors including age and healthcare worker status. These findings suggest that knowledge alone is insufficient to ensure adherence. Interventions targeting practical constraints and behavioral determinants may be more effective than education-focused strategies alone. Future research should employ longitudinal designs and multivariable analyses to further clarify causal pathways influencing adherence in the Saudi context.

## Acknowledgement.

We would like to express our sincere gratitude to all the participants of this study for their valuable time and insights. We also acknowledge the support from King Abdul-Aziz Medical City and the staff at the Lifestyle Clinics in Jeddah for their assistance in the data collection process.

## Conflict of interest.

The authors declare no conflict of interest.

## Funding.

The authors declare that this project did not receive any funding.

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