REPUBLIC OF AZERBAIJAN

On the rights of the manuscript

ABSTRACT

of the dissertation for the degree of Doctor of Science in Medicine

THE HORN OF THE EYE IN AZERBAIJAN PREVALENCE OF DISEASES, NOSOLOGICAL STRUCTURE, RISK FACTORS, RESULTS OF SURGICAL TREATMENT AND WAYS OF OPTIMIZATION

Specialty: 3219.01 - opthalmological diseases

3212.01 - healthcare and its organization

Field of Science: Medicine

Applicant: **Polad Maharram Maharramov**

BAKU – 2023

The work was performed at the National Ophthalmology Centre named after Academician Zarifa Aliyeva.

Scientific consultant: Corresponding member of ANAS, Honored Scientist, Doctor of Medical Science, Professor **Elmar Mustafa Kasimov**

Official opponents: Doctor of Medical Science, Professor **Chinghiz Jarulla Jarullazadeh**

Doctor of Medical Science **Mushviq Israfil Karimov**

Doctor of Medical Science, Associate Professor **Aytan Kamal Mammadbayli**

Doctor of Medical Science, **Rafail Gurban Eyvazov**

Dissertation Council BED 1.03 of the Supreme Attestation Commission under the President of the Republic of Azerbaijan operating under the National Ophthalmology Centre named after Academician Zarifa Aliyeva

Chairman of the Dissertation council: Corresponding member of ANAS, Honored Scientist, Doctor of Medical Science, Professor **Elmar Mustafa Kasimov**

Scientific secretary of the Dissertation council: Doctor of Medical Sciences, Associate Professor **Nazila Mammad Rustamova**

Chairman of the scientific seminar: Doctor of Medical Sciences, Associate Professor **Anar Azam Aghayev**

INTRODUCTION

The relevance of the topic and the degree of it's elaboration. The high rate of the modern level development of scientific and technical discipline is not proportional to the possibilities of solving medical and social problems of society. Against the background of great achievements in the field of health, the problem of poor vision and blindness remains a serious medical and social problem[1;2;3;4]. Millions of people around the world suffer from poor eyesight and blindness. According to the official statistics in Azerbaijan, 100 thousand children and adolescents have more than 30 cases of blindness.

The share of corneal diseases among the nosological causes of poor vision and blindness varies widely depending on the socio-economic, environmental, climatic and geographical conditions of the countries[5;4]. Therefore, clinical and demographic characteristics, risk factors, treatment and prevention of bladder diseases are studied in different aspects in accordance with national priorities in all countries. Corneal diseases account for 10% of the causes of poor vision and blindness in The United States of America. To find out the cause of this, morphometric characteristics of the cornea were studied in depth, the mechanism of damage to its unique structure was substantiated[6].

---

[1]Gyawali, R. Retrospective data on causes of childhood vision imprairment in Eritrea / R.Gyawali, B.K.Bhayal, B.Adhikary [et al.] // BMJ ophthalmology, - 2017. 17, - p. 209

[2]Li, Y. Prevalence and causes of blindness, visual impairment among different ethinical minority groups in Xinjiang Uygar autonomous region, Chine / Y.Li, W.Huang, A.Qiqige [et al.] // Bile ophthalmology, - 2018. 18(41), - p.1-7.

[3]Sheng, X.L., Prevalence and associated factors of corneal blindness in Ningxia in northwest China / H.P.Li, Q.X.Liu [et al.] // Int J ophthalmol., - 2014. V.7, №3, - p.557-562

[4]Xu, S.C. Risk factors for visual impairment diseases in associated with corneal southern China / S.C.Xu, J.Chow, S.Liu [et al.] // Clinical ophthalmology, - 2016. 10, - p.777-782.

[5] Thapa, R. Prevalence and causes of low vision and blindness in an elderly population in Nepal / R.Thapa, S.Bajimaya, G.Paudyal [et al.] // BMC Ophthalmology, - 2018. 18(42), - p.1-10.

[6]Lamm,V. Corneal blindness. and xenotransplantation / V.Lamm, H.Kaza, A. Mammen [et al.] // Xenotransplantation, - 2014. 24 (2), - p. 99-117.

The role of infectious factors in the occurrence of corneal diseases in poorly developed countries is investigated[7;5]. The problem of alleviating the risk of dry eye syndrome in modern demographic and environmental conditions is the focus of scientists[8]. Laboratory, clinical and epidemiological characteristics of keratitis of mycotic origin have been studied in Egypt and Brazil [9;10]. Clinical and epidemiological characteristics of corneal diseases were carried out in broader aspects in the studies of Chinese scientists[11;12]. During 1,000 examinations, one case of blindness was revealed in connection with corneal diseases, the prevalence of infectious keratitis among rural population more than 2 times compared with urban population was proved, nosological structure of corneal diseases was determined. Corneal diseases

[7]Cherinet, F.M. Prevalence and associated factors of low vision and blindness among patients attending St. Paul`s hospital millenium medical college, Addis Abeba, Ethiopia / F.M.Cherinet, S.Y.Tekalign, D.H. Anbesse [et al.] // BMC Ophthalmology, -2018. 3(18), 1, – p.232.

[8]Narayanan, S. Dry Eye Disease and mikrobialkeratits: is there a connection? / S.Narayanan, R.L.Redfern, W.L. Miller [et al.] // Ocular Surf., - 2013. 11(2), - p. 75-92.

[9]Ibrahim, M.M. A new method to predict the epidemiology of fungal keratitis by monitoring the sales distribution of antifungal eye drops in Brazil / M.M.Ibrahim, , R.Augelis, A.S.Lima [et al.] // PLOS ONE, - 2012. V.7, - issue 3, e33775, - p.1-4.

[10]Khater, M.M., Shehab, N., El-Badry, A.S.Comparison of mycotic keretitis with non mycotickeretitis: an epidemiological study // Journal of Ophthalmology, - 2014. Article ID 2543 02, - p.7.

[11]Cao, J. Prevalence of infection keratitis in Central China / J.Cao, Y.Yang, W.Yang [et al.] // BMJ Ophthalmology, - 2014. 14(43), - p. 1- 6.

[12]Li, Y. Prevalence and causes of blindness, visual impairment among different ethinical minority groups in Xinjiang Uygar autonomous region, Chine / Y.Li, W.Huang, A.Qiqige [et al.] // Bile ophthalmology, - 2018. 18(41), - p.1-7.

[13]Chidambazam, J.D. Epidemiology, risk factors, and clinical a outcomes in severe microbial keratitis in South India / J.D.Chidambazam, N.V.Prajna, P.Srikanthi [et al.] // Ophthalmic epidemiology, - 2018. V.25, №4, - p.297-305

have created more severe problems for Indian population [13;14;15].

Scientists of this country have received positive results in the study of the etiological structure, season dependence and microbiological profile of keratitis. The role of the study of corneal fever by infrared thermography in the pathogenetic mechanism of eye diseases has been studied[16;17;18].

In countries where high-tech methods of examination are available, the topography of the cornea was perfectly studied and the treatment of keratoko-NUS was significantly optimized[19;20]. The effectiveness of surgical interventions was increased on the basis of an excellent assessment of the biomechanics of the cornea [21;22;23.] The

---

[14] Lin, C.C. Seasonal trends of microbial keratitis in south India / C.C.Lin, L.V.Prajna, M.Srinivasan [et al.] // Cornea, - 2012. 31(10), - p.1123-1127.

[15]Tewari, A. Epidemiological and microbiological profile of infective keratitis in Ahmedabad / A.Tewari, N.Sood, M.M.Vegad [et al.] // Indian J. Ophthalmol., - 2012. 60 (4), - p. 267-272.

[16]Konieczka, K. Cornea thermography: optimal evaluation of the outcome and the resulting reproducibility / K.Konieczka, A.Schoetzau, S.Koch [et al.] // Translational Vision Science & Technology, - 2018. Vol.7, №3, - p. 14.

[17]Nemeth, O. Ocular surface disease index and ocular thermography in keratoconus patients / O.Nemeth, A.Langenbucher, T.Eppig [et al.] // Journal of ophthalmology, - 2020. Article ID 1571283, - 8 p.

[18]Slettedal, J. K., Ringvold, A. Correlation between corneal and ambient temperature with particular focus on polar conditions // Acta Ophthalmologica, - 2015. Vol.93, №5, -p. 422– 426.

[19] Gomes, J.A.P. Global consensus on keratoconus and ectatic diseases / J.A.P.Gomes, D.Tan, C.J.Rapuano [et al.] // Cornea, - 2015. Vol. 34, № 4, - p. 359–369

[20]Itoi, M. Anterior and posterior ratio of corneal surface areas: a novel index for detecting early stage keratoconus / M.Itoi, K.Kitazawa, I.Yokota [et al.] // PLOS ONE, - 2020. 15(4), e0231074.

[21]Blackburn, B.J. A review of structural and biomechanical changes in the cornea in aging, disease, and photochemical crosslinking / B.J.Blackburn, M.W.Jenkins, A.M.Rollins [et al.] // Front. Bioeng. Biotechnol., - 2019. 7, - p. 66.

[22]Hashemi, H. Two-year changes in corneal stiffness parameters after accelerated corneal cross-linking: 18mW/cm2 versus 9mW/cm2 / H.Hashemi, R.Jr.Ambrósio, R.Vinciguerra [et al.] // J Biomech., - 2019. 93, - p. 209–212.

[23] Luz, A. Corneal biomechanics: Where are we?/A.Luz, F.Faria-Correia, M.Q.Salomao [etval.] // J. Curr. Ophthalmol., - 2016. 28, - p. 97–98.

diagnosis of corneal ectasia has been significantly improved [24;25;26].

The most important achievement of modern Ophthalmology is the justification of optimal options for the treatment of keratoconus [27;28;29]. Separate application of intrastromal segment rings of the cornea (ICRS), ultra-Violet crosslinking (CXL) and combination of different variants (CXL, topographic photorefractive keratoecomia TopoPRK, CXL+ICRS, CXL+PRK, etc.) made it possible to optimize the treatment of corneal appendages[30;31;32].

The study of Epidemiology, clinical features and treatment of corneal diseases in different countries is necessary to substantiate a single concept by revealing regional features of these pathologies.

---

[24] Salomao, M. The role of corneal biomechanics for the evoluation of ectasia patients / M.Salomao, A.L.Hofling- Lima, L.P.Esporcatte [et al.] // International Journal of Environmentol Research and Public Health, - 2020. 17(2113), - p.2-17.

[25] Ma, J. Biomechanics and structure of the cornea: implications and association with corneal disorders / J.Ma, Y.Wang, P.Wei [et al.] // Surv. Ophthalmol., - 2018. 63(6), - p.851–861

[26] Vinciguerra, R. Corneal biomechanics and biomechanically corrected intraocular pressure in primary open-angle glaucoma, ocular hypertension and controls / R.Vinciguerra, S.Rehman, N.A.Vallabh, [et al.] // Br J Ophthalmol., - 2020. 104(1), - p.121–126.

[27] Паштаев, Н.П., Поздеева, Н.А., Синицын, М.В. Двухлетний анализ клинико-функциональных результатов имплантаций колец MyoRing у пациентов с кератоконусом // Офтальмохирургия, - 2016. №1, - с.26 - 30.

[28] Aksoy, S., Topography and Higher order corneal aberrations of the fellow Eye in unilateral keratoconus / S.Aksoy, S.Akkaya, G.Ozkurt [et al.] // Turk J Ophthalmol., - 2017. 47(5), - p.249-254.

[29] Tummanapalli, S.S. Efficacy of axial and tangential corneal topography maps in detecting subclinical keratoconus / S.S.Tummanapalli, H.Potluri, P.K.Vad¬davalli [et al.] // J Cataract Refract Surg., - 2015. 41, - p.2205-2214.

[30] Camellin, M. Guidotti, J.M. Arba Mosquera, S. Corneal wave front guided transepithelial photorefractive keratectomy after corneal collagen cross linking in keratoconus // Journal of Optometry, - 2017. Vol. 10, №1, - p. 52–62

[31] Sakla, H. Simultaneous topography-guided photorefractive keratectomy and accelerated corneal collagen cross-linking for keratoconus / H.Sakla, W.Altroudi, G.Munoz [et al.] // Cornea, - 2016. Vol. 35, №7, - p.941–945.

[32] Sherif, A.M. One-year results of simultaneous topography-guided photorefractive keratectomy and corneal collagen cross-linking in keratoconus utilizing a modern ablation software / A.M.Sherif, M.A.Ammar, Y.S.Mostafa [et al.] // Journal of Ophthalmology, - 2015. Vol. 2015, Article ID 321953, - 7 p

Taking into account the above, the topic of scientific research aimed at optimizing the distribution, nosological structure and surgical treatment of corneal diseases in Azerbaijan and considered relevant.

Object of study. A patient with a possible corneal disease was selected as the object of the study.

Subject of research. The subject of the study was the anatomo-physiological state of the cornea of the eye, pathological changes, their conservative and operative correction.

The purpose of the study. The spread of corneal diseases in Azerbaijan, the study of risk factors, the analysis of existing treatment profilactic tactics, the justification of ways for optimal satisfaction of the population's demand for the evaluation of the results of new surgical treatment methods.

Tasks of the study:

- Studying the regional characteristics of corneal pathologies of the population of Azerbaijan;
- Prevalence of corneal injuries, risk factors, analysis of treatment results;
- Assessment of the prevalence, causes, risk factors and clinical characteristics of corneal clouding;
- Clinical-epidemiological characteristics of keratitis and investigation of effectiveness of treatment;
- Assessment of corneal ulcer prevalence, causes, risk factors and clinical features;
- Evaluation of the spread of non-infectious diseases of the cornea, risk factors and the effectiveness of treatment;
- Analysis of the effectiveness of operative treatment of corneal ectasias;

Methods of research:

- Visometry, refractorkeratometry, biomicroscopy, pachymetry fluorescein instillation test, endothelial microscopy, optical coherence tomography, keratotopography and computer tomography methods were used to assess the condition of the cornea;
- Microbiological analysis of corneal smear and methods of assessing sensitivity of microorganisms to antibiotics;

– Intrastromal segment implantation (ISI), corneal ultrasound cross-linking (CUCL), topoguided photorefractive keratectomy (TopoPRK) methods in the surgical treatment of corneal ectasias;
– Clinical-statistical methods: quantitative (mean level, standard error, confidence interval, dispersion) and qualitative (relative indicator, standard error and confidence interval) descriptive statistics methods; correlation and regression methods.

The main provisions to be defended:

– Azerbaijan is in an average position among the countries of the world in terms of clinical and epidemiological characteristics of corneal diseases, the main determinants of the prevalence of pathologies are the level of medical and economic development of settlements, the gender and age composition of the population;
– Trauma and burns, corneal erosion, ulceration and swelling, infectious keratitis and ectasia are the main priorities among corneal diseases. The clinical features and risk factors of these pathologies (occupational activity, age, lifestyle) are common, there is a high probability of complications due to different degrees of availability of medical care;
– Conservative treatment of infectious diseases of the cornea is successfully carried out taking into account the microbiological structure of corneal smears and their sensitivity to antibiotics;
– The effectiveness of surgical treatment of corneal ectasia varies significantly depending on the application of existing methods (implantation of intrastromal segments, ultraviolet crosslinking, topographic photorefractive keratectomy) in staged and combined variants.

Scientific novelty of the results of the study:

– The current settlement of the population of Azerbaijan and the country's role of the regional factor in the spread of corneal diseases, in the organization of their treatment and prevention is substantiated in the example of western-territorial division;
– Complex clinical-epidemiological characteristics of the main nosological forms of corneal diseases (trauma and burns,

erosion, ulcer and clouding, keratitis, ectasia, degeneration and dystrophy) have been determined;

- The algorithm of the effective surgical treatment of staged complex treatment of corneal ectasias is substantiated;

The theoretical significance of the study.

- The methodological basis of the research and the obtained results indicate the priority of the complex application of modern high-tech examination and treatment methods in the organization of ophthalmological assistance;
- In order to organize the treatment and prevention of corneal diseases, the necessity of a single ophthalmological care system was justified, taking into account the regional characteristics of the prevalence of corneal pathologies, risk factors, and primary care.

The practical significance of the research results:

- The obtained results make it possible to determine the etiopathogenetic treatment algorithm of conservative treatment of corneal diseases;
- In the study, the methodology of staged surgical treatment of corneal ectasias was theoretically and practically justified and proved to be highly effective.

Approbation and application of research results.

The results of the dissertation "Actual issues of ophthalmology" (Baku, April 28, 2019), at the 7th regional conferences of Azerbaijan Society of Ophthalmologists (Sheki, October 25, 2019), at the XL International scientific-practical conference "Modern medicine: approach and current researches " (Moscow, September 29, 2020), at the International Conference on "Current issues of education and science" (Tambov, February 27, 2021), at the International scientific-practical conference dedicated to the 98th anniversary of academician Z. Aliyeva's birth (Baku, April 28, 2021), at the XIII International scientific and practical conference (Amsterdam, July 31, 2021), at the XII "Eurocornea" congress (Virtual Event, September 25, 2021), dedicated to the 99th anniversary of the birth of Academician Z. Aliyeva reported at the international scientific-practical conference (Baku, April 28, 2022).

The initial discussion of the case was held at the meeting of The National Ophthalmology Center named after Academician Zarifa Aliyeva (protocol No1, 15 february 2023). It was reported and discussed at the scientific seminar of the FD 1.03 Dissertation Council operating under the National Ophthalmology Center named after Academician Zarifa Aliyeva (23 november 2023; protocol No21).

Publications. The main results of the research were published in 25 journal articles, including 9 abroad (journals in Web of Science, Scopus international indexing system), 16 in Azerbaijan. The journals in which the articles are published are the journals recommended by the Higher Attestation Commission. He participated in various international conferences with 13 theses and reports.

The results of the dissertation work are applied at the National Ophthalmology Center named after academician Z. Aliyeva in Masalli, Ganja and Sheki branches.

The name of the organization where the dissertation work was carried out: Azerbaijan State Advanced Training Institute for Doctors named after A. Aliyev.

The total volume of the dissertation with marks, taking into account the volume of the structural sections of the dissertation separately: Dissertation thesis entry - 10311 marks; Chapter I (Literature review) – 97427 signs; Chapter II. Research Materials and Methods – 19030 marks; Obtained results (Chapter III – 28344 marks; Chapter IV. – 19559 marks; Chapter V. – 23882 marks; Chapter VI – 49134 marks; Chapter VII – 62334 marks; Chapter VIII – 26905 marks;) Results (discussion and conclusion of obtained results) 34061 signs; results 7864 marks; practical recommendations 2419 signs. In the list of literature: In the list of literature: among the works of 20 Azerbaijani authors in literature list, 6 literature sources were used in Azerbaijani language, 82 in Russian and 426 in English.

The total volume of the dissertation with signs (excluding tables, graphs and literature list) consists of 381270 signs, 77 tables, 21 diagrams 1 picture and 1 schemes.

MATERIALS AND METHODS OF THE RESEARCH

According to the purpose of the research, the cornea of the hu-

man eye was chosen as the object of observation. The clinical, morphometric and functional condition of the cornea of healthy and patients with corneal pathologies, conservative and operative correction of existing pathologies were the main subjects of the research. Options for the object and subject of observation differed depending on the planned issues.

The prevalence of corneal pathologies in Azerbaijan is based on official state statistical data.

In order to study the prevalence of corneal traumas, risk factors and the results of treatment, referrals in outpatient clinics and hospitalizations in inpatient facilities of Baku city were used. In the inpatient treatment, 126 patients were observed with the diagnosis of mechanical trauma of the cornea, 19 patients with chemical and thermal burns of the cornea, and 31 patients with the diagnosis of corneal foreign body. 1212 applications with eye foreign body and 137 applications with eye burns were registered in ambulatory polyclinic institutions.

In order to characterize the prevalence of corneal opacification, referrals to ambulatory polyclinic institutions of the country are used. The scope and structure of the diagnostic assistance provided to patients with this pathology was evaluated in the database of the National Ophthalmology Center named after Academician Z. Aliyeva. The anamnesis, bio-demographic characteristics (age, gender) of the patients were studied, they were subjected to a complex ophthalmological examination (ophthalmoscopy, visometry, refractometry, biomicroscopy, perimetry, tonometry, optical coherence tomography, topography, ultrasound biometry, electroretinogram, sensitivity of the vision analyzer and determination of lability) provided. Biometric characteristics of the cornea were evaluated according to the results of end-optical coherence tomography. The following biometric characteristics have been identified:

Spherical and cylindrical components of refraction;

Visual acuity without correction;

Irregular astigmatism;

Central thickness of the cornea;

Minimal thickness of the cornea;
Maximum thickness of the epithelium;
Depth of corneal opacity;
Surface asymmetry index (SAI);
Density of endothelial cells;
SRI

Corneal opacity severity was determined by densitometry with the help of Pentacam device, the indicator was expressed in Gray Scale Units. The incidence of corneal ulcers in the population was assessed according to ambulatory-polyclinic institutions, and was calculated for the cities and regions of the republic. In order to deeply study the clinical features of patients with this pathology, 97 patients were observed at the National Ophthalmology Center named after Academician Z. Aliyeva.

The spread of infectious keratitis was studied based on the materials of the polyclinics of Baku, which have wide diagnostic possibilities according to the application materials. Bacterial, viral, fungal, and mixed keratitis were distinguished. Taking into account the age composition of Baku population, bacterial infections per 100,000 people aged 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80 and older , the prevalence level of viral, fungal and mixed keratitis was determined.

The population's demand for inpatient care related to infectious keratitis was used in hospitals of Baku, including The National Center of Ophthalmology named after Academician Z. Aliyeva (219 patients). The patient examination program is designed according to clinical protocols. Corneal smears of all patients were microbiologically analyzed, sensitivity to preparations was assessed and the detected microorganisms were antibacterials such as vancomycin, amikacin, gentamicin, chloramicin, ciprofloxacin, ofloxacin, gatifloxacin, moxifloxacin, tobramycin and cefotaxime.

The general epidemiological characteristics of non-infectious diseases of the cornea were studied mainly according to the application materials, and according to the results of the specially planned and appropriately selected population examination for individual nosologies.

Epidemiological observation was organized in the sample of Baku city population and deep clinical examination was organized in The National Ophthalmology Center named after Academician Z. Aliyeva.

Optical coherence tomography (Cirrus HD-OCT 5000, Carl Zeiss), keratotopography (Wavelight Oculysez Alcon, Pentacam device), endothelial microscopy (Tomey EM-3000) were used in the examination of patients. The following morphometric indicators are considered: total optical density, central thickness of the cornea, density of endo-thelial cells, endothelial-dessement - stromal density, epithelial optical density, stromal optical density.

In the surgical treatment of Keratoconus, Intracorneal Ring Segments (ICRS), Corneal Cross Linking (CXL), topographic photorefractive keratoectomy (Topo FRK) separately and in combined options (ICRS+CXL; CXL+Topo FRK and ICRS+CXL+Topo FRK) were applied.

Statistics of research results. As the results of the research are expressed quantitatively (morphometric indicators of the cornea and the results of objective ophthalmological examinations) and qualitatively (diagnoses, demographic and clinical characteristics), adequate statistical methods of quantitative and qualitative signs were applied for their statistical processing. Statistical calculations were carried out on a personal computer with the help of the "data analysis" envelope of the Excel program. The average level and standard deviation were determined for the quantitative signs, dispersion analysis was applied to compare the groups. For quality signs, intensive and extensive indicators and their 95% confidence interval were calculated using the descriptive statistics method, compared groups were evaluated by the χ^2 criterion of the difference between intensive and extensive indicators.

CORNEA OF AZERBAIJAN POPULATION DISEASE WITH PATHOLOGIES

In Azerbaijan, the rate of eye disease with CP (number per

100,000 people) was 34.5±0.9$^{0}/_{0000}$, in the female population (44.2± 1.6$^{0}/_{0000}$) compared to the male population (22.5±1,2$^{0}/_{0000}$) up to 2 times statistically significant (P<0.0001) was recorded. The level of initial morbidity with CP both in the male population (7.0±1.6$^{0}/_{0000}$ 0-4; 6.5±1.4 $^{0}/_{0000}$ 5-9 years old) and in the female population (respectively 12.0± 2.1 and 15.0±2.2$^{0}/_{0000}$) in children up to 10 years of age was relatively less compared to other age groups. The initial morbidity of the population with CP in the following age groups increases dynamically and statistically reaching the highest level in the age interval of 65-69 years (92.5±9.2$^{0}/_{0000}$ in men, 120±10.4$^{0}/_{0000}$ in women; P<0.05). In men and women aged 70 and over, the initial incidence rate of CP is relatively low and does not differ statistically (75.0±8.4 and 72.0±5.4; P>0.05).

The total morbidity rate of the population with CP was 34.0±2,0$^{0}/_{0000}$) (95% confidence interval 30-38 $^{0}/_{0000}$). The overall morbidity rate of CP in male and female population is statistically significantly different from each other (249.3±2.4 and 433.8± 3.2$^{0}/_{0000}$; P<0.001; relative risk 1.6; attributive risk 184.5$^{0}/_{0000}$).

The overall incidence rate in the green intervals 0-4 and 5-9 was higher in both male (80.0±4.8 and 80.0±4.6 $^{0}/_{0000}$) and female population (132.1±6.5 and 136.0± 6.4$^{0}/_{0000}$) didn't differ from each other (P>0.05), the risk of disease was relatively high in women. The overall morbidity level of children aged 10-14 with BCP was statistically higher (P<0.001) than the corresponding indicator of younger children, and the gender difference in morbidity in this age range is also evident to a significant extent (P<0.001). In the later age groups (15-19), although the general level of morbidity increases slightly, there is no statistically significant difference. The gender difference in this age group is statistically correct (136.4±6.8$^{0}/_{0000}$ in men, 228.6±9.4$^{0}/_{0000}$ in women). A similar result can be observed for the general morbidity of 20-24-year-old men and women: the age-dependent indicator does not change, but the gender difference is maintained (138.0±6.4$^{0}/_{0000}$ in men, 203.3±8.1$^{0}/_{0000}$ in women). The overall incidence of CP in the age range of 25-29 years was not statistically significantly different from the level of morbidity recorded in the age range of 20-24 years, the indicator in women

(186.7± 6.9‰) compared to men (118.4±5.4‰) was statistically significant (P<0.001).

After the age of 30, the overall incidence rate of CP in both men and women increased dynamically. The increase continued until the age of 70, and the general level of morbidity decreased sharply at later ages.

Thus, the age-dependent dynamics of the general morbidity of the population with CP is not unidirectional, it remains relatively stable in a number of age intervals (0-4 and 5-9; 15-19 and 25-29), in certain age intervals (40-44, 45-49 ; 50-54 and 55-59) is characterized by a sharp increase.

As in the general population, the level of general morbidity with CP in different age intervals was different in the female and male population, and the indicator was statistically significantly higher in the female groups.

The specific weight of corneal diseases of non-infectious origin was 63.0%. The specific weight of keratitis of infectious origin was 37%. Corneal trauma and foreign body were the most frequent pathologies (20.3%) attributed to corneal diseases of non-infectious origin. The share of corneal erosion among the disease cases was 18%. Chemical burns of the cornea were recorded in 2.3%, dystrophy in 6.1%, other non-infectious diseases in 7% and keratoconus in 9.3% of cases. 20.2% of infectious keratitis were bacterial, 4 1% of them were caused by viruses, 4.7% by fungi, and 8.0% by mixed in fections.

Table 1 provides information on the pathologies of CP detected during the population's appeals in large cities and regions of Azerbaijan Republic.

As it can be seen, the level of morbidity fluctuates in a wide range: a relatively low level of morbidity in Samukh district (228.4±20.2‰), a relatively high level of morbidity in Zardab district (697.6±34.3‰) was observed. The 95% confidence interval of the incidence rate in these regions was 188.0 – 208.8 and 629.0 – 697.6‰, respectively.

In Zardab district, the level of morbidity of the population with CP above the lower limit of the 99% confidence interval (594.7‰)

was recorded in the following districts and cities: Shabran district (627.4±32.4$^{0}/_{0000}$), Ujar district (601.6±26.0$^{0}/_{0000}$), Qobustan region (595.7±34.0 $^{0}/_{0000}$), Kurdamir region (594.9± 18.8 $^{0}/_{0000}$), Agdash region (594.8± 21.1$^{0}/_{0000}$).

Table 1. Incidence of corneal pathologies in the regions and cities of Azerbaijan Republic (per 100,000 population)

Name of the region and city	Disease $^{0}/_{0000}$	Name of the region and city	Disease $^{0}/_{0000}$
Baku	275,9±3,6	Khacmaz	379,6±14,6
Sumqayıt	255,8±8,6	Quba	415,4±15,5
Absheron	258,3±11,0	Shabran	627,4±32,4
Qazakh	418,9±20,6	Siyazan	457,2±32,7
Ganja	274,2±9,0	Göyçay	432,0±18,9
Aghstafa	414,1±21,7	Beylaqan	330,5±18,2
Tovuz	284,9±12,7	Aghjabadi	420,5±17,6
Shamkir	273,5±11,2	Barda	369,6±15,3
Gadabay	323,8±17,9	Neftchala	338,7±19,5
Dashkasan	372,8±32,5	Bilasuvar	366,3±19,3
Samukh	228,4±20,2	Salyan	427,8±17,5
Goygol	234,5±14,5	Yevlakh	393,1±17,4
Goranboy	273,8±12,9	Mingachevir	446,7±20,5
Balakan	409,0±20,4	Agdash	594,8±21,1
Zaqatala	379,8±17,1	Ujar	601,6±26,0
Qakh	430,8±27,4	Zardab	697,6±34,3
Sheki	309,2±12,8	Kurdamir	594,9±18,8
Oguz	451,6±31,9	Imishli	418,3±17,9
Qabala	361,0±18,4	Saatli	497,3±21,4
Astara	385,7±18,8	Sabirabad	357,7±14,2
Lankaran	367,4±12,6	Hajıqabul	285,8±19,4
Lerik	430,8±22,5	Shirvan	244,9±16,8
Yardımlı	450,5±25,9	Qobustan	595,7±34,0
Masallı	380,6±12,9	Ismayıllı	274,4±17,7
Jalilabad	364,6±12,8	Agsu	311,0±19,7
Qusar	367,0±19,3	Shamakhi	436,7±20,3

These regions have been attributed to the regions where the population is relatively sick with CP.

PREVALENCE OF CORNEA TRAUMA, RISK FACTORS, RESULTS OF TREATMENT

According to the data of outpatient - polyclinic and stationary institutions of Baku, the prevalence of corneal trauma among the population was 60.1±1.6 per 100 thousand population (95% confidence interval 56.9 - 63.3$^{0}/_{0000}$). This indicator is male population (74.7± 2.6$^{0}/_{0000}$; 95% confidence interval 69.5 – 79.9$^{0}/_{0000}$) compared to the female population (45.9±2.0; 95% confidence interval) probability interval 41.9– 49.9$^{0}/_{0000}$) is statistically fairly high. The level of relative risk related to the gender factor is 1.8; the level of attributive risk is 28.8$^{0}/_{0000}$.

The lowest level of corneal traumatism is observed among children aged 0-9 years (7.2±1.5$^{0}/_{0000}$; 95% confidence interval 4.2-10.2$^{0}/_{0000}$), and among the population aged 80 and older, traumatism is also higher. (11.7±6.7$^{0}/_{0000}$; 95% confidence interval 0 – 24.4$^{0}/_{0000}$). In ten-year age groups (10-19, 20-29, 30-39, 40-49) in the 10-49 age range, corneal traumatism increases dynamically and is 45.3±4.3, respectively; 60.9±3.9; It is 96.3±4.9 and 122.5±6.3$^{0}/_{0000}$. At later ages, the level of traumatism decreases significantly, a sharp decrease occurs in the age range of 60-69 years (20.5±3.4$^{0}/_{0000}$).

The majority of corneal injuries are treated on an outpatient basis, in severe cases, patients are treated in an inpatient facility and surgical operation is provided. The level of corneal trauma requiring inpatient treatment is 7.9±0.2 cases per 100,000 people. This is 13.3% of the total traumatism (60.1±1.6 $^{0}/_{0000}$). The majority of corneal injuries requiring inpatient care (70.9%) are mechanical injuries, relatively few foreign bodies (17.7%) and even less burns (11.4%). The frequency of inpatient treatment related to this type of trauma per 100,000 people is 5.6±0.5 $^{0}/_{0000}$ (95% confidence interval 4.6-6.6$^{0}/_{0000}$), 1, 4±0.2$^{0}/_{0000}$ (95% confidence interval 1.0 – 1.8$^{0}/_{0000}$) and 0.9±0.2$^{0}/_{0000}$ (95% confidence interval 0.3 – 1.3$^{0}/_{0000}$) does.

The majority of corneal injuries in all age groups were mechanical injuries. Mechanical injuries of the cornea in early

children (5.7±1.3‰at 0-9 years old), teenagers (3.3±1.2‰at 10-19 years old) and young people (at 20-29 years old 1,3±0.6‰) was statistically significantly higher. After the age of 20, the frequency of inpatient treatment with corneal injuries has dynamically increased.

Demographic and clinical characteristics of ocular trauma associated with corneal damage are listed in Table 2.

Table 2. Demographic and clinical characteristics of corneal trauma

Signs	Variants	%	Signs	Variants	%
The area where it occurs	House-hold	19,8±2,7	Type of the injury	Attrition	57,1±3,5
	Work-place	43,3±3,7		Foreign body	15,8±2,6
	Sport	13,1±2,5		Chemical burn	5,6±1,6
	School	12,5±2,4		Thermal burn	4,1±1,4
	Other	11,3±2,4		Perforation	5,1±1,5
Gender of the patient	Man	57,4±3,7		Other	12,3±2,3
	Woman	42,6±3,7	The depth of the injury	Epithelium	55,1±3,5
The pati-ent's field of activity	Pupil	11,9±2,4		Anterior stroma	19,4±2,8
	Student	10,2±2,3		Middle stroma	15,3±2,6
	Worker	40,9±3,7		All layers	10,2±2,2
	Other	37,0±3,6	Severit y of injury	Easy	57,1±3,5
Damaged eye	One side	88,6±2,4		Middle	37,8±3,7
	Two side	11,4±2,4		Heavy	5,1±1,5
Time after injury	<6	69,3±3,5	Eye injury scale, points (OTS)	< 45	4,0±1,4
	6 – 24	17,6±2,9		46 – 64	9,2±2,1
	24 – 48	10,2±2,3		65 – 79	37,0±3,6
	48 and more	2,9±1,2		80 – 89	21,6±3,1
Age of the patients, years	0 – 9	11,4±2,4		90 – 100	28,2±3,4
	10 – 19	5,1±1,6	Visual acuity	≥ 6/18	57,1±3,5
	20 – 29	2,8±1,2		6/18 – 3/60	5,9±1,6
	30 – 39	9,1±2,1		< 3/60	37,0±3,6
	40 – 49	21,6±3,1			
	50 – 59	21,6±3,1			
	60 – 69	20,5±3,0			
	70 – 79	6,8±1,9			

	80 and more	1,1±0,8

The most important features include:

- Most of the traumas (43.3±3.7%) occurred at work;
- There is a high proportion of men among patients (57.4±3.7%);
- The majority of patients are workers (40.9±3.7%);
- Most of the patients are 40-49 (21.6±3.1%), 50-59 (21.6± 3.1%); and are aged 60-69 (20.5±3.0%);
- In 88.6±2.4% of cases of eye trauma, injuries are unilateral;
- Corneal traumas are mostly characterized by corneal abrasion (57.1±3.5%);
- The majority of corneal damage is superficial (in 55.1±3.5% cases, the epithelium is damaged, and in 10.2±2.2% cases, all layers are damaged).

The visual acuity of most of the patients under our observation was satisfactory after the treatment (73.5±3.2% of patients had a visual acuity of >6/18). Blindness (visual acuity <3/60) was recorded in 8.1±1.9% of patients. The risk of blindness after trauma didn't depend on the area where the trauma occurred, the level of the indicator changed in the range of 5.0±4.8 - 10.0±3.5% (P>0.05).

Male and female patients were 9.9±2.9 and 8.0±3.1%, respectively, and were not statistically significantly different from each other after corneal trauma (P>0.05). A similar result was obtained for the specific gravity of those with visual acuity >6/18 (73.3±4.4 and 66.7±5.4%, respectively; P>0.05).

During the treatment of corneal injuries under our observation, the cornea was clear (transparent) in 69.3±3.4% of cases, and in 14.2±2.6% of cases, grade II cloudiness (opaque, hazy cornea).

PREVALENCE, CAUSES, RISK FACTORS, AND CLINICAL CHARACTERISTICS OF CORNEAL OPACITY

Corneal clouding (H17) is an important cause of disability related to eye diseases. In order to determine the prevalence of corneal opacification in the population, data were obtained based on a deep and complex examination of a representative population. It was determined that 1.59±1.16% (95% confidence interval 1.27 - 2.31%)

of those examined had signs of corneal clouding. The level of the indicator is relatively high in the male group (1.89±0.25; 95% confidence interval 1.39 - 2.39%), and relatively low in the female group (1.28±0.21%; 95% reliability interval 0.86 - 1.70%), although their difference was not statistically significant (P>0.05). 0.94±0.17% (95% confidence interval 0.43 – 1.45%) of the examined urban population, 2.26± 0.28% (95% confidence interval) of the rural population 1.70 – 2.82%), corneal clouding was recorded. No statistically significant difference was found between these indicators (P<0.05) 1.67±0.55 among patients aged 30-39, 40-49, 50-59, 60-64 and 70-79 years, respectively; 1.26±0.29; 1.80±0.34; 1.88±0.39 and 2.04±0.67% of individuals were diagnosed with corneal clouding. Although the level of the age-dependent indicator changes, the age dynamics is not statistically honest (P>0.05).

In the calendar year (2017), 71 patients who applied to the Azerbaijan National Ophthalmology Center named after Academician Z. Aliyeva with corneal diseases were diagnosed with BGB (8.6±3.43%), 21 of them were partial (<5 mm), 28 were sub - total (5 - 8 mm) and total (28 mm) BGB was recorded in 22 people (respectively 29.6±5.4; 39.4+5.8 and 31,015.5%). Corneal vascularization was observed in the majority of patients (38 people, 53.5±15.9%).

The average age of patients diagnosed with BGB was 49.9± 2.19 years (minimum age 18, maximum 81 years; age mode 53, median 52 years), BGB was diagnosed and registered in 86 eyes (one eye of 56 patients, both eyes of 15 patients). In the majority of patients, corneal clouding was caused by keratitis (45 people, 63.4± 5.7%). In 20 people (28.2±5.3%), it was related to post-traumatic facades. The diagnosis of BGB due to other causes was determined in a small number of patients (6 people, 8.4±3.3%). First category visual impairment (visual acuity 0.1-0.30) was recorded in 72.1% of eyes.

Various categories of visual impairment with correction (visual acuity ≤0.3) were observed in 90.7±3.1% of eyes. Visual impairment of the first category (visual acuity 0.1-0.3) was recorded in 59 eyes (68.6±15.0%). Second category visual impairment (visual acuity 0.05-0.10) was observed in 19 eyes (22.1±4.5%).

The densitometric characteristics of the cornea are reflected in Table 3. According to the results of densitometry, the optical hardness of the front layer of the cornea in the zone of 0-2 mm was in the range of 26-85 conventional units and was on average 52.4±2.87 conventional units, and it's reliability level is 5.7 conventional units.

Table 3.Descriptive statistics of densitometry in patients with a diagnosis of BGB (conventional units)

Indicators	Zone 0 – 2 mm		Zone 2 – 6 mm		Zone 6 – 10 mm	
	The front layer of the cor-nea	The central layer of the cornea	The front layer of the cornea	The central layer of the cornea	The front layer of the cornea	The central layer of the cornea
Average	52,4	43,3	35,2	31,8	24,4	23,6
Standard error	2,87	1,09	1,36	1,91	1,37	1,14
Median	34	41	32	26	18	19
Mode	85	29	19	14	15	11
Standard deviation form	24,3	9,2	11,5	16,2	11,6	9,6
Minimum	26	29	19	14	12	11
Maximum	85	56	50	65	41	41
Number	86	86	86	86	86	86
Degree of reability	5,7	2,2	2,7	3,8	2,7	2,3

In this zone, the optical hardness of the central layer of the cornea (in the range of 26-85 conventional units, on average 43.3±1.09 conventional units) was statistically significantly less than the corresponding feature of the anterior layer ($P<0.05$). The average hardness of the front and central layers in the 2-6 mm zone was 35.2±1.36 and 31.8±1.91 conditional units respectively and didn't

differ statistically (p>0.05). , but it was statistically less than the corresponding indicators of the 0-2 mm zone (P<0.01).

The optical density of the front and central layers of the cornea is close to each other in the 6-10 mm zone (24.4±1.37 and 23.6±1.14 conventional units, respectively), 0-2 and 2-6 mm- and it is statistically less than the corresponding indicators of lik zones (P<0.01).

Internal concomitant diseases, especially diabetes, which cause pathological changes of the cornea, affect the choice of treatment tactics.

Diabetes changes the biomechanics of the cornea and affects intraocular pressure. It is believed that the changes caused by diabetes in the cornea (corneal thickening) may increase the risk of ectasia.

Biometric characteristics of the cornea in patients with BGB with and without diabetes are shown in table 4.

Table 4. Biometric characteristics of patients BGB diagnosed with and without diabetes

Characteristics	D	M	m	G	Me	Confi-dence level
Spherical component of refraction	+ •	2,66	0,09	0,51	2,6	0,2
	-	2,82	0,08	0,53	2,9	0,2
Uncorrected visual acuity	+	0,16	0,01	0,08	0,16	0,03
	-	0,17	0,01	0,07	0,17	0,02
Astigmatism, dptr (-)	+ •	-2,95	0,16	0,9	2,95	0,3
	-	-4,01	0,25	1,65	4,5	0.5
Central corneal thickness (mkm)	+ •	563,0	4,27	23,4	567,0	8,7
	-	485,7	5,78	37,0	511	11,7
Minimal corneal thickness (mkm)	+	4,87,1	8,48	46,5	500,0	17,4
	-	485,2	7,48	47,9	500	15,1
The maximum thickness of the epithelium (mkm)	+	81,0	2,31	12,7	80	4,7
	-	80,5	2,04	13,1	80	4,1
Depth of blur (mkm)	+	207,4	10,5	57,6	206	21,5
	-	208,9	8,8	56,4	206	17,8
Corneal asymmetry index (CAI)	+	2,88	0,22	1,21	2,85	0,5
	-	3,27	0,24	1,59	3,10	0,5
Density of endothelial cells	+ •	2464	14,0	77,5	2468	28,9
	-	2667	15,8	101,6	2844	32,1

Corneal surface regularity index (SRİ)	+	1,61	0,07	0,38	1,55	0,14
	-	1,70	0,06	0,38	1,70	0,12

- P<0,05

As can be seen, between the compared groups, the spherical component of refraction (2.66±0.09 and 2.82±0.08), astigmatism (2.95±0.16 and 4.01±0.25), cornea differences in central corneal thickness (563.0±4.27 vs. 485.7±5.78 μm) and endothelial cell density (246.4±14.0 vs. 266.7±15.8) were statistically significant, but the corneal thickness (487.1±8.48 and 485.2±7.48 μm), the maximum thickness of the epithelium 81.0±2.31 and 80.5±2.04 μm, the depth of turbidity (207.4± 10.5 and 208.9±8.8 μm), corneal asymmetry index (2.88±0.22 and 3.27±0.24) and regularity index (1.61±0.07 and 1 .70±0.06) were close to each other in both groups (P>0.05).

Thus, against the background of diabetes mellitus, it was recorded that the central thickness of the IWB cornea was 77.3 μm more, while the density of endothelial cells was 203 less.

Thus, the levels of biometric indicators specific for corneal clouding differ in patients with and without diabetes. The central thickness of the cornea in patients with diabetes (563.0±4.27μm) is greater than in those without diabetes (485.7±5.78μm). Against the background of diabetes, the density of endothelial cells in the cornea is statistically significantly lower than in the control group (2464±14.0 and 2667±15.8).

Corneal densitometry indicators do not change significantly depending on the association of diabetes in patients diagnosed with corneal clouding.

CLINICAL-EPIDEMIOLOGICAL CHARACTERISTICS OF KERATITES AND EFFECTIVENESS OF THE TREATMENT

Keratitis, which includes the group of diseases associated with inflammation of the cornea, is divided into different nosological forms in several rubrics of the International Classification of Diseases. In the country, 48.8±0.8 corneal ulcers per 100,000 people were treated. The lowest level of the indicator is in Sumgayit city (22.7±2.5$^{0}/_{0000}$); 99% confidence interval 15.2-33.2$^{0}/_{0000}$), the highest level in Neftchala

district (78.4±9,5‰); 99% confidence interval 50.2 – 106.6‰) was recorded and didn't differ statistically from each other ($p<0.01$).

The age of patients diagnosed with corneal ulcer was in the range of 15-87 years, the average was 56.4±1.7 years. The mode of the patients' age was 51 years, the median was 58 years, the standard deviation was 16.9, and the variance was 287.

During the initial consultation, most of the patients had purulent ulcer of the cornea (52.6%), the patient was diagnosed with an unspecified corneal ulcer. The specific weight of other clinical forms (herpetic ulcer, neurotrophic ulcer, posttraumatic ulcer) has decreased.

Based on the complex examination and observation of patients, the causes of corneal ulcer were distinguished. Among these reasons, the first place is occupied by traumatic erosion of the cornea, and the reason mentioned in 20.6±4.1% of all patients was considered the main one. The share of developed corneal ulcer related to the operative interventions carried out earlier in the eye is also high (15.5± 3.7%). One of the relatively common causes is corneal ulcer after acute respiratory viral infections (14.4±3.5%). Corneal ulcer developed as a result of contact violation lens usage was recorded in 10.3±3.1% of cases. In 24.7±4.4% of patients, it was not possible to detect the primary cause of corneal ulcer. Other known causes (dry eye syndrome, foreign body in the cornea) had a relatively low weight (7.2±2.6 and 5.2±2.2, respectively).

Corneal ulcer was unilateral in most cases (in 80 patients, 82.5%), damage to both eyes was recorded in 17.5% (17 patients). Relatively severe (on a 3-point rating scale) - central location of the ulcer was observed in 25.4±4.1% of eyes.

The majority of corneal ulcers were less than 2 mm in size (56.1±4.7), large ulcers (5.1-7 and >7mm) were 15.8±3.4 and 3.5±1, respectively. 7% was registered in the eye.

Superficial ulcers (the thickness of the cornea is less than 3 times) were observed in 74.6±4.1% of eyes, deep ulcers (covering more than 2/3 of the thickness of the cornea) in 3.5±1.7% of eyes.

Against the background of corneal ulcer, uveitis was observed in 15.8±3.4% eyes, perforation in 2.6±1.5% eyes, and panophthalmitis

in 3.5±1.7% eyes. The specific gravity of severe (8-12 points) and very severe (13-16) ulcers was 11.3±3.2 and 4.1±2.0%, respectively.

When the patients were admitted to the hospital, a smear was taken from the cornea of all ulcerated eyes (114 eyes, 97 patients) and a microbiological examination was provided.

Staphylococcus epidermidis was found in 40% of the examined smears (25.3±3.4% of all positive reactions), Staphylococcus aureus in 12.4% (7.8±2.1% of all positive reactions). , streptococcus viridans (16.3±2.9% of all positive reactions) and streptococcus pneumoniae were found in 34.3% (21.7±3.2% of all positive tests). Pseudomonas aeruginos (22.3±3.2 out of 100 positive reactions) and microsporum gypseum (6.6±1.9% of positive reactions) were detected in 35.25 of the smears.

The structure of the types of microbes found in smears depending on the location of the corneal ulcer doesn't differ from each other. The difference of the sequence ranking frequency and it's detection of microbes is small.

According to the types of microbes detected in corneal smear of eyes with ulcer size ≤5 and >5mm, the structure was close to each other, the difference of indicators was not statistically significant ($p>0.05$).

It is necessary to evaluate the sensitivity of the microorganisms found in the ulcer to antibiotics in order to establish the antibacterial treatment of corneal ulcers. In our study, the results obtained about the sensitivity of the corneal microflora to these antibacterial drugs are given in table 5.

Apparently, the micro-organisms associated with corneal ulcer are mostly sensitive to the tested antibiotics. Streptococcus pneumoniae was most susceptible to ciprofloxacin (100%) and ofloxacin (91.7±4.6%; 95% confidence interval 79.5–100%), less than chloramphenicol (69.4±7 ,6%; 95% confidence interval is 54.2-84.2%). Streptococcus epidermidis was sensitive to practically all tested antibiotics, sensitivity to azithromycin was relatively low (81.0±6.1%; 95% confidence interval 68.9-93.2%).

Streptococcus viridans showed low sensitivity (81.5±7.5%) to ceftazidime and very high sensitivity (≥92.6±5.0) to other antibiotics.

Stafilococcus aureus was susceptible to ciprofloxacin in 69.2±12.8% of cases, to chloramphenicol in 84.6±10.0% of cases, to moxifloxacin in 71.9±11.6% of cases, and to other antibiotics in ≥92.3±7.4% of cases.

The sensitivity of Pseundomonas aeruginos to antibiotics was between 81.1±6.4% and 97.3±2.6%: relatively low sensitivity to azitromycin and relatively high sensitivity to ciprofloxacin was observed.

Table 5. Susceptibility of microorganisms isolated from corneal ulcer smear to antibiotics

Microorganisms	Antibiotiks	Sensitivity %	Microorganisms	Antibiotiks	Sensitivity %
Streptococcus pneumonial (N=36)	Azithromycin Ceftazidime Chloramphenicol Suprofloxacin Moxifloxacin Ofloxacin	83,3±6,2 75,0 ±7,2 69,4 ±7,6 100 75,0 ±7,2 91,7 ±4,6	Staphylococcus aureus (N=13)	Azitromisin Seftazidim Xloramfenikal Suprofloksazin Moksifloksazin Ofloksazin	92,3±7,4 100 84,6 ±10,0 69,2 ±12,8 76,9 ±11,6 100
Staphylococcus epidermedis (N=42)	Azithromycin Ceftazidime Chloramphenicol Suprofloxacin Moxifloxacin Ofloxacin	81,0 ±6,1 100 92,9 ±3,9 97,6 ±2,4 95,2 ±3,2 92,8 ±3,9	Pseudomonas aeruginos (N=37)	Azitromisin Seftazidim Xloramfenikal Suprofloksazin Moksifloksazin Ofloksazin	81,1 ±6,4 91,9 ±4,5 86,5 ± 5,6 97,3 ±2,6 83,8 ±6,0 94,6 ±3,7
Streptococcus viridans (N=27)	Azithromycin Ceftazidime Chloramphenicol Suprofloxacin Moxifloxacin Ofloxacin	92,6 ±5,0 81,5 ±7,5 100 96,3 ±3,6 92,6 ±5,0 100			

Intensity of complications in patients with corneal ulcer duration ≤4 and >4 months (17.8±5.6 and 27.9±5.7%) differ from each other, but the integrity of the difference is not confirmed ($p>0.05$) . The frequency of purulent complications and non-purulent corneal ulcers was 27.9±5.7 and 15.1±4.9%, respectively, and did not statistically differ from each other ($p>0.05$). The frequency of complications depending on the cause of short corneal ulcer varied from 13.3±8.7% (after operative intervention) to 27.3±9.4% (after trauma), the difference is large, but the statistical error is also large. therefore, statistical integrity is not confirmed.

Depending on the severity of the corneal ulcer, the frequency of complications in the separated groups was between 4.7±3.2% and 82.5±9.2% and was statistically significantly different from each other ($p<0.01$). The presence of co-morbidities in patients (45.5±10.61% against the background of sinusitis; inflammation in oral cavity organs 41.7±10.06%) was associated with the complications of corneal ulcer with statistical integrity.

Perforation was prevented in all patients during treatment, perforation was observed in only three patients before treatment. Therefore, the complication of perforation in corneal ulcers was 2.6±1.5%, and the danger of perforation in 97.4±1.5% of ulcerated eyes disappeared.

Corneal syndrome (tear discharge, fear of light, reflex spasm of the eyelids and other inflammatory symptoms) occurred in 35.1±4.7% of cases during the first week, in 69.3±4.3% of cases during the second week, and in 100% of cases it was observed during the third week.

Corneal epithelization was clearly noticeable in 25.9±3.8% cases during the first week, and in 85.9±3.2% cases during the second week. Epithelization of the cornea was completed in all patients in the third week of treatment. Absorption of the inflammatory infiltrate started relatively late: in the first week of treatment, signs of the infiltrate were registered in all patients, only in 33.3±4.4% of cases in II, in 84.2±3.4% of cases in III week, the infiltrate was mostly absorbed and observed in 8 eyes (7 .2%) signs of inflammatory.

For monitoring the improvement of visual acuity, patients were divided into 5 groups at the beginning of treatment (those with light sensitivity only, visual acuity ≤0.05; 0.05 – 0.10; 0.10 – 0.30 and >0.30) and the dynamics of visual acuity in each group was monitored. As visual acuity improved, patients were transferred from one group to another. As can be seen from our observations, in the first week of treatment, only 15.8±3.4% of eyes had visual acuity >0.3, in the second and third weeks, the specific weight of those with visual acuity >0.3 increased and results were 49, 1±4.6 and 71.9±4.1%.

As a conclusion of the ulcea cornea treatment, it's swelling was formed. From a prognostic point of view, the nature of the clouding plays a big role. In the literature, three types are distinguished according to the intensity of haze (fog, stain, belmo). Our information about the intensity of corneal opacification, which is the final result of the patients treatment under our observation is given in table 6.

Intraocular pressure in the general population of patients was 15.0±0.4 mm Hg (95% confidence interval 14.2-15.8 mm Hg). This indicator depends on the gender of the patients (14.8±0.6 mm cs in male body, 15.4±0.8 mm cs in female body) and place of residence (14.4±0.7 mm cs living in Baku and big cities, 15.1± 0.6 mm cs in those living in the regions) didn't differ statistically, but in the groups distinguished by age, duration of the disease, clinical forms, and degree, they differed statistically from each other.

The intraocular pressure was statistically significant ($p \leq 0.05$) higher in the groups of patients aged ≥60 years, duration of corneal ulcer ≥4 months, suppuration and severe course.

After treatment, the majority of patients had a weak corneal opacification (haze) (52.6±4.6% in eyes with corneal ulcers). Spotty haze was observed in 36.9±4.5% of cases, and belmo was observed in 10.5±2.8% of cases.

41.3% of male patients diagnosed with infectious keratitis and 58.7% were females.

The distribution of male and female patients by age was similar and the specific weight of patients in separate intervals was: 1.1 and 1.6% 0-9, 4.7 and 3.7% 10-19, 7.7 and 6.7% 20-29, 19.7 and 17.2%

30-39, 24.3 and 25.6% 40-49, 23.4 and 25.5% 50-59, 14.8 and 15.3 % 60-69, 4.4 and 3.9% 70-79, 0.4 and 0.5% 80 and older.

In 25.7% of patients diagnosed with keratitis, no information about the risk factor of the disease was recorded. The most frequently registered risk factor was the presence of previous trauma to the eye and it's accessory apparatus in patients (36.9%).

Table 6. Some indices of corneal biomechanics after corneal ulcer treatment

Signs	Variants of signs	Intraocular pressure mm cs	Corneal resistan-ce factor mm cs	Corneal hysterosis mm cs	Central corneal thickness Mkm
Gender	Man (75)	14,8±0,6	8,4±0,5	11,6±0,4•	551±1,6
	Woman (39)	15,4±0,8	8,6±0,6	10,4±0,3	558±2,8
Age, years	<60 (56)	13,2±0,7	8,7±0,6	10,2±0,6	556±1,5
	≥60 (58)	18,6±0,9•	8,2±0,5	11,9±0,5•	552±1,6
Place of living	Baku and big cities (30)	14,4±0,7	9,8±0,4•	10,6±0,5	557±2,6
	Others (84)	15,1±0,6	8,0±0,4	11,9±0,3•	551±1,5
The duration of the disease	≤4 (45)	13,6±0,9	8,8±0,4•	10,4±0,2	558±2,0
	>4 (69)	16,7±0,7•	7,2±0,5	11,8±0,3•	552±1,9
Clinic forms	Purulent (56)	13,6±0,5•	7,0±0,6	12,0±0,4	556±1,8
	Without pus (58)	14,0±0,6	8,9±0,5•	10,6±0,3	552±2,0
The degree of heaviness	Easy (40)	12,6±1,0	8,9±0,5•	10,1±0,4	552±1,5
	Medium heavy and heavy (74)	16,4±0,9•	7,3±0,4	12,2±0,3	557±2,0
All	N=114	15,0±0,4	8,5±0,3	11,2±0,2	554±1,2

Diabetes (5.6%), rheumatoid arthritis (1.1%), foreign body in the eye (6.5%), taking steroid drugs (7.4%), eye surgery (2.5%)), viral infections (14.3%), use of contact lenses (4.1%), blepharitis, dry eye syndrome and other eye diseases (9.6%) were recorded as risk factors

in a relatively small number of patients. It is worth noting that only 63.7% of patients had one risk factor, and 2, 3 or more risk factors were found in 7.6 and 3.0% of cases, respectively. In Baku, there are 9 cases per 100,000 people per calendar year. ,75±0,61 cases of inpatient treatment related to infectious keratitis fall (95% confidence interval 8,43-11,07 $^{0}/_{0000}$). The average annual rate of bacterial keratitis treatment was 5.39± 0,49$^{0}/_{0000}$ (95 confidence interval 4.47-6.37 $^{0}/_{0000}$).

Viral keratitis (1.07±0.22$^{0}/_{0000}$; 95% confidence interval 0.63-1.57 $^{0}/_{0000}$), mycotic keratitis (1.20±0.23 $^{0}/_{0000}$; 95% confidence interval 0.74-1.66$^{0}/_{0000}$), mixed infection keratitis (1.02±0.21$^{0}/_{0000}$; 95% confidence interval 0.60-1.44$^{0}/_{0000}$), and keratitis of other forms (1.07±0.22 $^{0}/_{0000}$; 95% confidence interval 0.63-1,57 $^{0}/_{0000}$), the demand for inpatient treatment was close to each other.

In separate age groups, the demand for inpatient care related to infectious keratitis varies in a wide range (0.90±0.51-19.3±3.3$^{0}/_{0000}$; P<0.01), as the age increases up to 70 years, the volume of the demand increases and tends to decrease in later ages. The volume of the demand for inpatient care related to viral keratitis increases significantly after the age of 40 2.62±0.92$^{0}/_{0000}$, until the age of 70 the indicator decreases within the statistical error (p>0.05), reaching it's peak level only at the age of 70-79 (4.66±2.64$^{0}/_{0000}$). The demand for inpatient care related to mycotic keratitis increases dynamically depending on age (0.48±0.41 – 3.11±2.19$^{0}/_{0000}$). The most detected microflora refers to: staphylococcus aureus (15.8% single and 2.6% mixed, total 18.4%), staphylococcus epidermidis (5.3% single, 1.8% mixed, total 7.1%), pseudomonas aeruginosa (7.9% single, 2.6% mixed, total 10.5%), enterobacter spp (4.4% single, 0.9% mixed, total 5.3%), aspergillus spp (4.4% single, 0.9% mixed, total 5.3%) , kubsiella pneumoniae (3.5% single, 0.9% mixed, 4.4% total). The detection frequency of other microflora (streptococcus pneumo¬niae, streptococcus viridans, proteus spp, fusarium spp, candida spp, afternaria spp, penicillum spp) was less than 3.5%.

Susceptibility to vancomycin (87.5-100), amikacin (92.8-100), gentamicin (80-90.5%), chloramycin (66.7-88.1%), ciprofloxacin (75.0-92.8%), ofloxacin (66.7-88.1%), gatifloxacin (80-100%),

moxifloxacin (80-91.7%), tobromycin (58.3-80.9%), cefotaxime (70-100%) changed in a wide range and differed from each other. In patients who were brought to the hospital on time (in the first week of the disease), complications of keratitis occurred in 2.5±2.5% of cases, in patients who were brought to the hospital late (after the third week of the disease). Up to 10 times more (24.7±4.3%) were observed. One of the factors that have a statistically significant effect on the probability of complications of keratitis is the implementation of treatment without determining the sensitivity of the microflora associated with keratitis to antibiotics.

Scarring without complications was recorded in 88.2±2.2% of infectious keratitis. This result depends on the age of the patients (97.0±2.1% age <40, 51.2±7.6% age ≥60 years), etiology of keratitis (47.8±10.4% in keratitis related to mixed infections, bacterial - 97.5 ±1.4% in ratitis, from early initiation of inpatient treatment (100 and 79.2±4.1% after 1 and ≥3 weeks), positivity to microflora (87.9±2.6 and 98.4±1.6%), depended on sensitivity to antibiotics (97.8±1.4 when taken into account and 73.0±5.6% when not taken into account).

During the treatment of keratitis, visual acuity improved in 53.0±3.3% of patients (compared to the period before treatment). The level of this indicator also depended on a number of factors (timely initiation of treatment, positivity to microflora, sensitivity to antibiotics).

The criterion of the probability of the treatment being less effective is the deterioration of visual acuity recorded in 32.0±3.1% of patients. The level of this indicator changed statistically, depending on the age of the patients and the early initiation of treatment.

PREVALENCE, RISK FACTORS AND TREATMENT EFFECTIVENESS OF NON-INFECTIOUS CORNEA DISEASES

There are 16.65±0.86 cases of inpatient treatment per 100 thousand people of Baku city (95% confidence interval 14.93 – 18.37 $^{0}/_{0000}$). The level of this indicator changed in the range of 6.28±1.37 $^{0}/_{0000}$ to 27.53±4.01 $^{0}/_{0000}$) in different age groups and

differed statistically from each other. The volume of inpatient treatment for non-infectious diseases of the cornea is very small (6.28± 1.37‰) in 0-9 years old, statistically high in 10-19, 20-29, 30-39, 80 and older years, but on average level (respectively 12.05±2.23; 10.61±1.65; 15.18±1.94 and 15.67±1,83 ‰), 40-49 (26,21± 2,93‰), 50-59 years (23,64±2,73‰), 60-69 (27,53±4,01‰), 70-79 (24,86±6,21‰) rust was at a high level.

The volume of demand for inpatient treatment with the diagnosis of keratoconus is relatively high in 10-49-year-olds (7.89± 1,81‰10-19, 9.05±1,53‰ 20-29, 10.45±1,61‰ 30-39, 9,17± 1,73‰40-49 years old) statistically less in 50-59 (2,21± 0,83‰) and 60-69 (2,92±1,31‰) years, in other age groups and there was no inpatient treatment.

Corneal erosion (COE) is one of the relatively common eye diseases mainly associated with damage of it's epithelial layer.

The prevalence level of COE registered in the calendar year 2017, was 47.6±1.5‰, in the male and female population (43.1± 2.0 and 52.1±2.1‰;$p<0.05$) were statistically significantly different from each other and calculated based on the information of patients with the diagnosis of COE. The relative risk of the disease is 1.2 times higher in women than in men. The level of age-dependent COE prevalence in the population varied in a wide range: 16.8±2.2‰ in the 0-9 age range, 130.6±8.7‰ in the 60-69 age range.

The level of prevalence of COE does not change proportionally depending on age, the first increase was recorded in the age range of 10-19 years (32.4±3.7‰), the level of the indicator became stable in the following ages up to the age range of 40-49 years. At the age of 49, 50-59, 60-69, the level of prevalence of COE increased dynamically and intensively, the highest level of the indicator falls in the age range, the level of prevalence of COE in the following age groups decreased dynamically and intensively. The age dependence of the prevalence of COE in male and female population is basically similar. Comparison of the level of COE in the male and female population in the same age intervals was only 10-19 (20.7±4.0 and 46.3±6.5‰), 20-29 (29.3±3.8 and 40, 3±4.6‰) a statistically significant difference was found in the age intervals. The gender

difference in the prevalence of COE in other age intervals was not statistically significant.

Surface opacification or scarring developed in 21.5±3.9% of treated eyes with COE and infective keratitis in 17.8±3.7%. Overall, visual acuity decreased in the eye with 54.2±4.8% COE after treatment. The intensity of these negative results did not differ statistically from each other and from the corresponding indicators of the general population in the groups separated depending on the patients gender and the etiological factors of erosions ($p>0.05$). The frequency of all complications was different in the three groups of patients under our observation based on their age ($p<0.05$).

As a result of complex examination of patients, spheroidal keratopathy is detected in 6.0±0.9% of cases. The prevalence of spheroidal keratopathy depends on age (3.1±1.4% in 40-49-year-olds, 24.5±6.1% in 70-year-olds and older), and the presence of concomitant diseases (ischemic heart disease, arterial hypertension and diabetes in the background more than 2 times). Spherodial keratopathies are more often associated with age-related eye degeneration, central thickness of the cornea, small minimum thickness and large radius of curvature (≥8 mm). Among residents of Baku city and villages, spheroidal keratopathies are spread at different levels (2.6±0.7 and 16.0±2.8%), which depends on the influence of the environment (ultraviolet rays, windy and dry climate). In order to obtain a reliable result about the prevalence of corneal dystrophies (PCD), an examination of 630 people (aged 40 and over) was carried out in National Center of Ophthalmology named after Academician Z. Aliyeva. PCD was detected in 8% (95% confidence interval 3.0-6.2%). The rate was higher among women (5.1±1.2%; 95% confidence interval 2.7–7.5%) than among men (4.1±1.1%; 95% confidence interval 1.9–6.3 %) and overall is relatively high, but statistically not significantly different from each other ($p>0.05$). The prevalence level of PCD is 2.1±1.4 at the ages of 40-49, 50-59, 60-69, 70-79, 80 and above, respectively; 3.1±1.3; 4.2±1.5; It was 6.8±2.0 and 8.2±3.9%, the level of the age-dependent indicator increased dynamically ($\chi^2=10$; $p<0.05$).

Endothelial dystrophy was the most common (51.7±9.3%; 95% confidence interval 33.2–70.3%). The specific gravity of anterior corneal dystrophy was 17.2±7.0% (95% confidence interval 3.2-31.3%). The specific weights of other forms are much lower, in 20.7±7.5% of cases and the dystrophial forums were not specified.

Corneal morphometrics of patients diagnosed with PCD characteristics are reflected in table 7. For comparison, the same morphometric measurements were evaluated in an adequate control group (individuals without corneal diseases of the same age and gender).

Table 7. The level of corneal morphometric indicators in patients with corneal dystrophy

Indicators	Groups	Min.	Max.	Average
Total optical density, conventional unit	M	11,2	41,3	24,1±0,54•
	C	6,0	28	18,4±0,32
The central thickness of cornea Mkm	M	554	686	595±1,36•
	C	500	585	526±1,25
Density of endothelial cells, quantity/mm3	M	1094	1824	1359±12•
	C	1896	2872	2261±15
Endothelial – dessement – stromal optical density	M	12,7	21,2	15,8±0,61•
	C	10,2	17,9	10,4±0,58
Epithelial optical density	M	14,4	28,6	18,2±0,31•
	C	12,2	19,8	13,5±0,28
Stromal optical density	M	16,8	32,1	23,6±0,34•
	C	12,8	24,4	18,3±0,21

M – Main group (PCD)
C – Control group (healthy)
• P<0,05

As can be seen, compared to the control group, total corneal optical density was 1.3 times, central corneal thickness was 1.1 times, endothelium-desement-stromal optical density was 1.5 times, epithelial optical density was 1.4 times, compared to the control group and the stromal optical density is 1.3 times higher, but the density of

endothelial cells is 1.7 times lower. PCD was primarily associated with significant loss of endothelial cells (40% reduction compared to normal). At the same time, the optical density has increased significantly in all layers. This is considered the main feature of dystrophy. 20.7±7.5% of patients had visual acuity <0.5, 48.2±9.3% had <0.6, 7.0±3.0% had visual acuity and still ha<0.3 does.

Based on the application data, the frequency of corneal degeneration was 10.9±0.7 $^{0}/_{0000}$, it was not statistically significantly different in male and female populations (10.8±1.0 and 11.8±1.0 $^{0}/_{0000}$; p>0.05). The level of the indicator changed depending on age in the range of 1.2±0.6 $^{0}/_{0000}$ to 82.3±17.9 $^{0}/_{0000}$ and it's change is proportional to age. The frequency of PCD in male and female population in all age groups did not statistically differ from each other.

Out of the 243 diagnoses of corneal degeneration recorded in the application data, only 25 people were diagnosed with Macular Degeneration of the Cornea (MDC). Therefore, the information about MDC cannot be considered adequate according to their applications to polyclinics. Objective observation shows that the level of prevalence of MDC in the male group is 32.7±2.6% and in the female group is 16.0±2.1% and it doesn't differ statistically from each other, the level of the relative risk was 2.1. In the examined persons aged 40-49, 50-59, 60-69, 70-79, 80 and older, the level of MDC differed statistically from each other and was, respectively: 6.3±2.5; 8.8±2.2; 25.7±3.4; 35.0±3.7; 71.4±6.4%. In all age groups (except 40-49), the prevalence of MCD was high among men. The relative risk level was high (2.6) in 50-59-year-olds, slightly lower (1.9) in 80-year-olds and older. Thus, in the purposeful examination of the population aged 40 and older, the wide spread of MCD among the population is confirmed.

In the examination of persons aged <60 and ≥60 years, 7.8 ± 1.7 and 37.2±2.5%, respectively, diagnosed BGAD ($p < 0.001$; relative risk 4.72). Depending on gender, the risk of BGAD increases twice (BGAD is more common in men). The frequency of BGAD in people with and without diabetes (75.0±4.8 and 17.1±1.6%; $p<0.001$) is statistically significantly different from each other, the relative risk is at the level of 4.38. 74.1±3.8 and 63.9±4.0% of patients with ischemic heart disease and arterial hypertension, respectively, and 10.9±1.4 and

12.4± in control groups. 1.5% had BQAD. Against the background of cardiovascular diseases, the risk of CAD is 5.37-6.79 times higher. In smoking and non-smoking patients, the risk of BGAD also differed statistically (36.8±3.8 and 20.2±1.8%; relative risk 1.82). Systolic and diastolic arterial pressure exceeding the norm is associated with a high risk of CAD.

Among the causes of visual impairment, the role of corneal ectasias (CE) is increasing. According to the data of outpatient polyclinics and inpatient institutions applications, the population's incidence rate with BSE is 24.6±1.1 $^{0}/_{0000}$ (29.7±1.6 $^{0}/_{0000}$ in the male population, 19.5±1.30 in the female population; p<0.001). The disease was observed 1.5 times more in men. The level of morbidity was relatively low until the age of 30, in the age intervals of 0-9, 10-19, 20-29 (7.2±1.5; 10.8±2.1 and 5.9±1.2 $^{0}/_{0000}$) were not statistically significantly different from each other. The level of morbidity at later ages was characterized by a dynamic increase depending on age (18.4±2.1 at the ages of 30-39, 40-49, 50-59, 60-69, 70-79, 80 and older; 3±3.7; 41.0±3.6; 73.2±6.5 and 37.3±7.6 $^{0}/_{0000}$). In all age groups, the incidence rate was higher among men. The gender risk of the disease was recorded most in the 20-29 age range (9.1±2.1 $^{0}/_{0000}$ in men, 2.7±1.2 $^{0}/_{0000}$ in women, relative risk 3.3). According to the examination data of the National Ophthalmology Center named after Academician Z. Aliyeva of the purposefully selected society, the prevalence of BSE was highest among those aged <40 years (8.4±2.8%), the prevalence of the disease in later ages decreases with increasing intensity. The prevalence of BSE in the observation population was not statistically significantly different in male and female groups (3.8±1.1 and 5.1±1.2%; p>0.05). The gender difference in the prevalence of BSE in different age groups was not statistically honest.

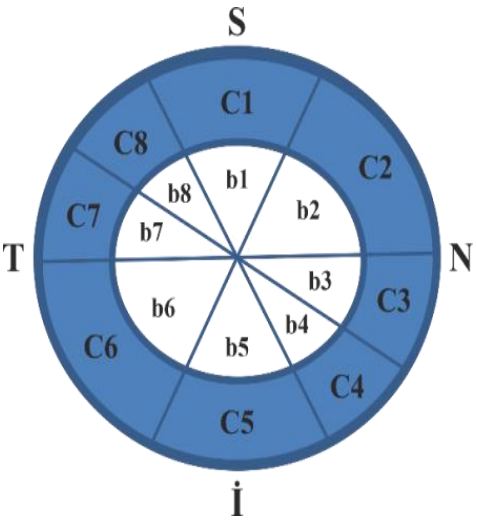
The distribution of eyes with BSE according to the degrees of ectasia shows that 35.7±6.4% of eyes had KK1, 28.6±6.0 ectasia of KK2, KK3 and KK4 degrees, respectively; 26.8±5.9 and 8.9±3.8% were recorded in eyes.

Distribution of eyes of male and female patients according to the degree of keratoectasia (KK1, KK2, KK3 and KK4 33.3±9.6; 29.2±9.2; 29.2±9.2 and 8, respectively) 8,3±5.6% in male group,

37.5±8.5, 28.1±7.9, 25.0±7.6 and 9.4±5.1% in female group) are similar (p>0.05). KK1 was recorded in 44.7±8.1% of eyes with complex myopic astigmatism and 20.0±12.6% of eyes with simple myopic astigmatism, although the difference in indicators was large and wasn't statistically honest (p>0.05).

Corneal ectasia is detected in 4.4±0.8% of the contingent with eye pathologies, including 3.8±1.1% of men and 5.1±1.2% of women. Corneal ectasia is recorded more often in people aged <40 (8.4±2.8%), in relatively younger people (1.9±1.0%). Corneal ectasia is detected in 35.7±6.4% of cases in the initial form, in relatively few cases (8.9±3.8%) in severe form. In order to timely detect corneal ectasia, a complex examination of the applied contingent is necessary.

The majority of corneal ectasias fall into the category of keratoconus. The most important characteristic for all ectasias, including keratoconus, is a change in the topography of the cornea. Modern diagnostic methods (keratotopography, pachymetry, endothelial microscopy, anterior coherence tomography, etc.) provide a basis for studying the topography of the corneal surface and the complex characteristics of it's issues. Our results for this aspect are reflected in table 8.



Against the background of initial keratoconus, the central thickness of the cornea and the thickness of the corneal epithelium were the most variable. The thickness of the corneal epithelium was variable and statistically significantly different from each other: in the center (46±3.1 μm) and in the IT (b6) region (46.0±3.0 μm) was recorded.

Table 8. It's tomographic and topographic indicators against the background of corneal ectasias

Indicators	Before surgery	8 months after surgery
Uncorrected visual acuity	0,13±0,03	0,40±0,05•
Visual acuity with maximum correction	0,38±0,03	0,72±0,03•
Spherical equivalent	-5,50±0,11	-5,18±0,14•
Cylindrical component of refraction, D	-3,26±0,14	-2,96±0,14
Spherical component of refraction, D	-2,04±0,11	-1,88±0,10
Keratometry of the anterior surface of the cornea on the vertical axis, D	50,81±0,12	50,32±0,11
Keratometry of the back surface of the cornea on the vertical axis, D	-7,68±0,01	-7,80 ±0,07
The thickness of the cornea at the apex is μm	458 ±4,5	445 ±4,2 •
Corneal volume, mm3	56,9 ±0,30	55,8 ±0,2 •
Asphericity (ϑ)	-0,84±0,05	-0,88 ±0,04
Progression index	2,27 ±0,05	2,50 ±0,06 •
Astigmatism, D	4,86 ±0,22	4,35 ±0,22
Surface dispersion index ISV	99,0 ±3,1	76,5 ±3,3 •
Vertical asymmetry index IVA	0,99 ±0,07	0,84 ±0,07
Keratoconus index KI	1,28 ±0,02	1,21 ±0,01
The highest asymmetry index UAV	2,64 ±1,5	2,40 ±1,2

Surface regularity index CRI	1,21 ±0,11	0,98 ±0,10
Surface asymmetry index SAI	2,28 ±0,09	2,61 ±0,12 •

The low level of the indicator was observed in the S(C1) area (41±2.4 μm). A relatively small thickness of the cornea was recorded in the I(b5) area (509±6.0 μm). Thus, against the background of corneal ectasia, the thickness of the cornea and the thickness of it's epithelium are different in its different areas.

EFFECTIVENESS OF OPERATIVE CORNEAL ECTASIAS TREATMENT

Corneal ectasias cause poor visual acuity due to astigmatism mainly as a result of it's thinning. Various treatment methods are used to prevent this process or to stop it's progression: using glasses and special contact lenses; implantation of intrastromal corneal rings; corneal crosslinking; keratoplasty and so on. In our study, intrastromal implantation of Keraring corneal rings, corneal ultraviolet-light crosslinking separately with each other and in combination with topographic photo-refractive keratectomy were applied and their effectiveness was compared. Corneal intrastromal segments (Intrastromal corneal ring segments (ICRS) are synthetic materials that improve corneal morphology and refractive ability.

Since the implantation of intrastromal segments into the cornea is considered the first stage of our research, before the second stage treatment planned after 8 months, a complex examination was conducted in order to evaluate the results of the first stage and to study the condition of the patients visual function at the beginning of the second stage, the information we received is reflected in table 9.

As it can be seen, the planned and expected main result in practice - improvement of visual function was ensured: uncorrected visual acuity improved up to 3 times (from 0.13±0.03 to 0.40±0.05 to; $p<0.01$), visual acuity was optimized with maximum correction (from 0.38±0.3 to 0.72±0.03). Such a result was associated with a statistically significant change in the spherical equivalent of the cornea

(-5.50 ±0.11 and -3.18±0.14; p<0.05). Cylindrical (-5.36±0.14 and -2.46± 0.14; p>0.05) and spherical (-6.04±0.11 and -1.88±0.10; p>) refraction 0.05) components have also changed, but the change is not statistically honest. A similar result was obtained by keratometry of the anterior (50.81±0.12 and 44.32±0.11D) and posterior (-7.68±0.01 and -7.80±0.07D) corneal surfaces on the vertical axis can be followed.

Statistically significant (p<0.05) changes were recorded for corneal apical thickness (458±4.5 and 467±4.2μm) and volume (56.9±0.30 and 55.8±0.20mm^3).

Table 9. Dynamics of the main indicators of the eye with keratoconus after ICRS implantations

Indicators	Before the surgery	8 months after surgery
Uncorrected visual acuity	0,13±0,03	0,40±0,05•
Visual acuity with maximum correction	0,38±0,03	0,72±0,03•
Spherical equivalent	-5,50±0,11	-3,18±0,14•
Cylindrical component of refraction, D	-5,36±0,14	-2,46±0,14
Spherical component of refraction, D	-6,04±0,11	-1,88±0,10
Keratometry of the anterior surface of the cornea on the vertical axis, D	50,81±0,12	44,32±0,11
Keratometry of the back surface of the cornea on the vertical axis, D	-7,68 ±0,01	-7,80 ±0,07
Keratometry of the back surface of the cornea on the vertical axis, D	458 ±4,5	467 ±4,2 •
Corneal volume, mm3	56,9 ±0,30	55,8 ±0,2 •
Asphericity (ϑ)	-0,84 ±0,05	-0,88 ±0,04
Progression index	2,27 ±0,05	2,50 ±0,06 •
Astigmatism, D	4,86 ±0,22	2,35 ±0,22
Surface dispersion index ISV	99,0 ±3,1	76,5 ±3,3 •

Vertical asymmetry index IVA	0,99 ±0,07	0,84 ±0,07
Keratoconus index KI	1,28 ±0,02	1,21 ±0,01
The highest asymmetry index UAV	2,64 ±1,5	2,40 ±1,2
Surface regularity index CRI	1,21 ±0,11	0,98 ±0,10
Surface asymmetry index SAI	2,28 ±0,09	2,61 ±0,12 •

In the treatment of keratoconus, corneal ultraviolet irradiation and crosslinking, which is carried out by applying ribolobin, has been used widely and for a long time (more than 30 years).

Since this method allows collagen fibers to thicken, the flexibility and stiffness of the cornea is optimized, ultimately improving visual function. Table 10 shows the state of visual function and biometric characteristics of the cornea in patients 8 months after CXL surgery.

Table 10. Visual function status and corneal biometric characteristics before and 8 months after CXL surgery

Indicators	Before surgery	8 months after
Uncorrected visual acuity	0,16±0,03	0,23±0,04•
Visual acuity with maximum correction	0,36±0,04	0,43±0,04•
Keratometry of the corneal surface in the vertical axis	50,9±0,21	50,20±0,12•
Keratometry of the surface of the cornea in the vertical axis, D	-7,65 ±0,08	-7,78 ±0,07
Demarcation line location depth, mkm		22,0 ±4,5
The degree of epithelopathy, points	-	0,5 ±0,04
Keratocyte activity, honey	-	0,2 ±0,01
Corneal thickness at the apex, μm	456 ±4,1	438 ±3,8
Corneal volume, mm3	57,0 ±0,2	56,1 ±0,3 •
Asphericity (ϑ)	-0,85 ±0,05	-0,89 ±0,06
Progression index	2,26 ±0,05	2,89 ±0,06 •
Astigmatism	5,85 ±0,21	5,34 ±0,21

Corneal surface dispersion index (ICV)	95,5 ±3,6	75,4 ±2,8 •
Vertical asymmetry index (IVA)	1,06 ±0,08	0,82 ±0,07 •
Keratoconus index (KI)	1,25 ±0,01	1,19 ±0,01 •
Highest Asymmetry Index (IHA)	26,2 ±1,3	23,8 ±1,2 •
Surface regularity index (SRI)	1,20 ±0,10	0,90 ±0,10 •
Surface asymmetry index (SAI)	2,9 ±0,08	2,5 ±0,10 •

As can be seen, the main result expected from the operation was a slight improvement in visual acuity: uncorrected visual acuity from 0.16±0.03 to 0.23±0.04, visual acuity with maximum correction and increased from 0.36±0.04 to 0.43±0.04. This positive result was associated with changes in the biometric characteristics of the cornea: the keratometry of the cornea anterior surface on the vertical axis decreased statistically (from 50.9±0.21D to 50.20±0.12D; $p < 0.05$), the depth of the demarcation line was 22.0±4.5μm, the degree of epitheriopathy was 0.5±0.04 points, the activity of keratocytes was 0.2±0.01 points. A decrease in the corneal volume (57.0±0.2 and 56.1±0.3mm^3), and an increase in the progression index (2.26±0.05 and 2.89±0.06) were observed.

Biometric indices of the cornea decreased after surgery: corneal surface dispersion index from 95.5±3.6 to 75.4±2.8, vertical asymmetry index from 1.06±0.08 to 0,82±0.07, keratoconus index from 1.25±0.01 to 1.19±0.01, height asymmetry index from 26.2±1.3 to 23.8±1, up to 2, surface regularity index from 1.20±0.10 to 0.90± 0.10, surface asymmetry index from 2.9±0.08 to 2.5±0, until 10.

The mechanism of the corneal positive role of infrastromal segments and corneal ultraviolet crosslinking in the treatment of keratoconus differs from each other, the experience of applying both of them separately as well as in a joint variant has long been available. In our study, the joint application of these methods was performed in 21 eyes of 21 patients. 8 of the patients had keratoconus in stage II, and 13 in stage III.

The results of the joint application of intrastromal implantation of the cornea and ultrasound cross-linking are given in table 11.

As can be seen, visual acuity without correction is more than 4 times after surgery (from 0.12<0.03 to 0.55±0.04), and visual acuity is increased up to 3 times with maximum correction. (from 0.31±0.04 to 0.83±0.03). Such an optimal result is a decrease in spherical equivalent (from -5.58±0.11 to -3.08±0.12), a decrease in keratometry of the front surface of the cornea (from 50.78±0.10 to 43, 11±0.12) was obtained against the background. After the operation, the volume of the cornea also decreased (from 56.8±0.3 to 55.4±0.2).

With the application of CXL, it was possible to obtain a stable refractive result. For eliminating residual refractive errors,Topo FRK was performed under local anesthesia, and the corneal epithelium was ablated with a thickness of 50 μm.

Table 11. Visual and biometric characteristics of the eye 8 months after the combined application of corneal intrastromal tubes implantation and ultrasound crosslinking

Indicators	Before surgery	8 months after surgery
Uncorrected visual acuity	0,12±0,03	0,55±0,04•
Visual acuity with maximum correction	0,31±0,04	0,83±0,03•
Cylindrical component of refraction	-6,22±0,13	-2,34±0,14
Spherical component of refraction	-7,08±0,11	-1,87±0,10
Spherical equivalent, D	-5,58±0,11	-3,08±0,12•
Keratometry of the front surface on the vertical axis, D	50,78±0,10	43,11±0,12
Keratometry of the back surface on the vertical axis, D	-7,65±0,08	-7,80 ±0,07
Corneal apex thickness μm	469 ±4,1	446 ±4,0
The volume of the cornea mm3	56,8 ±0,3	55,4 ±0,2 •
Asphericity (ϑ)	-0,85±0,04	-0,88 ±0,04
Progression index	2,26 ±0,05	2,51 ±0,07 •
Astigmatism	5,88 ±0,22	1,98 ±0,25
Surface dispersion index, ISV	98,0 ±2,9	74,5 ±3,1 •
Vertical asymmetry index, IVA	1,02 ±0,08	0,72 ±0,09 •
Keratoconus index KI	1,22 ±0,01	1,15 ±0,02 •
Height asymmetry index UAV	26,5 ±1,3	22,9 ±1,2 •

Surface regularity index SRI	1,30 ±0,12	0,94 ±0,11 •
Surface asymmetry index SAI	3,01 ±0,14	2,68 ±0,14 •

•P <0,05

As can be seen, visual acuity without correction is more than 4 times after surgery (from 0.12<0.03 to 0.55±0.04), and visual acuity is increased up to 3 times with maximum correction. (from 0.31±0.04 to 0.83±0.03). Such an optimal result is a decrease in spherical equivalent (from -5.58±0.11 to -3.08±0.12), a decrease in keratometry of the front surface of the cornea (from 50.78±0.10 to 43, 11±0.12) was obtained against the background. After the operation, the volume of the cornea also decreased (from 56.8±0.3 to 55.4±0.2).

With the application of CXL, it was possible to obtain a stable refractive result. For eliminating residual refractive errors, Topo FRK was performed under local anesthesia, and the corneal epithelium was ablated with a thickness of 50 μm.

After that, photo-refractive keratectomy ablation was performed in the stroma. The patients were observed for 8 months and the refractive results obtained at the last stage are reflected in the 12th table.

Table 12. Results of staged application of CXL and TopoPRK in the treatment of keratoconus

Indicators	Front of the surgery	After CXL	After ToPoPRK
Uncorrected visual acuity	0,12±0,03	0,55±0,04	0,70±0,04•▲
Visual acuity with maximum correction	0,31±0,04	0,83±0,03	0,98±0,03•
Cylindrical component of refraction	-3,22±0,13	-2,84±0,14	-2,40±0,12•▲
Spherical component of refraction	-2,08±0,11	-1,87±0,10	-1,51±0,09•
Spherical equivalent, D	-5,58±0,11	5,08±0,12	4,12±0,11•▲
Keratometry of the anterior surface in the vertical axis, D	50,78±0,10	50,21±0,12	50,07±0,09

Keratometry of the posterior surface in the vertical axis, D	-7,65±0,08	-7,84±0,05	-7,84±0,05
The peak thickness of the cornea Mm	459±4,1	446,0±4,0	436±3,0•
The volume of the cornea mm^3	56,8±0,3	55,4±0,2	54,8±0,1•
Asphericity (ϑ)	-0,85±0,04	0,88±0,04	0,89±0,05
Progression index	2,26±0,04	2,51±0,07	2,68±0,07•
Astigmatism	4,88±0,22	4,28±0,25	4,05±0,12
Surface dispersion index, ISV	98,0±2,9	74,5±3,1	62,0±2,5•
Vertical asymmetry index, IVA	1,02±0,08	0,72±0,09	0,51±0,05•▲

Table 12 (continue)

Keratoconus index KI	1,22±0,01	1,15±0,02	1,09±0,01•
Height asymmetry index HAI	26,5±1,3	22,9±1,2	19,2±0,9•
Surface regularity index SRI	1,30±0,12	0,94±0,11	0,64±0,12•
Surface asymmetry index SAI	3,01±0,14	2,68±0,14	1,8±0,12•

•P<0,05 (compared to post-CXL)

As can be seen, TopoPRK after CXL allowed an increase in visual acuity: visual acuity after CXL uncorrected from 0.16±0.03 to 0.23±0.04 in addition to TopoPRK after its application, it increased from 0.23±0.04 to 0.51±0.03.

The maximum correction was manifested by the dynamics of visual acuity with higher results: visual acuity, which was at the level of 0.36±0.04 before the operations, increased to the level of 0.43±0.04 after CXL, and after TopoPRK it was brought to the level of 85±0.04.

As can be seen, corneal biomechanical properties improved significantly (P<0.05) after TopoPRK: corneal apical thickness was 456±4.1μm at baseline and 438±3.8μm after CXL surgery and decreased to 386.1±3.0μm after TopoPRK. The corneal volume also

decreased dynamically: 57.0±0.2mm^2 before operations, 56.1±0.3 after CXL operation and finally 56.0±0.2mm^3 after TopoPRK.

After staged operations, clearer dynamics are observed according to the dispersion index of the corneal surface (ICV): 95.5±5.6 before operations, 75.4±2.8 after CXL operation and 65.1±1.9 TopoPRK -after. Topo PRK was applied to stabilize the positive results of the implantation of cornea intrastromal segments and to make the vision better.

Pre-operatively, after ICRS and Add TopoPRK-¬ the change of these indices was statistically honest and constituted accordingly:

- Corneal surface dispersion index (ICV) 99.0±3.1; 76.5±3.3 and 66.4±2.5;
- Vertical asymmetry index 0.99±0.07; 0.84±0.07 and 0.69± 0.04;
- Keratoconus Index 1,28±0,02; 1,21±0,01 and 1,13±0,02;
- Height Assymetry Index 26,4±1,5; 24,0±1,2 and 20,6±1,2;
- Regularity of the corneal surface 1,21±0,11; 0,98±0,10 and 0,75±0,11;
- Assymetry of the corneal surface index 2,98±0,09; 2,61±0,12 and 2,11±0,12.

Implantation of intrastromal corneal segments (ICRS), ultraviolet crosslinking (CXL), and topographic photorefractive keratectomy optimize the refractive properties of the ectased cornea by different mechanisms. Therefore, their combined options strengthen the effect of each other and allow to get higher positive results.

In our interview, 21 eyes of 21 patients (keratoconus stage II-III) underwent ICRS surgery with a standard protocol, CXL after 24 hours, and TopoPRK after 8 months.

The data we received about the dynamics of visual acuity and biomechanical characteristics of the cornea before the operations, 8 months after ICRS+CXL combined surgery and 8 months after TopoPRK are shown in table 13.

As it can be seen, as a result of the combined application of ICRS and CXL operations, improved without correction (from 0.12± 0.03 to 0.55±0.04) and with maximal correction (from 0.31±0.04 to 0

.83±0.03) visual acuity is further optimized by applying TopoPRK and reaches the level of 0.70±0.04 and 0.98±0.03, respectively. Improvement of visual acuity is associated with dynamic changes of biometric characteristics of the cornea. Spherical equivalent (preoperatively -5.58±0.11; after CXL+ICRS 3.08±0.12 and after TopoPRK 1.12± 0.11) significantly (P<0.05) has decreased. Cylindrical (-6.22±0.12; -2.34±0.14 and -0.70±0.12 and -0.70±0.12 respectively) and spherical components of refraction (-7.08±0.11; -1, 87±0.10 and - 0.51±0.09) decreased statistically.After the combined operations, the keratometry of the anterior surface of the cornea in the vertical axis was significantly reduced (50.78±0.10; 43.11±0.12 and 41.07±0.09, respectively; P<0.05), whereas the posterior surface keratometry increased (respectively -7.65±0.08; -7.80±0.07 and -7.84±0.05; P<0.05).

Corneal apical thickness (469±4.1; 446±4.0 and 401±3.0μm, respectively; p<0.05) and volume (56.8±0.3, 55.4±0.2 and 54.8± 0.1mm^3 p<0.05) decreased.

Table 13. The results of staged application of CXL+ICRS+ +TopoPRK operations in the treatment of keratoconus

Indicators	Before surgery	After CXL	After ToPoPRK
Uncorrected visual acuity	0,12±0,03	0,55±0,04	0,70±0,04•▲
Visual acuity with maximum correction	0,31±0,04	0,83±0,03	0,98±0,03•
Cylindrical component of refraction	-6,22±0,13	-2,34±0,14	-0,70±0,12•▲
Spherical component of refraction	-7,08±0,11	-1,87±0,10	-0,51±0,09•
Spherical equivalent, D	-5,58±0,11	3,08±0,12	1,12±0,11•▲
Keratometry of the anterior surface in the vertical axis, D	50,78±0,10	43,11±0,12	41,07±0,09
Keratometry of the back surface on the vertical axis, D	-7,65±0,08	-7,84±0,05	-7,84±0,05
The peak thickness of the cornea μm	469±4,1	446,0±4,0	401±3,0•

The volume of the cornea mm^3	56,8±0,3	55,4±0,2	54,8±0,1•
Asphericity (ϑ)	-0,85±0,04	0,88±0,04	0,89±0,05
Progression index	2,26±0,04	2,51±0,07	2,68±0,07•
Astigmatism	5,88±0,22	1,98±0,25	1,05±0,12
Surface dispersion index, ISV	98,0±2,9	74,5±3,1	62,0±2,5•
Vertical asymmetry index, IVA	1,02±0,08	0,72±0,09	0,51±0,05•▲
Keratokonus index KI	1,22±0,01	1,15±0,02	1,09±0,01•
Height asymmetry index IHA	26,5±1,3	22,9±1,2	19,2±0,9•
Surface regularity index SRI	1,30±0,12	0,94±0,11	0,64±0,12•
Surface asymmetry index SAI	3,01±0,14	2,68±0,14	1,8±0,12•

•P<0,05 (compared to the pre-operative indicator)
▲P<0,05 (compared to post-CXL)

Although asphericity (ϑ) did not change significantly, it tended to increase (-0.85±0.04; 0.88±0.04 and 0.89±0.05, respectively). The dynamics of the progression index is characterized by growth (2.26±0.05; 2.51±0.07 and 2.68±0.07). Astigmatism decreased after surgery (5.88±0.22, 1.98±0.25 and 1.05±0.12, respectively).

Thus, combined ICRS, CXL, and TopoPRK improve visual function statistically and optimize corneal topography.

After CXL, ICRS, ICRS+CXL and ICRS+CX+TopoPRK operations, visual acuity without correction was 0.23±0.04, respectively; 0.40±0.05; 0.55±0.04 and 0.43±0.04 with maximum correction of 0.70±0.04; 0.72 ± 0.03; It was 0.83±0.03 and 0.98±0.03. As can be seen, the visual acuity after CXL, ICRS operations was close to each other ($p>0.05$), but compared to these results, the results of the combined options (CXL+ ICRS and CXL+ ICRS+ TopoPRK) were better. ($p<0.05$). The highest positive result was achieved with a staged combination of CXL+ICRS+TopoPRK operations.

Anterior corneal keratometry (on the vertical axis) after CXL, ICRS, CXL+ICRS and CXL+ICRS+TopoPRK operations was 50.20± 0.12; 44.32±0.11; It was 43.11±0.12 and 41.07±0.09 D. The difference between these indicators is not statistically significant ($p>0.05$). A similar result is observed according to surface keratometry (7.78±0.07;

-7.80±0.07; -7.80±0.07 and -7.84±0.05). As it can be seen, the application of operations separately and combined in different variants allows to get keratometric results close to each other.

Corneal thickness at the apex after CXL, ICRS, ICRS+CXL and ICRS+CXL+TopoPRK operations was 438±3.8, respectively; 467± 4.2; It was 446±4.0 and 401±3.0 μm. After the mentioned operations, the volume of the cornea was 56.1±0.3, respectively; 55.8±0.2; It was 55.4±0.2 and 54.8±0.1 mm3 and statistically significantly different from each other ($p<0.05$). The level of the indicator after CXL and ICRS operations is close to each other and does not differ from each other, but the combination of these operations is associated with a decrease in corneal volume. Corneal asphericity index (ϑ) before surgery (-0.85±0.05) and after operations in all variants -0.89±0.06 after CXL; -0.88±0.04 after ICRS; -0.88±0.04 after CXL+ICRS and 0.89±0.05 after CXL+ICRS+TopoPRK) did not change significantly.

Increased progression index after CXL, ICRS, ICRS+CXL and CXL+ ICRS+ TopoPRK compared to preoperative status (2.89±0.06; 2.50±0.06; 2.51±0.07 and 2.51±0.07, respectively) 68±0.07) were different from each other, the difference is mainly the result obtained after CXL. No statistically significant difference was found between the level of astigmatism obtained after these operations (5.34±0.21; 2.35±0.22; 1.98±0.25 and 1.05±0.12).

The dispersion index of the corneal surface (the ratio of the radius of curvature in the sagittal plane to the average radius of curvature) was significantly reduced after all operations, 74.5±3.1 after CXL, ICRS, ICRS+CXL and ICRS+CXL+TopoPRK operations 76.5±3.3; It was 74.5±3.1 and 62.0±0.05, the combination of three methods allowed to get a higher result. A similar result is observed according to the vertical asymmetry index (the average difference of the radii at the opposite points of the cornea in the vertical plane). After appropriate practices, the level of this indicator is 0.82±0.07; 0.84±0.07; It was 0.72±0.09 and 0.51±0.05, statistically significantly different from each other: a level close to the norm (≤0.28mm) was obtained in the combined version of 3 methods (ICRS + CXL + TopoPRK).

The highest asymmetry index (the average level of the difference in the heights of the upper and lower sectors of the cornea in the horizontal meridian) was 23.8±1.2 after CXL, ICRS, ICRS+CXL and ICRS+CXL+TopoPRK operations, respectively; 24.0±1.2; It was at the level of 22.9±1.2 and 19.2±0.9 μm and was statistically significantly different from each other. Normalization of the indicator was recorded only in the combined version of ICRS+CXL+TopoPRK operations.

The keratoconus index (the ratio of curvature indices in the upper and lower sectors of the cornea) decreased after the operations and became close to the norm (≤1.07). The level of the indicator after CXL, ICRS, ICRS+CXL and ICRS+CXL+TopoPRK operations is 1.19± 0.01, respectively; 1.21±0.01; It was 1.15±0.02 and 1.09±0.01. The optimal level of this indicator was achieved in the combined version of ICRS+CXL+TopoPRK operations.

A similar result is observed by comparing the regularity and asymmetry indices of the corneal surface.

Thus, it is proven that ICRS, CXL and TopoPRK operations are effective in the treatment of keratoconus and more optimal results are obtained in the combined versions of these methods. The positivity of operations is manifested both in the improvement of visual function and in the dynamics of topographical and keratometric indicators of the cornea.

RESULTS

1. The primary incidence of corneal pathologies in Azerbaijan is 34.5±0.9 $^{0}/_{0000}$ (22.5±1.2 $^{0}/_{0000}$ in men and 44.2±1.6 $^{0}/_{0000}$ in women) age (7.0±1.6 $^{0}/_{0000}$ males and 12.0±2.1 $^{0}/_{0000}$ females at 0-4 years of age, 92.5±9.2 $^{0}/_{0000}$ males and 120.0±10.4 $^{0}/_{0000}$ females at 65-69 years of age) varies in a wide interval depending on the cornea. Total morbidity with pathologies at the level of 340.4±9.0 $^{0}/_{0000}$ (249.3± 2.4$^{0}/_{0000}$ in men and 433.8±3.2 $^{0}/_{0000}$ in women) age (80.0±4,6 $^{0}/_{0000}$ men and 132.1±6.5 $^{0}/_{0000}$ women – 981.7±30.1 $^{0}/_{0000}$ men and 1147.8±29.4 $^{0}/_{0000}$ women) and from the place of residence (Samukh- 228, 4±20.2 $^{0}/_{0000}$– Serum - 697.6±34.3 $^{0}/_{0000}$) varies in a wide range depending on the nosological structure of

37.0% of infectious keratitis (20.2% bacterial, 4.1% viral and 4.7% mycotic, 8.0% mixed origin), 20.3% trauma (foreign bodies), 18.0% erosion, 9.3% keratoconus, 6.1% dystrophies.

2. The prevalence of corneal injuries is 60.1±1.6 $^{0}/_{0000}$ (74.5± 2.6 $^{0}/_{0000}$ in men, 45.9±2.0 $^{0}/_{0000}$ in women), age-dependent 7.2±1.5 – 122.5±6.3 $^{0}/_{0000}$ (in the age groups of 0-9 and 40-49), the demand for inpatient assistance is at the level of 7.9±0.2 $^{0}/_{0000}$, they are mainly in workplaces and households (43 ,3±3.7 and 19.8±2.7%) occur, in most cases unilateral (88.6±2.4%), corneal abrasion (57.1±3.5%), foreign body (15.8±2.6%) manifested by chemical and thermal burns (5.6±1.6 and 4.1±1.4%), perforation (5.1±1.5%), 55.1. In ±3.5% of cases, it is associated with damage to the epithelium, in 19.4±2.8% and 15.3±2.6% of front and middle stroma, and in 10.2±2.2% of all layers. Effectiveness depends on clinical characteristics, in 69.3±3.4% of cases complete recovery (clean and transparent cornea), in 14.2±2.6% of cases the surface of the cornea is hazy, 11.4±2.4. Results with macular blurring in % cases and leukomatous blurring in 5.1±1.6% frown cases.
3. The incidence rate of corneal opacification is 27.1±0.6 $^{0}/_{0000}$ in Azerbaijan, 16.0±2.1 $^{0}/_{0000}$ to 47.6±9.0 $^{0}/_{0000}$ in the subordinate cities and regions of the republic, in most cases (72 .1%) visual impairment of the first category (visual acuity 0.1-0.3) and changes in biometric characteristics of the cornea in a wide range (spherical equivalent of refraction 2-3.7 dptr, -5–(+1, 5) dptr astigmatism, central thickness of the cornea 429-589μm, minimum thickness of the cornea 414-549μm, maximum thickness of the epithelium 66-107μm, degree of blurring 118-276μm, 1.1-5.9 asymmetry index, 1.1-2, 4 is associated with corneal regularity index, 2091-2903 number of endothelial cells), blur area 29.4±6.4; 35.3±6.6 and 35.3±6.6% of cases are partial, subtotal and total, vascularization (51.0±7.0%) is recorded in most cases, 60.9±7 is formed as a result of keratitis in 6% of cases, trauma in 29.3±7.1% of cases, diabetes mellitus increases the risk and severity of the pathology.
4. The total incidence of infectious keratitis is 97.9±2.1 $^{0}/_{0000}$ (53.5± 1.5 $^{0}/_{0000}$ bacterial, 12.4±0.7 $^{0}/_{0000}$ viral, 10.9±0.6 $^{0}/_{0000}$ mycotic, 21.1±0.9 $^{0}/_{0000}$ mixed), depends on age (9.3±1.6 $^{0}/_{0000}$ in 0-9 and

193.9±10.6 $^{0}/_{0000}$ 60-69 years old), mainly requiring outpatient treatment, inpatient treatment the frequency of requiring events is 9.75± 0.66 $^{0}/_{0000}$, corneal smears are gram-negative in 22.8% of cases, gram-positive in 31.6% of cases, and mycoses are found in 14.4% of cases, sensitivity to antibiotics varies depending on the type of microflora (vancomycin 87.5 - 97.6%; amicocin 83.3 - 100%; gentamicin 63.3 - 90.5%; chloramicin 66.7 - 88.1%; ciprofloxacin 75.0 - 92.8%; ofloxacin 80 - 100%; gatifloxacin 80 - 100%; moxifloxacin 80.0 - 91.7%; tobramycin 58.3 - 80.9%; cefofaxime 70 - 100%), pathogenic treatment 16.0±2.4. Complication in % of cases resulted in scarring without endophthalmitis in 88.1±2.2 cases.

5. In Azerbaijan, the incidence rate of corneal ulcer is 48.8± 0.8 $^{0}/_{0000}$, it varies in a wide range (22.7±2.5 $^{0}/_{0000}$ – 78.4±9.4 $^{0}/_{0000}$) in the cities and districts of the Republic, mainly (52.6%) is found in purulent form, the causes include 20.6±4.1% traumas, 15.5±3.7% history of eye operations, 10.3±3.1% use of contact lenses, accounts for 14.4±3.5% of respiratory infections, 50.0±4.7% of cases are peripheral, 24.6±4.0% are paracentral, 25.4±4.1% are located in central, in most cases of small size (56.1±4.7%≤2mm, 24.6±4.0%≤2.1-5.0mm) and in 74.6±4.1% of cases it is in the depth of one third of the cornea, 15.8±9 Uveitis in 4% of cases, panophthalmitis in 3.5±1.7%, perforation in 2.6±1.5% of cases, pseudomonas aeruginas in 22.3±3.2% of cases, pseudomonas aeruginas in 21.7±1.5% of cases. 3.2% streptococcus pneumoniae, 25.3±3.4% staphylococcus epidermidis, 16.3±2.9% streptococcus viridans, 7.8±2.1% staphylococcus aureus, 6 ,6±1.9% microsporum durseum is detected, microfl its sensitivity to azithromycin, ceftazidin, chloramphenicol, ciprofloxacin, moxifloxacin and ofloxacin is in the range of 69.2±12.8 - 97.6±2.4%, conservative treatment in 100% of cases is corneal epithelization. Elimination of corneal syndrome is in 84.2±3.4% of cases and results in the resorption of the infiltrate.
6. There is a difference in the age distribution of patients diagnosed with non-infectious diseases of the cornea - erosion, dystrophy and degeneration, as well as keratoconus: the majority of patients with

the diagnosis of corneal dystrophy and degeneration (>89.7%)) are aged 40 and over, and more than half (57.6%) are aged 50 and over; the majority of patients diagnosed with keratoconus (49.2%) are in the 0-49 age range; in the age distribution of patients diagnosed with corneal erosion, the specific weight of patients in the age interval of 10 years after 20 years increases sharply (7.3% at 10-19 years old, 12.5% at 20-29 years old). The incidence rate of corneal erosion in the population is 47.6±1.5$^{0}/_{0000}$ (43.1±2.0 $^{0}/_{0000}$ in men, 52.1±2.1 $^{0}/_{0000}$ in women), depending on age (16, 8±2.2 $^{0}/_{0000}$in 0-9 years old 130.6±8.2 $^{0}/_{0000}$in 60-69 years old), mainly large size (62.6±4.6%), in upper and lower zone the same number of lesions (46.7±4.8 and 53.3±4.8%), often relapse (60.7%), the role of etiological factors is different (18.7±3.8% contact lens, 18.7±3.8% diabetes, 10.3±2.9% foreign body, 34.6±4.6% spontaneous), treatment results depend on clinical features and etiological factor and 21.5±3.9% blurring and scarring in 17.8±3.7% cases, it is complicated by infectious keratitis. Corneal spheroid degeneration, dystrophies, and senile degenerations are rarely recorded in referral materials, corresponding to 5.0±1.2% in targeted examination; 4.1±1.1% and 32.1±2.6% in men, 7.1±1.4%; 5.1±1.2%; 16.0±2.1% in women, steroidal the central thickness of the cornea (<11.0±2.1 on a background of 580 μm), the depth of the anterior chamber (<10.8±2.0 on a background of 3 mm), the radius of curvature of the cornea (≥ 9.2±1.9% against the background of 8mm, ischemic heart disease (12.8±2.2%), arterial hypertension (9.4±1.9%), diabetes (11.4±2.1%), place of residence (16.0±2.8% in windy and dusty environmental conditions) and smoking (11.4±2.1%) affect, in most cases it is the share of grade 1-2 keratopathies (71.0±7 .4%), it is associated with poor visual acuity in 73.9±7.1% of cases. Corneal dystrophies are most often detected in people aged 80 and older, mainly endothelial dystrophy (51.7±9.3%) and it is observed in the form of anterior dystrophy, from the morphometric indicators, the total optical density, central thickness of the cornea, endothelial-dessement-stromal optical density, endothelial optical density and stromal density increase. It is associated with a decrease in the density of endothelial cells.

7. Corneal ectasias (mainly keratoconus) are recorded in 24.6± 1.1 cases per 100,000 population according to application materials, in targeted examinations in 3.8±1.1% of men and 5.1±1.2% of women. It is found in 8.4±2.8% of people under 40 years of age, 1.9± 1.0% of people aged 60-69, and is associated with changes in the morphometric, tomographic and topographical indicators of the cornea. The majority of corneal ectasias (64.3±6.4%) are indications for surgical intervention (stage I-III). Visual acuity after CXL, ICRS, ICRS+CXL and ICRS+CXL+TopoPRK without correction was 0.23±0.04, respectively; 0.40±0.05; 0.55±0.04 and 0.43±0.04 with maximum correction of 0.70±0.04; 0.72±0.03; it was 0.83±0.03 and 0.98±0.03. Corneal thickness at the apex after CXL, ICRS, ICRS+CXL and ICRS+CXL+TopoPRK procedures is 438±3.8, respectively; 467±4.2; 446±4.0 and 401±3.0 μm. Implantation of corneal intrastromal segments and ultraviolet crosslinking of the cornea separately and in a combined (joint) variant, each of these methods with topographic photorefractive keratectomy combining (jointly) allows obtaining continuous optical, refractive and topographical positive results, the joint application of three of them (ICRS+CXL+ TopoPRK) is more effective.

PRACTICAL RECOMMENDATIONS

1. In ophthalmological practice, regardless of the reason of the application, if the patient does not correct according to the refractometric indicators, if the keratometric indicators are higher than 45.0 dptr, to evaluate the biometric, tomographic and topographic indicators of the cornea;
2. Prefer inpatient treatment in the treatment of keratitis and prescribe microbiological analysis of the cornea smear, choose adequate antibacterial therapy in evaluating the sensitivity of the microflora to antibiotics;
3. In the case of corneal injuries, bring the patients to the specialist hospital early according to the instructions;

4. Active detection of dystrophy and degeneration of the cornea, taking into account the age, gender, comorbidity of the patients (diabetes, ischemic heart disease, arterial hypertension, etc.);
5. To use International Clinical Protocols and Standards in the treatment of corneal diseases and examination of patients;
6. To select patients with corneal ectasia for early surgical treatment (at the first stage of the disease).
7. In the preventive examination of different social classes of the population, the condition of the cornea should be assessed, biomicroscopy, tomography and topography should be prescribed in risk groups and when there is a possibility of pathological changes.
8. The main directions of prevention of corneal diseases: protection of the eye from the effects of the environment, including accidents; prevention of dystrophies by regulation of metabolic processes; protection from microorganisms; to comprehensively plan general body strengthening measures.
9. In the official report on the morbidity of the population (form 12) in the 10th revision of the International Classification of Diseases, 4 large groups of corneal diseases (H16 – keratitis; H17 – corneal scarring and clouding; H18 – other corneal diseases, H19 – other) information classified in rubric display.
10. For applying the magnitude of the difference in the incidence of corneal diseases within the country between regions and cities as a measure of the inadequacy of regional health care.
11. Corneal diseases in most cases lead to impaired visual acuity (poor vision). Therefore, the perspective concept of the prevention and treatment of these pathologies should be formed the role of risk factors and the clinical-epidemiological characteristics of the diseases. First of all, the condition of the cornea should be evaluated in the preventive examination of different social classes of the population, biomicroscopy, tomography and topography should be prescribed in risk groups and when there is a possibility of pathological changes.

THE LIST OF PUBLISHED ARTICLES ON THE TOPIC OF THE DISSERTATION

1. Магеррамов, П.М. Имплантация Icl Staar после кросслинкинга у больных кератоконусом, сочетающимся с миопией высокой степени // - Bakı: Oftalmologiya elmi-praktik jurnal, 2019. №2 (30), - s.56-60
2. Məhərrəmov, P.M. Buynuz qişanın bulanması diaqnozu ilə pasiyentlərə göstərilən ambulator diaqnostik yardımın həcmi və strukturu // - Bakı: Sağlamlıq jurnalı, 2019. №3, s.73-78
3. Məhərrəmov, P.M. Buynuz qişa xorası olan xəstələrin ilkin müraciət zamanı demoqrafik və klinik xüsusiyyətləri // - Bakı: Azərbaycan Tibb Jurnal, 2019. №3, - s.118-122
4. Məhərrəmov P.M. Buynuz qişanın bulanması fonunda onun biometrik səciyyələri // Azərbaycan Təbabətinin Müasir Nailiyyətləri, 2019. №2, - s. 248-251
5. Məhərrəmov, P.M. İnfeksion keratitlərin epidemioloji xüsusiyyətləri və Bakı şəhəri əhalisinə stasionar yardımın zəruriliyi // - Bakı: Azərbaycan Oftalmologiya Jurnalı, 2020. №1 (32), - s.20-26

6. Магеррамов, П.М. Распространенность инфекционных кератитов в г. Баку по материалам обращаемости // Офтальмология Восточная Европа, Беларусь 2020, том 10, №2, стр 195-201
7. Məhərrəmov, P.M. Prevalence of non-infectious corneal diseases // - Ukraine: Journal of Ophthalmology, 2020. №5, - p. 75-78
8. Məhərrəmov, P.M. Buynuz qişanın xəstəlikləri fonunda görmə qabiliyyətinin pozulmasının risk amilləri // - Bakı: Azərbaycan Tibb Jurnal, 2020. №3, - s.118-122
9. Məhərrəmov, P.M. Buynuz qişanın patologiyaları ilə bağlı əhalinin stasionar yardımına tələbatı // - Bakı: Azərbaycan Təbabətinin Müasir Nailiyyətləri, 2020. №3, - s. 23-27
10. Məhərrəmov, P.M. Buynuz qişanın qeyri-infeksion xəstəlikləri ilə bağlı stasionar yardımına tələbatın səciyyələri // - Bakı: Sağlamlıq jurnalı, 2020. №4, - s. 96-101
11. Магеррамов, П.М. Клинико-эпидемиологическая характеристика кератоконуса в городе Баку // - Bakı: Azərbaycan Oftalmologiya Jurnalı, 2020. №3 (34), - s. 37-44
12. Məhərrəmov, P.M. Buynuz qişanın eroziyasının yayılması və klinik səciyyələrinə görə strukturu // - Bakı: Azərbaycan Oftalmologiya Jurnalı, 2020. №3 (34), - s. 20-26
13. Məhərrəmov, P.M. Buynuz qişanın ahıllıq degenerasiyasının yayılma səviyyəsi və risk amilləri // - Bakı: Sağlamlıq jurnalı, 2020. №6, - s.72-77
14. Məhərrəmov, P.M. Buynuz qişanın ektaziyalarının klinik-epidemioloji səciyyələri // - Bakı: Azərbaycan Oftalmologiya Jurnalı, 2020. №4 (35), - s. 20-26
15. Məhərrəmov, P.M. Şəkərli diabet fonunda buynuz qişanın bulanmasının biometrik səciyyələri // Azərbaycan Təbabətinin Müasir Nailiyyətləri, Bakı, 2021, №1, s.55-59
16. Магеррамов, П.М., Гулиева, М.Г.Изменчивость микробиологического профиля язвы роговицы // - Москва: Российский Офтальмологический Журнал, 2021. Том14 №1, - с. 69-73

17. Məhərrəmov, P.M. Buynuz qişanın sferoidal degenerasiyasının yayılması və klinik səciyyələri // - Bakı: Sağlamlıq jurnalı, 2021. №1, - s.80-85
18. Магеррамов, П.М. Распространенность болезней роговицы (по материалам амбулаторно-поликлинических учреждений города Баку) // - Москва: Российский Офтальмологический Журнал, 2021. Том14 №2, - с. 23-26
19. Məhərrəmov, P.M. Buynuz qişanın distrofiyasının yayılma və növlərinin strukturunun səciyyələri // - Bakı: Azərbaycan Təbabətinin Müasir Nailiyyətləri, 2021. №2, - s.158-161
20. Maharramov, P.M. Frequency and risk factors of complications of surgical treatment of corneal diseases // World of medicine and biology, 2021. №3(77), - p. 106-110,
21. Магеррамов, П.М. Региональные особенности распространенности заболеваний роговицы в Республике Азербайджан // Социальные аспекты здоровья населения, 2021. №6 (67), DOI: 10.21045/2071-5021-2021-67-6-6
22. Магеррамов, П.М. Эффективность трёхэтапного лечения кератоконуса с коррекцией сопутствующей аметропии // - Казань: Казанский Медицинский Журнал, 2022. том 103, №1 - с. 153-159
23. Maharramov, P. M., Aghayeva F.A. Evaluation of the effectiveness of combined staged surgical treatment in patients with keratoconus // PLOS ONE | https://doi. org/10.1371/ journal.pone.0264030 2022. March 7
24. Магеррамов, П.М. Четырехэтапное лечение кератоконуса, сочетающегося с рефракционными аметропиями // Офтальмохирургия (fyodorov journal of ophthalmic surgery) 2022. № 1, - с. 6-12
25. Məhərrəmov, P.M., Cəfərova, S.F. Keratokonusun müalicəsində kroslinkinq və topoqrafik fotorefraktiv keratoektomiyanın müştərək tətbiqinin nəticələri // - Bakı: Azərbaycan Oftalmologiya Jurnalı, 2022. №3 (42), - s. 11-18
26. Qasımov E.M., Məhərrəmov P.M. Keratoektaziyalarda «Keraring As Proqressive Thickness» buynuz qişa intrastromal

seqmentlərinin implantasiyasinin nəticələri // - Bakı: Oftalmologiya elmi-praktik jurnal, 2019. №1 (29), - s.73-77
27. Магеррамов П.М. Оценка эффективности ультрафиолетового кросслинкинга роговицы при кератоконусе // XL международная научно-практическая конференция «Современная медицина: новые подходы и актуальные исследования» // - Москва: сентьябрь, - 2020 №9(36), - с. 11-16, ISSN 2541-9854
28. Магеррамов П.М. Анализ эффективности имплантации интрастромальных роговичных колец Keraring // Актуальные вопросы образования и науки: - Тамбов- 27 февраля 2021 г. - с 75-77
29. Магеррамов П.М. Сравнительная оценка результатов ультрафиолетового кросслинкинга роговицы в комбинации с имплантацией интрастромальных роговичных колец при лечении кератоконуса // General question of world science / XIII international scientific-practical conference, 31 iyul 2021, Amsterdam - с. 8-12
30. Магеррамов, П.М., Усубов, Э.Л. Сравнительная оценка результатов комбинированного применения различных методов лечения: кросслинкинга роговицы, имплантации интрастромальных роговичных колец-сегментов и трансэпителиальной топографической фоторефрактивной кератэктомии при лечении кератоконуса // Точка Зрения Восток – Запад. Научно-практический журнал, 2022. № 2, - с. 46-53
31. Məhərrəmov, P.M. Buynuz qişanın bulanması olan pasiyentlərdə biometrik göstəricilərin qiymətləndirilməsi // Akademik Zərifə Əliyevanın 100 illik yubileyinə həsr olunmuş «OFTALMOLOGİYANIN AKTUAL PROBLEMLƏRİ» mövzusunda Beynəlxalq elmi-praktik konfransın materialları: - Bakı. 27-29 aprel 2023
32. Məhərrəmov, P.M. Mərkəzi keratokonus olan xəstələrdə krosslinkinqdən sonra Icl Star implantasiyasının nəticələri // Azərbaycan Oftalmoloqlar Cəmiyyətinin 7-ci regional konfransı: - Şəki 25 oktyabr, 2019.

33. Məhərrəmov P.M. Keratokonusda femtosaniyə lazer üsulu ilə müxtəlif növ keraring – buynuz qişa halqaların implantasiyası // Akademik Zərifə Əliyevanın anadan olmasının 98 illiyinə həsr olunmuş Beynəlxalq Elmi praktiki Konfrans. Bakı 28 aprel, 2021.
34. Maharramov P.M. The results of the implantation of the instromal certain segments of keraring as progressive thikness under ceratic seasons // 12th Eurocornea Congress e-poster, 25 sentyabr 2021, Virtual Event
35. Məhərrəmov P.M. Buynuz qişa ektaziyaların və yanaşı gedən ametropiyaların müasir müalicə metodları // Akademik Zərifə Əliyevanın anadan olmasının 99 illiyinə həsr olunmuş Beynəlxalq Elmi praktiki Konfrans, 28 aprel 2022, Bakı
36. Məhərrəmov P.M. Keratokonus və yanaşı gedən ametropiyaların müasir müalicə metodları // Oftalmologia Kafedrasının yaradılmasının 100 illiyinə həsr olunmuş Beynəlxalq Elmi-Praktik Konfrans, 23-24 dekabr, 2022, Bakı
37. Магеррамов П.М. Имплантация «Keranatural» при кератоконусе // Международная конференция по офтальмологии ВОСТОК–ЗАПАД. 1-2 iyun 2023, Уфа
38. Maharramov P.M. Kroslinkinq və topoqrafik fotorefraksion keratoektamiyanın II-III mərhələ keratokonusun müalicəsində müştərək tədbiqi // International Conference''Physiology of vision and occupational pathologies;fundamental and applied aspects'' & 6th Congress of Azerbaijan Physiologists. 30-31 oktyabr 2023 AMEA, Baku

LIST OF ABBREVIATIONS

ISV	–	dispersion index of surface
IVA	–	vertical asymmetry index
CKI	–	central keratoconus index
HAI	–	height asymmetry index
ADI	–	altitude descent index
HAI	–	the highest asymmetry index
KI	–	keratoconus index
Rmin	–	the minimum sagittal radius of the cornea
K1	–	flat measure of keratometry
K2	–	vertical dimension of keratometry
ACP	–	average corneal power
CYL	–	cylindrical power
SRI	–	surface regularity index
SAI	–	surface asymmetry index
KPI	–	keratoconus probability index
CLC	–	ultaburp crosslinking of cornea
TBUT	–	tear break up time
PED	–	permanent defect in the epithelium of the bladder

CLEC	–	cord lining epithelial cells
PVP - 1	–	povidone-iodine
EED	–	endothelial-epithelial dystrophy
ABMD	–	antrior basement membrane dystrophy
CPE	–	cornea punctire epitheliopathy
SRI	–	surface regularity index
SAI	–	surface asymmetry index
KSI	–	keratoconus (Klays - Malda) index
SDP	–	standard deviation of power
CSI	–	center surround index
DSI	–	differential sector index
K	–	central K reoding
OSI	–	opposite Sector Index
CEI	–	corneal eccentric index
ICRS	–	Intrastromal corneal ring segments
Topo PRK	–	topographic photorefractive keratoectomy
CP	–	pathologies of the cornea
CTFB	–	corneal trauma and foreign body
CCR	–	clouding of the cornea
GSU	–	Grey Scale Units
ICD-10th review	–	10th review of the International Classification of Diseases
NIDC	–	Non-infectious diseases of the cornea
ECR	–	Erosion of the cornea
DCR	–	dystrophy of the cornea
OAGC	–	old age generation of the cornea
EC	–	ectasias of the cornea

The defence will be held on 26 (day) January (month) 2024, at 14^{00} (time) at the meeting of the Dissertation council BED 1.03 of Supreme Attestation Commission under the President of the Repulic of Azerbaijan operating at National Optholmology Centre named after Academician Zarifa Aliyeva.

Address: AZ 1114, Baku city, Javadkhan street 32/15

Dissertation is accessible Library at the National Optholmology Centre named after Acad. Zarifa Aliyeva.

Electronic versions of the dissertation and its abstract are available on the official website of the http://www.eye.gov.az.

Abstract was sent to the required addresses on 21 (day) December (month) 2023 (year)

Signed for print: _____

Paper format: 60 x 84 1/16

Volume: 78008

Number of hard copies: 20