

# GLAUCOMA EPIDEMIOLOGICAL SITUATION IN THE FERGANA VALLEY: REGIONAL CHALLENGES

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## Abstract

The aim of the research was to organize and conduct a prospective analytical epidemiological study to determine the prevalence of glaucoma in the Andijan region of the Fergana Valley.

**Keywords** Epidemiology, glaucoma, meteorological factors, clinical-meteorological monitoring.

## INTRODUCTION

The study utilized complex survey-based epidemiological, biochemical, instrumental, and specialized ophthalmological methods for evaluating glaucoma over three years. A total of 1112 men (35.8%) and women (64.2%) aged  $\geq 1.5$ –70 years participated in the study. An analytical epidemiological approach was used in the prospective observation, yielding results on the epidemiological effects of contemporary glaucoma. It was found that total glaucoma occurs in 35.7% of the male population and 64.3% of the female population ( $R < 0.05$ ). Glaucoma occurs 1.8 times more in women in the valley's climate. This is a relatively high rate compared to other regions [3.7] and certainly indicates unfavorable

epidemiological conditions for glaucoma.

**Materials and Methods of the Study:** In the Fergana Valley under the conditions of variable and sharply continental climate, there are unfavorable epidemiological conditions for the occurrence of glaucoma in the Andijan region. Thus, it was established that the widespread practice of epidemiological research to identify and assess the population, obvious clinical signs of glaucoma patients is a scientific recommendation.

Andijan's regional climate conditions: In the context of eye diseases, with the widespread occurrence of glaucoma, the necessity of adopting effective treatment methods, the possibility of causing irreversible complications (vision loss),

and creating conditions for exacerbating the quality of life, it is becoming increasingly relevant. When studying cases of glaucoma patients, it becomes clear that in the population of both young (children and adolescents) and geriatric populations (elderly individuals), there is a significant shortage of documented cases, and information about the disease is also scarce. Currently, in research conducted worldwide, it is becoming increasingly clear that glaucoma, its modern treatment methods, and its full cure are not achievable, and 100% prevention of vision loss resulting from the disease is impossible. Without achieving significant breakthroughs in the timely diagnosis and access to modern treatment methods, the prevalence of glaucoma will continue to increase at the regional level, and reducing this condition remains challenging. Epidemiological surveillance and the finalization of examination activities are necessary to determine the prevalence of glaucoma, and this situation presents a significant challenge. The results of surveillance activities indicate an increase in the number of cases among younger patients, and maintaining life-long eye health is currently a significant concern. "Addressing these issues is considered one of the crucial tasks of modern ophthalmology. To accomplish such complex tasks and apply them in practice, new scientific directions are being explored. The presence of existing challenges, which are generally poorly understood in the epidemiological sense among the population of elderly individuals: tasks related to finding solutions to previously mentioned issues have become apparent. In order to address these highly relevant issues, programs have been developed based on the findings of detailed scientific research conducted by specialists in Andijan, aiming to closely study these problems in the regional context, resulting in the creation of protocols and the initiation of implementation activities.

The significance of these findings is evidenced by the fact that the clinical course of glaucoma is associated with the relationship between geographical and meteorological factors, which has led to an increase in scientific research dedicated to understanding this correlation. According to life

scientific research results, favorable climatic conditions contribute to the progression of glaucoma cases. Such climatic changes, according to the Khalifa theory, exert their influence through four receptors (receptors located in the inner layers of the eye, receptors located in the back and frontal areas of the eyeball, receptors located in the hypothalamus area of the midbrain, and receptors located in the brainstem).

Some researchers suggest that an increase in atmospheric pressure in most cases aggravates glaucoma, while according to other information, they advocate for the worsening of general conditions in patients suffering from glaucoma and emphasize the continuous progression of the disease regardless of specific climatic factors." The information gathered from the studies conducted to compare glaucoma in different climatic conditions indicates that living in high-altitude conditions may lead to a decrease in glaucoma prevalence. Hypobaric conditions, i.e., lower atmospheric pressure, affect the optic nerve analyzers, leading to an increase in intraocular pressure. Such conditions, as symptoms, may cause a deterioration in visual activity or even complete blindness due to the expansion of the atrophic climate, accompanied by a decrease in intraocular pressure, which exacerbates angiovascular processes and sharpens the clinical picture of glaucoma.

Such climatic changes affect the body through positive influences, for instance, increased solar insolation, intensified wind speed, and hyperthermic regimes, resulting in conditions that increase intraocular pressure. These changes gradually exacerbate themselves through positive influences on the optic nerve, resulting in increased intraocular pressure and the onset of glaucomatous processes and diseases. As a result, 80% - 90% of patients suffering from glaucoma and up to 60% - 65% of their close relatives experience meteogeomagnetic conditions. These complex situations can be concluded to possibly affect the local climatic conditions' human ocular hydro and hemodynamic characteristics, becoming a factor in exacerbating glaucoma's pathogenetic "chains" in

populations ranging from childhood to geriatric age. These pathogenetic indicators exhibit various characteristics in different populations. However, such complex processes remain largely unexplored. As scientific research continues, it has been noted that most of the scientific sources contain inconsistencies and conflicting information. The number of patients under observation is insufficient to draw comprehensive conclusions, and there are methodological shortcomings in grouping and establishing clinicometeorological indicators or statistical analysis of results. Such scientific studies in Uzbekistan, particularly regarding glaucoma and its climatic factors, have been somewhat limited, and in some areas, completely absent. Glaucoma, both in theoretical and practical meteorological forecasting, lacks a comprehensive treatment and prevention system.

These complex and challenging scientific investigations in the field of climate-ophthalmology have been actively pursued by researchers, who have been using modern techniques and methods, as well as contemporary experiences, to advance their work. The purpose of the research was to conduct comprehensive prospective studies, analytical, epidemiological, and surveillance to monitor and evaluate the progression of glaucoma in the Fergana Valley, specifically in the Andijon region. The research lasted for three years and employed general survey-epidemiological, biochemical, instrumental, and specific ophthalmological methods, as well as statistical techniques. During these intricate scientific investigations, 1112 patients were examined and monitored in relation to climate changes. These included 35.8% males and 64.2% females aged 1.5 to 70 years, who volunteered to participate in the scientific study. Our findings in the climatologically unstable and strongly continental climate of the Fergana Valley differ significantly from the previous studies conducted by other researchers.

Analytical epidemiological methods were employed systematically in the sequential stages of research, leading to insights into glaucoma

epidemiology. During the course of the research, it was found that out of the total number of patients suffering from glaucoma, 35.8% were males and 64.2% were females, which is statistically significant ( $P < 0.05$ ). It was determined that in the climatic conditions of Andijon, glaucoma is diagnosed 1.8 times more often in females. These findings, compared to other regions [3,5], suggest a higher incidence of glaucoma in relation to specific epidemiological climatic conditions. Consequently, it is evident that ecological and climatic factors play a significant role in the manifestation of glaucoma. Open-angle glaucoma was identified in 35.8% of the population, with 35.8% in males and 64.2%, or 1.7 times more, in females ( $P < 0.05$ ). It was observed that narrow-angle glaucoma occurred in 30.0% of the population, with 38.0% in males and 62.0%, or 1.5 times more, in females. Secondary glaucoma, in turn, occurred in 23.0% of the population, with 29.0% in males and 71.0%, or 2.4 times more, in females ( $P < 0.01$ ). Moreover, suspected glaucoma was found in 8.8% of the population, with 23.9% in males and 76.1%, or 3.2 times more, in females ( $P < 0.001$ ). Absolute glaucoma prevalence was 5.8% in the population, with 42.8% in males and 57.2%, or 1.3 times more, in females ( $P < 0.05$ ). The indicators of suspected glaucoma prevalence constitute 6.5% of the population, with 28.1% in males and notably 71.9%, or 2.7 times more, in females ( $P < 0.01$ ).

These particular indicators, when compared with existing scientific sources, draw attention for several reasons: first, due to the utilization of epidemiological trends, and secondly, because the examination area's climatic and environmental characteristics are considered, thus demonstrating the relevance of specific glaucoma incidence indicators. The systematic stage-by-stage research conducted on the relationship between geographical areas and glaucoma reveals significant findings from an ophthalmological standpoint, recognizing climate-related factors as hazardous elements. Moreover, it has been identified that most of the information regarding the age-related progression of glaucoma has been clarified. Continuous analysis of epidemiological conditions, either periodically or by specific

factors, holds theoretical and practical importance. The necessity and requirements for scientific directions related to climate are increasing, especially in high-continent areas, where glaucoma epidemiological studies are lacking.

The conclusion drawn from our findings is of considerable importance. Glaucoma incidence is rising significantly in relation to age, starting from the second decade of life and increasing by 1.5 times in the third decade. By the fourth decade of life, it triples and increases by seven times in the fifth decade. The highest incidence of glaucoma is identified in individuals aged 60 to 69. Identifying these trends in disease progression and understanding them in specific geographical areas are crucial for acquiring diagnostic, clinical, and preventive capabilities in the fight against the "silent thief of sight" - glaucoma.

### **CONCLUSIONS**

1. The epidemiological conditions necessary for the increased incidence of glaucoma in changing and strong continental climates are evident. Therefore, it is imperative to conduct broad epidemiological research to identify and evaluate the clinical signs of glaucoma in patients affected by the disease, especially in high-risk populations.

2. In Andijon's region, characterized by significant continental climate changes, glaucoma has been found to be significantly more prevalent in women than men, with a ratio of 1.8:1. This demonstrates unique epidemiological characteristics and indicates a higher incidence in relation to age.

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