GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 9 (342) Сентябрь 2023

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 ВИНИТИ 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 ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

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
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. Корректура авторам не высылается, 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 compu-ter-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.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 საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ 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. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის 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 ფჩხილებში 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.

GEORGIAN MEDICAL NEWS
No 9 (342) 2023

Содержание:

GEORGIAN MEDICAL NEWS
No 9 (342) 2023

THE CORNEAL ENDOTHELIUM IN OCULAR SURFACE DISEASE AND GLAUCOMA: MECHANISMS OF DYSFUNCTION AND TREATMENT STRATEGIES

Ashish Chander[1], Sanjeev Verma[2], Devanshu Patel J[3], Roopashree[4], Dimple[5], Dilip Kumar Pati[6].

[1]Professor, Department of Ophthalmology, TeerthankerMahaveer University, Moradabad, Uttar Pradesh, India.

[2]Professor, Department of Ophthalmology, Jaipur National University, Jaipur, India.

[3]Associate Professor, Department of Pharmacology, Parul University, PO Limda, Tal.Waghodia, District Vadodara, Gujarat, India.

[4]Assistant Professor, Department of Chemistry, School of Sciences, JAIN (Deemed-to-be University), Karnataka, India.

[5]Tutor, Department of Nursing, IIMT University, Meerut, Uttar Pradesh, India.

[6]Professor, Department of Ayurveda, Sanskriti University, Mathura, Uttar Pradesh, India.

Abstract.

To determine risk factors and the overall incidence of ocular surface disorders in a cohort of long-term glaucoma patients. Utilizing simple clinical tools, cross-sectional observational research were constructed to evaluate ocular surface problems and indicators. Using a four-grade scale, ten queries regarding symptoms and indications on the cornea's surface were used to create an OSD severity score. The patients were divided into three groups: A, B, and C, depending on the result. The variables that increase the incidence of surface sickness were identified using a multinomial logistic regression. Five hundred and twenty patients made up the total population. According to the multivariate analysis, the patient's age, the number of daily eyedrops, any previous changes in topical treatment for ocular intolerance, intraocular pressure, and degree of glaucoma were all connected with the severity of ocular surface illness. Ocular surface disorders are frequently developed by patients getting treatment for primary open-angle glaucoma or ocular hypotension. which are less prevalent and serious in geriatric patients because their use greater drugs and have greater advanced glaucoma.

Key words. Glaucoma, Ocular surface disease, Preservatives, eyedrops.

Introduction.

A multifactorial disorder called ocular surface disease affects the meibomian glands, lacrimal glands, conjunctival epithelium, and corneal epithelium. Through various inflammatory mechanisms, it can either result in insufficient or excessive tear production, which impairs visual clarity and causes ocular discomfort [1]. While OSD may occur with various other ocular illnesses, they will focus on the combination of glaucoma and OSD. Glaucoma, the world's second-most common cause of vision today, was predicted to affect 80 million people by 2020. 15% of the 5 million Americans older than fifty have glaucoma and dry eye condition together [2]. The most frequent initial glaucoma treatment is topical drug therapy, and ocular surface disease occurs in 50–60% of glaucoma patients on topical anti-glaucomatous medicine. OSD may be a new problem that develops when topical glaucoma therapy starts, or it can be an existing condition in people with this condition that is made worse by topical treatment. During three months of starting the medicine, topical glaucoma medications may produce burning, itchiness, stinging and weeping, and loss in visual acuity [3]. People in neglected primary open-angle glaucoma (POAG) are more inclined to develop OSD, partially because they have a twenty-two percent less normal break turnover than patients without glaucoma. Topical application prescription medication is among the most common first glaucoma treatment, and 50-60 percent of glaucoma patients giving topical anti-glaucomatous medications experience. Primary open-angle glaucoma (POAG) is a progressive eye condition characterized by increased intraocular pressure (IOP) and optic nerve damage, leading to vision loss if left untreated. The severity of POAG is typically assessed based on a combination of clinical findings, including IOP levels, visual field defects, and optic nerve damage. These criteria help healthcare professionals classify the disease into different stages, guiding treatment decisions and monitoring disease progression. IOP is a critical factor in determining POAG severity. Elevated IOP is a significant risk factor for the development and progression of the disease. Generally, higher IOP levels are associated with more severe POAG, although not all patients with elevated IOP develop advanced disease, and some may have normal IOP [4]. People may have trouble taking their prescriptions because of the OSD caused by glaucoma. Additionally, subconjunctival glaucoma surgery failure is associated with OSD at a greater risk [5] Therefore, it is crucial to discuss about the appearance of OSD together with external glaucoma treatment and the treatment of glaucoma while OSD is present so as to avoid further ocular morbidity and improve the efficiency of glaucoma treatment.

The organization of this paper are as follows: part 2 explains the related work, part 3 explains the materials and methods, part 4 explains the result and discussion, part 5 explains the conclusion.

Related works.

Research [6] demonstrated that glaucoma patients have decreased and uneven corneal epithelial thickness (CET). Optical coherence tomography of the anterior section, the CET features of glaucomatous patients receiving medical care were assessed and contrasted with the CET values of controls. The cornea was mapped using the pachymetry scan pattern, and the specifications for the synthetically produced thickness of the corneal were noted. The mean inferiority (2 to 7 mm) and higher (2 to 7 mm) CETs decreased identically and roughly evenly in the glaucoma group. The ocular epithelial thickness has been universally reduced in glaucoma patients. In study [7], OSD using tear-film MMP-9 expression was thought to be a marker for those who had POAG (primary open-angle glaucoma). The

InflammaDry test was employed to assess the systemic MMP-9 concentration. The subgroup analysis revealed no statistically relevant differences comparing the 3 groupings for the DEQ-5, Oxford staining assessment, Schirmer-I, or MMP-9 expressions. Progressive MMP-9 detection in the tear film may reveal more about OSD and be a more accurate indicator of inflammation than traditional results. Government and terrorist organizations have employed mustard gas (MG), a strong searing and reducing chemical. After exposure to MG, ocular surface injuries are frequent. The study [8] offered a current update on the etiology, side effects on the ocular surface, and available treatments for ocular damage caused by MG. Study [9] aimed to determine how common OSD is in patients with glaucoma receiving topical medication, quantify complaints and quantitative ocular surface features, and determine how ocular surface therapy affects OSD and IOP control. Patients underwent Schirmer testing, staining of the ocular surface, examination of objective surface features, and symptom screening with the OSDI questionnaire. There were many OSD symptoms and signs in glaucoma patients getting medical treatment for the illness. The management of ocular surface diseases and IOP may be enhanced by short-term OSD treatment without the need to cease taking glaucoma medications. Anterior segment-OCT (AS-OCT) was used in a study [10] to evaluate the cornea and limbal epithelial changes in individuals having current glaucoma treatment to identify the changes carried on by preservatives and glaucoma medications that can result in limbal stem cell deficit (LSCD). The AS-OCT was used to quantify limbal thickness to assess the deficiency of limbal cells. The Schirmer test-I, OSDI Questionnaire, and AS-OCT were used in addition to the routine administration of fluorescein sodium sterile strips to quantify the tear break-up time. An advanced, non-invasive, and potentially useful method for identifying and classifying corneal degeneration in the context of external glaucoma treatment is the as-OCT evaluation of limbal epithelial thickness. According to a study [11], when compared to patients having other varieties of glaucoma (non-PEXG), individuals with PEX glaucoma (PEXG) had a different prevalence of OSD symptoms and indicators. Using the OSDI (ocular surface disease index) questionnaire, patients having non-PEXG and PEXG were prospectively assessed for the presence and intensity of OSD indicators. People with PEXG experienced OSD symptoms more frequently than people with other glaucoma types. Eyelid redness was much more prevalent in PEXG compared to the other groups. Autologous serum eyedrops (ASE) may repair ocular surface damage induced by preserved glaucoma eyedrops in study [12]. ASEs successfully treated chronic keratopathy when glaucoma eye drops were being used. It has been demonstrated that introducing ASEs may have a sizable influence while continuing to utilize glaucoma eyedrops. Even without stopping the causing eyedrops, ASE successfully addresses ocular-surface conditions brought on by prolonged use of maintained glaucoma eyedrops. Using specular microscope imaging, the shape of cornea epithelial cells in main fetal glaucoma (PCG) was investigated in study [13]. A noncontact Fresnel microscopy, model EM-3000 (Tomey), was used to examine the cornea endothelial cell layer. Endothelial cell density (ECD), the mean size of cells, coefficients of variation (CV), the highest and lowest cell measure, and other specular microscopy information were evaluated across the group participating in the experiment and the control group. ECD is much lower in PCG sufferers when compared to uninjured controls.

Materials and Methods.

In order to assess OSD in POAG/ocular hypertension (OHT) patients, this study was carried out as a qualitative, cross-sectional investigation with a one-month inclusion period. At the point of the evaluation, the patient had been diagnosed with POAG or OHT, being at least eighteen years old, and taking a minimum of one topical medication. A team of 65 ophthalmologists having experience treating POAG/OHT patients enlisted the patients. Without attempting to single out certain cases, including those highly driven by ocular surface concerns, they were assigned the responsibility of compiling information from 15 consecutive patients who satisfied the inclusion criteria.

Data sample.

Data were gathered anonymously via questionnaires using a standardized case reporting form accessible online. The data noted comprised the following:

Age and gender are sociodemographic factors.

Clinical information: IOP, Corneal hyperemia, lid line redness, cornea and conjunctive fluorescein stains, and lid edema, all scored on a scale of 1-4, along with the investigator's assessment of the extent of POAG along with other ocular surface feelings and symptoms. Mild, low, and severe are the three degrees of severity.

Inclusion and exclusion criteria.

Humans with glaucoma or ocular surface problems can participate in the study. The precise diagnosis must be specified. Give a range of ages for the patients or participants who will be a part of the study. Indicate whether a certain gender is included in the research of when both men and women are welcome to participate. Case reports or case series with a limited sample size should be excluded. Studies that don't offer information about the causes of corneal endothelial dysfunction or therapy options for glaucoma and ocular surface disorders should be excluded.

Current medical treatment of POAG/OHT:Medication category, duration from initial-line treatment, previous medical care for POAG/OHT, and earlier medication adjustments due to ocular intolerance are all factors in the present medical management of POAG/OHT. The patient, the ophthalmologist before the clinical evaluation, and the ophthalmologist after the clinical examination all submit ratings of how well the eye drops are tolerated on a scale of 0 to 15. These ratings are used to determine how well the current drug is taken.

The desired sample size for an observational study is established using the confidence intervals (CI) utilized to measure the main result criterion. This study's main goal was to statistically estimate how many patients were in each of the three groups—A, B, and C—based on how severe their signs and symptoms were. These ratios weren't known at the start of the investigation. We used the worst-case scenario of a 55% proportion to determine the required sample size because that is the proportion for which the CI of a proportion reaches its

highest. No matter how the three categories were distributed among the 610 study participants, having a CI of 96%±6%, the incidence of eye dryness should be roughly approximal. It was anticipated that 65 researchers would be sufficient, based on current expertise, to enroll the 610 patients required for the trial.

The ocular surface sensation and acknowledge rankings ranged from 0 to 5, and the indicator ratings, which varied from 1 to 5, were used to form groups. According to how severe their symptoms and signs were, the patients were then split into three separate categories based on their overall sum scores, which ranged from 1 to 30:

The score for group A: 1 to 5

The score for group B: 5 to 15

The score for group C: 15 to 30

Statistical evaluation.

The statistical evaluation used SAS software 9.1. Frequency counts, and percentages were used to describe the ordinal and qualitative variables, respectively. The total number of replies, averages, deviations from the standard, and the mean, highest, and lowest values for all patients who provided data were used to define quantitative variables. Using the Pearson chi2 test, a statistical analysis of qualitative variables was conducted. For numerical variables, the study of variance or Student t-test was performed. Nonparametric tests were applied when it was determined that the data were not distributed normally. The risk factors for OSD were discovered in two steps.

1. The patient ratios in every one of the three categories were used in bivariate analysis to identify characteristics significantly associated with OSD severity.

2. The patient group served as the dependent variable in a multimodal multinomial minimal logic model that included the characteristics closely associated with the severity of the ocular surface condition.

The following factors were considered independent: IOP, POAG severity, gender, age, the number of daily eyedrops and eye medications used, the need for prior changes to the eyedrop regimen, and any previous alterations to the amount of time of medicine due to OSD. These data were gathered and added as separate variables to the multivariate model to distinguish between the results for the condition under study.

The patients who were enrolled in this observational study were not subjected to any physical or psychological harm, nor were they required to participate in a special study visit. All patients were, however, fully informed of the study's objectives, and all information was gathered anonymously. All Informed agreement was obtained from participants, and this observational study complied with the Declaration of Helsinki's standards for clinical trials.

Results.

This study had 520 patients in total. These patients' characteristics are listed in Tables 1,2 and 3. Regarding the 517 patients (three patients' data were unavailable). 235 (45.1%)

Table 1. *Risk factor identification: bivariate analysis group-A.*

	Group A, 260 (50%)	Group B, 104 (20%)	Group C, 156 (30%)	Total, 520(100%)	p-value
Gender, n(%)					0.11
Male	122	44	72	238(45.7)	
Female	138	60	84	282(54.2)	
Age Group, y, n (%)					0.007
50-59	95	25	40	160(30.7)	
60-69	80	30	55	165(31.7)	
70+	75	49	61	185(35.5	
Date of initial POAG treatment, y, n (%)					0.002
≤5	125	40	45	210(40.3)	
5-10	70	30	60	160(30.1)	
>10	61	34	51	146(28.01)	

Table 2. *Risk factor identification: bivariate analysis group-B.*

	Group A, 260 (50%)	Group B, 104 (20%)	Group C, 156 (30%)	Total, 520(100%)	p-value
Eye drops used daily, n (%)					0.008
NR	1	2	-	3	
1	125	40	70	235(45.1)	
2	70	30	30	130(251.0)	
≥3	64	32	56	152(59.2)	
Previous eye drop modification (for whatever reason), n (%					0.001
Yes	170	94	135	399(76.7)	
no	90	10	21	121(23.2)	
Ocular surface intolerance-related treatment modification in the past, n (%)					0.001
Yes	65	78	75	218(41.9)	
no	195	26	81	302(58.01)	
IOP for the right eye, mmHg, mean (SD)	16.7	18	16.8	17.0	
Mean (SD) IOP for the left eye in mmHg	16.6	18.4	17.5	17.5	

Table 3. *Risk factor identification: bivariate analysis group-C.*

	Group A, 260 (50%)	Group B, 104 (20%)	Group C, 156 (30%)	Total, 520(100%)	p-value
Glaucoma severity, n (%)a					0.01 0.001 <0.0001
Ocular hypertension	60	10	20	90(17.3)	
Mild glaucoma	95	23	50	168(32.3)	
Moderate glaucoma	56	38	55	149(28.6)	
Severe glaucoma	45	33	31	109(20.9)	
Ocular surface disease with known co-morbidity, n (%)b					<0.0001
Yes	12	45	35	92(17.6)	
no	248	59	121	428 (82.3)	
An everyday eye-active substance, n (%)					
NR	1	2	-	3	
Monotherapy	140	35	60	235	
Bitherapy	90	45	60	195	
Tritherapy	30	24	40	94	

Table 4. *Classification of risk factors: multinomial logistic regression system multivariate analysis.*

The reference group consists of patients having an ocular surface score between 1 to 5 (group A).	Patients in group B (ocular surface score range: 5–15) 96% CI	Patients in group C (ocular surface score range: 15–30) 96% CI	p
Age, y (reference:<60 years)			0.001
60-70	1.79	0.82-3.82	
>70	1.94	1.55-6.38	
amount of active medicines (reference: monotherapy)			
Bitherapy	1.10	0.66-2.52	0.003
Tritherapy	2.44	1.47-7.40	
IOP >16 mmHg (reference: ≤16 mmHg)	1.24	1.5-4.66	0.002
Ocular hypertension is a reference for glaucoma severity that is moderate to severe.	1.45	1.69-6.09	0.002
concurrent ocular surface conditions (reference: no)	5.77	5.84-33.69	<0.001
Treatment modifications made in the past as a result of intolerance to the ocular surface. (reference: no)	2.86	4.13-13.31	<0.001

Table 5A. *Outcomes of the Patients in group B having an ocular surface score of 5 to 15.*

	Patients with an ocular surface score from 5 to 10 (group-B)
60-70	1.78
>70	1.94
Bitherapy	1.11
Tritherapy	2.45
IOP>16mmhg	1.24
Glaucoma severity moderate/severe	1.45
Concomitant ocular surface disease	5.77
Modification of the treatment	2.86

Table 5B. *Outcomes of the Patients in group C having an ocular surface score of 15 to 30.*

	Patients with an ocular surface score from 11 to 30 (group C)
60-70	1.77
>70	3.14
Bitherapy	1.29
Tritherapy	3.3
IOP>16mmhg	2.65
Glaucoma severity moderate/severe	3.21
Concomitant ocular surface disease	14.81
Modification of the treatment	8.41

patients with POAG/OHT received just one topical medication, 184 (35.8%) received two medications, and 94 (18.07%) received three medications.

One daily dose was administered to 235 (45.1%) patients with POAG/OHT, two drops to 130 (25.0%) patients, and three drops or more to 152 (29.2%) patients. It proved believed that the deployment of set variants, where 2 drugs are provided by 1 or 2 drops, was responsible for the discrepancies.

The POAG topical medicine had been adjusted at least once in 399 patients (76.7%), with 218 patients (41.9%; Tables 1, 2, and 3) suffering at least one adjustment due to discomfort for the ocular surface. According to the researcher, 20.9% of the patients had severe glaucoma, 32.3% had mild glaucoma, and 17.3% had ocular hypertension. The symptoms frequently included burning, dry eyes, a feeling of a foreign body, itching, and weeping. Conjunctival hyperemia, eyelids margin redness, strong corneal fluorescein staining, strong conjunctival stains, and eyelid edema were the most common symptoms.

According to our scoring technique, 260 patients (or 50%) of the total 520 patients were placed in group A, 104 patients (20%) in the B group, and 156 patients (30%) in group C (Tables 1, 2, and 3). Figure 1 displays the number of cases for every individual's score.

From table 1, 2 and 3 Age-related increases in OSD prevalence (p=0.007). According to patient gender, we did not observe any differences in OSD prevalence (Table 1, 2, and 3). Since the initial POAG/OHT treatment, the prevalence of OSD has risen over time (p=0.002):

The prevalence of OSD when more topical medications used to treat POAG/OHT (p<0.0001) (Tables 1, 2, and 3). Similar outcomes were attained when the daily dosage of drops was taken into account. As more drops were used for POAG/OHT treatment, the prevalence of OSD (Tables 1, 2, and 3).

The history of treatment modifications and the ocular surface scores were both correlated. Patients whose anti-glaucoma medication had previously been altered because of ocular surface intolerance showed a higher prevalence of OSD (p<0.0001) (Table - 1, 2 and 3).

On the other hand, patients with higher levels of OSD were more likely to have previously modified their anti-glaucoma medication.

The prevalence of OSD increased with the severity of glaucoma (p<0.0001) (Tables 1, 2 and 3). Additionally, IOP increased as OSD deterioration advanced: in Table - 1, 2 and 3, patients in group C had higher right and left eye IOP measurements (16.8 and 17.5 mmHg) compared to those seeing groups B (18 and 18.4 mmHg) and A (16.7 and 15.6 mmHg). Due to this, the prevalence of disorders that underlie topical drug resistance may have been underestimated. However, as anticipated, there was a strong correlation between the severity and frequency of a concomitant OSD (p0.0001). These multivariate comparison analyses showed an essential favorable connection among OSD extent and patient age, time because topical therapy started, Numerous topical drugs, the quantity of droplets taken each day, changes made to prior external treatments, IOP or disease severity of the POAG (as determined by an ophthalmology). The patient's age, quantity of topical drugs, any prior adjustments to topical medication for ocular intolerance, contemporaneous

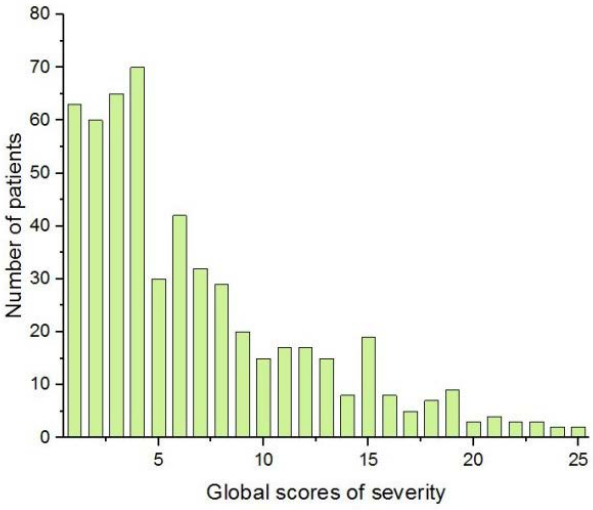

Figure 1. *Distribution of scores for ocular surface disease.*

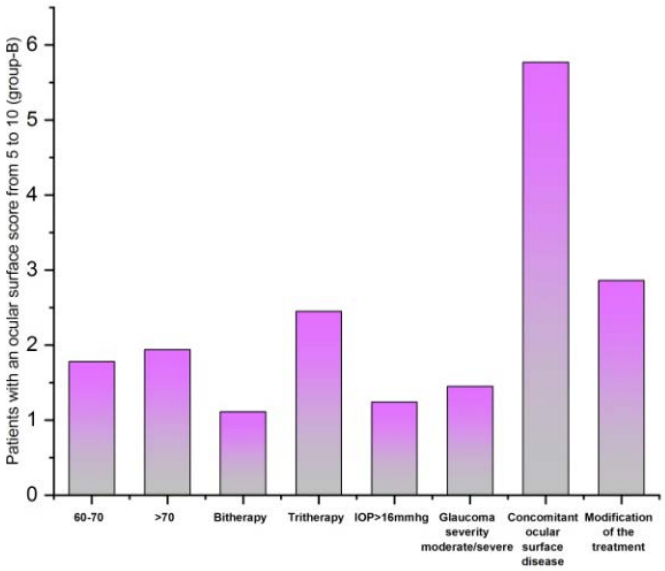

Figure 2. *Patients in group B having an ocular surface score of 5 to 15.*

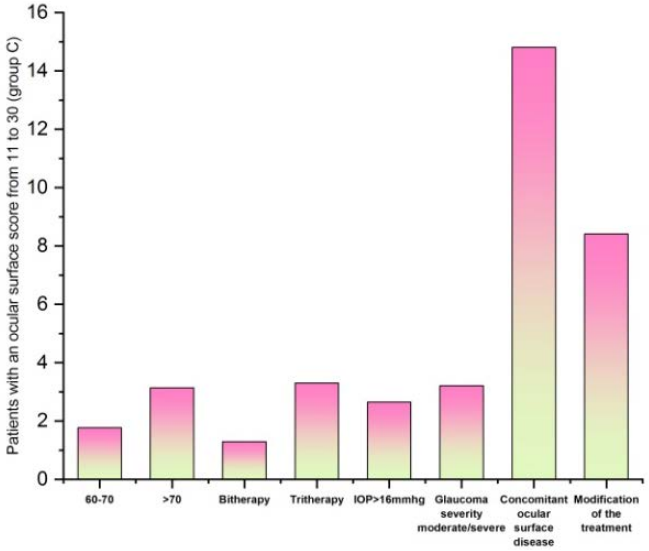

Figure 3. *Patients in group C having an ocular surface score of 15 to 30.*

OSD, IOP, and severity of glaucoma were still associated with the amount of OSD, according to the multivariate research (Table 4)(Figure 2 and Table 5). (Table 6 and Figure 3)The multinomial logistic regression had to be carried out because our scoring system divided the participants into three groups (A, B, and C).

The presence of a concomitant OSD, like Sjogren disorder, rosacea, or oratopy, was also taken into account in order to account for this confounding factor while doing the multivariate analysis. As blepharitis and a dry eye condition could not be distinguished from diseases connected to therapy, they were not regarded as distinct contemporaneous pathologies.

Conclusion.

This observational cross-sectional study examined the risk factors for OSD and the prevalence of the condition in long-term care glaucoma patients. Using ten questions on corneal surface symptoms and signs, an OSD severity rating was created by evaluating ocular surface signs and indicators using basic clinical equipment. A 4-grade scale is used to determine the score. Based on their final ratings, the patients are divided into 3 groups: A, B, and C. The examination from multinomial linear modeling revealed several significant OSD danger factors. The multivariate analysis found age, daily eyedrop use, modifications to topical medication used for ocular intolerance, the pressure inside the eye, and the level of glaucoma as factors linked to the extent of ocular surface sickness in the 520 individuals that made up the study sample. These results show that patients with the main open-angle or ocular hypertension frequently experience OSD. Healthcare professionals should prioritize tracking and controlling OSD in patients with glaucoma to solve these issues. Since the corneal endothelium had a limited ability for regeneration, endothelial dysfunction that cannot be reversed may result from severe injury to or elimination of endothelial cells. The intricate interactions among the corneal endothelium, optic nerve, and glaucoma etiology require more study.

REFERENCES

1. Schechter B, Mah F. Optimization of the Ocular Surface Through Treatment of Ocular Surface Disease Before Ophthalmic Surgery: A Narrative Review. Ophthalmology and Therapy. 2022;11:1001-1015.
2. Zhang X, Vadoothker S, Munir W.M, et al. Ocular surface disease and glaucoma medications: a clinical approach. Eye & contact lens. 2019;45:11.
3. Kumar S, Singh T, Ichhpujani P, et al. Ocular surface disease with BAK preserved travoprost and Polyquaternium 1 (poly quad) preserved travoprost—Romanian Journal of Ophthalmology. 2019;63:249.
4. Shin D.Y, Jung K.I, Park H.Y.L, et al. The effect of anxiety and depression on the progression of glaucoma. Scientific Reports. 2021;11:1-10.
5. Zhang X, Vadoothker S, Munir W.M, et al. Ocular surface disease and glaucoma medications: a clinical approach. Eye & contact lens. 2019;45:11.
6. Halkiadakis I, Vernikou A, Tzimis V, et al. Assessment of corneal epithelium thickness in glaucomatous patients undergoing medical treatment. Journal of Glaucoma. 2021;30:44-49.
7. Kim D.W, Seo J.H, Lim S.H. Evaluation of ocular surface disease in elderly patients with glaucoma: expression of matrix metalloproteinase-9 in tears. Eye. 2021;35:892-900.
8. Soleimani M, Momenaei B, Baradaran-Rafii A, et al. Mustard Gas–Induced Ocular Surface Disorders: An Update on the Pathogenesis, Clinical Manifestations, and Management. Cornea. 2023;42:776-786.
9. MyllaBoso A.L, Gasperi E, Fernandes L, et al. Impact of ocular surface disease treatment in patients with glaucoma. Clinical Ophthalmology. 2020:103-111.
10. Güçlü H, Çınar A.K, Çınar A.C, et al. Corneal epithelium and limbal region alterations due to glaucoma medications evaluated by anterior segment optical coherence tomography: a case-control study. Cutaneous and Ocular Toxicology. 2021;40:85-94.
11. Dermenoudi M, Matsou A, Keskini C, et al. Ocular Surface Disease Signs and Symptoms in Patients with Pseudoexfoliative Glaucoma: A Case—Control Study. Vision. 2022;6:11.
12. So H.R, Park H.Y.L, Chung S.H, et al. Effect of autologous serum eyedrops on ocular surface disease caused by preserved glaucoma eyedrops. Journal of Clinical Medicine. 2020;9:3904.
13. Mandal A.K, Gothwal V.K, Chaurasia S. Corneal Endothelial Features in Patients Operated for Primary Congenital Glaucoma. Ophthalmology Glaucoma. 2023;6:380-386.