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ORIGINAL RESEARCH

Prevalence of Open-Angle Glaucoma in Wetland and Hilly Areas

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ABSTRACT

Purpose: Open-angle glaucoma (OAG) is a chronic, progressive, and irreversible multifactorial optic neuropathy. Characterized by an open angle of the anterior chamber, optic nerve head changes, and a gradual decline in peripheral vision followed by central visual field loss, OAG remains asymptomatic until advanced stages, emphasizing the critical need for early detection and management. Elevated intraocular pressure is a key risk factor for primary or secondary causes. Participating clinicians review the causes of OAG, pathophysiology, and the latest evidence-based strategies for evaluation and management in wetland areas. **Design:** This is a retrospective, observational study conducted in District Bandipora, Jammu and Kashmir, India. **Method:** This is a retrospective, observational study conducted in District Bandipora, Jammu and Kashmir, India. A total of 16,000 patients were screened at the hospital for various eye conditions. Of these, 224 patients were diagnosed with open-angle glaucoma and included in the study. Patients with other types of glaucoma, prior eye surgeries, or pre-existing ocular conditions were excluded. **Results:** Out of the 16,000 patients screened in the hospital over the 5-year period, 224 patients were diagnosed with open-angle glaucoma. Using the extrapolation formula, the estimated prevalence of open-angle glaucoma in the general population of District Bandipora was calculated to be 1.4%. **Conclusion:** This study demonstrates a higher-than-expected prevalence of open-angle glaucoma (1.4%) among individuals exposed to prolonged UV light in a high-altitude wetland area.

INTRODUCTION

Glaucoma is a leading cause of irreversible blindness, with open-angle glaucoma being the most common form globally.[1,2,3] Various factors contribute to its development, including genetics, intraocular pressure (IOP), and environmental influences.[4,5,6,7,8,9,10]This study focuses on environmental factors like UV light exposure and altitude, which may elevate the risk of glaucoma, particularly in high-altitude, wetland regions.[11,12,13,14,15,16,17] District Bandipora, Jammu and Kashmir, surrounding the Wullar Lake, is an area where these environmental factors are present due to the high levels of sunlight reflection off the water surface.

This study aims to estimate the prevalence of open-angle glaucoma among individuals in District Bandipora, using a hospital-based sample over a 5-year period and applying an extrapolation method to project the findings to the general population.

MATERIAL AND METHODS

This is a retrospective, observational study conducted in District Bandipora, Jammu and Kashmir, India. The district has a population of 385,099(Census 2011), with most people living in rural areas and engaged in agriculture and water-related occupations around Wullar Lake. The high-altitude location and occupational exposure to sunlight reflected off the water create conditions that may contribute to an increased prevalence of glaucoma.

The primary aim of this study was to determine the prevalence of open-angle glaucoma in individuals occupationally exposed to UV light in high-altitude wetland areas. The majority of the population is involved in occupations around Wullar Lake, leading to long-term exposure to UV light and sunlight reflection from the water.

Study Duration

The study was conducted over a period of 5 years, from January 2019 to December 2023.

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Sample Size

During this period, a total of 16,000 patients were screened at the hospital for various eye conditions. Out of these, 224 patients were diagnosed with open-angle glaucoma and included in the study based on the inclusion criteria.

Inclusion Criteria

Patients aged 18 years and above, diagnosed with open-angle glaucoma using clinical and diagnostic tools (such as tonometry, gonioscopy, and visual field testing), were included. Patients with other types of glaucoma, prior eye surgeries, or pre-existing ocular conditions were excluded.

Extrapolation Method

To estimate the true prevalence of open-angle glaucoma in the general population of District Bandipora, the Extrapolation formula was applied. The formula used to calculate the estimated prevalence was:

This method allows for an estimation of the population-level prevalence based on the number of glaucoma cases observed in the hospital sample.

RESULTS

Out of the 16,000 patients screened in the hospital over the 5 years, 224 patients were diagnosed with open-angle glaucoma. Using the extrapolation formula, the estimated prevalence of open-angle glaucoma in the general population of District Bandipora was calculated to be 1.4%.

Table 1.Demographic distribution.

Sno.	Gender	Number of patients	Percentage (%)
1	Male	152	68
2	Female	72	32

Total sample size(N)= 224

Table 2.IOP Range

Sno.	IOP Range	Number of patients	Percentage (%)
1	20-25mmhg	47	21
2	25-30mmhg	73	33
3	30-35mmhg	64	29
4	> 40 mmHg	38	17

Table 3.Disc changes

Sno.	Disc changes	Percentage (%)
1	>0.5	17
2	0.6	19
3	0.7	37
4	0.8	17
5	0.9	10

In all the patients 24-2 visual field analysis was done (SITA standard) visual field changes correlating with disc changes were seen. Andersons criteria was fulfilled by all the patients including in our study.

DISCUSSION

The findings of this study highlight the increased prevalence of open-angle glaucoma in high-altitude, wetland areas like District Bandipora, where UV exposure and occupational factors contribute to ocular stress. The calculated prevalence of 1.4% is consistent with global estimates for glaucoma in high-risk populations. The role of environmental factors, particularly UV exposure and high-altitude hypoxia, may play a significant role in the development of open-angle glaucoma in these regions. [18,19,20,21] Preventive strategies, such as the use of UV-protective sunglasses, could mitigate the risk of glaucoma progression by reducing ocular exposure to harmful UV rays. Further research is needed to investigate the long-term impact of these interventions and to explore other environmental factors contributing to glaucoma prevalence in hilly and wetland areas. [22,23,24,25]

CONCLUSION

This study demonstrates a higher-than-expected prevalence of open-angle glaucoma (1.4%) among individuals exposed to prolonged UV light in a high-altitude wetland area. The use of UV-protective measures, such as sunglasses, is recommended to reduce the risk of glaucoma progression. The results provide valuable insights for developing targeted interventions in similar high-risk populations across other high-altitude and wetland regions.

Abbreviations Used

- AION – Anterior Ischemic Optic Neuropathy
- POAG – Primary Open-Angle Glaucoma

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- NVG – Neovascular Glaucoma
- IOP – Intraocular Pressure
- BCVA – Best Corrected Visual Acuity
- FBS – Fasting Blood Sugar

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