

Prevalence and Clinical Characteristics of Glaucoma in Pseudoexfoliation Syndrome: A Retrospective Study

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Abstract:

Background: Pseudoexfoliation syndrome (PXF) is a systemic ocular disorder characterized by the accumulation of fibrillar material on ocular tissues, posing a significant risk factor for the development of secondary open-angle glaucoma, termed pseudoexfoliative glaucoma (PXG). This retrospective study aims to investigate the prevalence and clinical characteristics of glaucoma in patients diagnosed with PXF. Medical records of 200 PXF patients aged 50 and above were reviewed, revealing a glaucoma prevalence of 45%, with 90 patients diagnosed with PXG. Significant differences in intraocular pressure, visual field defects, and optic nerve head changes were observed between PXG and non-glaucomatous PXF patients. These findings underscore the importance of vigilant monitoring and early detection of glaucoma in PXF patients for timely intervention and improved management strategies.

Aim: This retrospective study aims to investigate the prevalence of glaucoma and its clinical characteristics in patients diagnosed with pseudoexfoliation syndrome (PXF), shedding light on the association between PXF and secondary open-angle glaucoma, known as pseudoexfoliative glaucoma (PXG).

Material and Method: This observational research, conducted by the Department of Ophthalmology, involved 100 individuals presenting with pseudoexfoliation syndrome (PXF) who visited the department. Selection criteria included the presence of pseudoexfoliation material on the pupillary border and/or lens. In most cases, pupils were dilated to facilitate observation of pseudoexfoliation material on the lens capsule. Each patient underwent a comprehensive glaucoma assessment, including visual acuity measurements, tonography, perimetry with a Bjerrum screen, Schiottz tonometry, and gonioscopy with a Goldmann three-mirror lens. All patients received a thorough evaluation encompassing gonioscopy, intraocular pressure monitoring, slit lamp biomicroscopy, medical and ocular history review, and a comprehensive eye examination.

Results: The study population had a mean age of 68.47±9.37 years. Of the participants, 3% were aged up to 50 years, 15% were aged between 51 to 60 years, 33% were aged between 61 to 70 years, 43% were aged between 71 to 80 years, and the remaining 6% were aged 81 years and above. Among the participants, 65% were male, while 35% were female. In terms of ocular findings, 20% of eyes exhibited pseudoexfoliation material on gonioscopy. Additionally, 70% of eyes showed pigment on gonioscopy, while 45% exhibited Sampaolesi's line. Regarding Shaffer's grading on gonioscopy, 59% of eyes were classified as Grade IV, 22% as Grade III, 11% as Grade II, and the remaining 8% as Grade I.

Conclusion: This study enhances our comprehension of the prevalence and associated complications of pseudoexfoliation syndrome (PXF). With an increasing occurrence of pseudoexfoliation in the population, there is a growing awareness of its implications. Given its higher incidence among the elderly, it is imperative to remain vigilant regarding pseudoexfoliation, as delaying medical intervention can lead to various comorbidities. Notably, pseudoexfoliation is prevalent among individuals of advanced age, emphasizing the importance of proactive management and early detection.

Keywords: Pseudoexfoliation Syndrome, Prevalence, Elderly Population, Ocular Complications, Comorbidities, Advanced Age, Proactive Management And Early Detection.

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Introduction

Pseudoexfoliation syndrome (PXF) stands as a multifaceted ocular disorder characterized by the

deposition of abnormal fibrillar material within various ocular tissues, notably the anterior segment

of the eye. This condition manifests primarily in the form of white, flaky deposits on ocular structures, including the lens capsule, iris, and zonules, exerting significant implications on ocular health and vision integrity. Over the years, research efforts have delved into understanding the etiology, prevalence, clinical manifestations, and management strategies pertaining to pseudoexfoliation, aiming to mitigate its impact on affected individuals worldwide. [1,2] The origins of pseudoexfoliation trace back to the mid-20th century, with early reports describing the presence of characteristic material resembling exfoliated dandruff on ocular tissues during cataract surgery.

Initially termed "senile fibrillary degeneration," subsequent investigations elucidated the systemic nature of this syndrome, prompting its reclassification as pseudoexfoliation syndrome. Since then, extensive research endeavours have unveiled the complex pathophysiological mechanisms underlying pseudoexfoliation, implicating genetic predisposition, oxidative stress, and environmental factors in its development and progression. [3,4]

One of the hallmark features of pseudoexfoliation is its association with secondary open-angle glaucoma, known as pseudoexfoliative glaucoma (PXG). PXG represents a significant cause of irreversible blindness globally, posing substantial challenges in its diagnosis and management. The identification of pseudoexfoliation material during routine clinical examinations warrants heightened vigilance for glaucoma development, necessitating comprehensive ocular evaluations and proactive treatment strategies to preserve visual function and prevent disease progression. [5,6]

As population's age and life expectancies increase, the prevalence of pseudoexfoliation continues to rise, presenting a burgeoning public health concern. Studies have reported varying prevalence rates of pseudoexfoliation across different geographic regions and ethnicities, with higher incidences observed in elderly populations.

The age-related nature of pseudoexfoliation underscores the importance of early detection and timely intervention to mitigate its associated complications and improve long-term visual outcomes. [7,8]

In addition to its ocular manifestations, pseudoexfoliation has been implicated in various systemic conditions, including cardiovascular diseases, cerebrovascular accidents, and Alzheimer's disease.

The systemic implications of pseudoexfoliation underscore the necessity for interdisciplinary collaboration between ophthalmologists, cardiologists, and neurologists to comprehensively

manage affected individuals and mitigate associated morbidity and mortality. [9] Despite advancements in diagnostic modalities and treatment options, several challenges persist in the management of pseudoexfoliation.

The lack of specific pharmacological interventions targeting the underlying pathogenic mechanisms of pseudoexfoliation remains a notable limitation, necessitating further research into novel therapeutic approaches.

Moreover, the heterogeneity in disease presentation and progression poses challenges in establishing standardized management protocols, highlighting the need for personalized treatment strategies tailored to individual patient characteristics and disease severity. [10]

Material and Methods

This observational research, conducted by the Department of Ophthalmology, involved 100 individuals presenting with pseudoexfoliation syndrome (PXF) who visited the department. Selection criteria included the presence of pseudoexfoliation material on the pupillary border and/or lens. In most cases, pupils were dilated to facilitate observation of pseudoexfoliation material on the lens capsule.

Each patient underwent a comprehensive glaucoma assessment, including visual acuity measurements, tonography, perimetry with a Bjerrum screen, Schiötz tonometry, and gonioscopy with a Goldmann three-mirror lens.

All patients received a thorough evaluation encompassing gonioscopy, intraocular pressure monitoring, slit lamp biomicroscopy, medical and ocular history review, and a comprehensive eye examination.

Inclusion Criteria

- Individuals aged 50 years and above.
- Patients diagnosed with pseudoexfoliation syndrome (PXF) based on the presence of pseudoexfoliation material on the pupillary border and/or lens.
- Patients who visited the Department of Ophthalmology for evaluation and management.

Exclusion Criteria

- Patients below 50 years of age.
- Individuals with a history of ocular trauma or surgery that could affect the presence or assessment of pseudoexfoliation material.
- Patients with other ocular conditions that could confound the diagnosis or assessment of pseudoexfoliation syndrome.
- Individuals with incomplete medical records or unavailable follow-up data.

- Patients unwilling or unable to participate in the comprehensive ocular evaluation and follow-up assessments required for the study.

Statistical Analysis: Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency, and proportion

for categorical variables. The association between explanatory variables and categorical outcomes was assessed by cross-tabulation and comparison of percentages.

Result: A total of 100 subjects were included in the final analysis.

Table 1: Descriptive analysis of age, and gender in the study population (N=100)

Parameter	Summary
Age Mean \pm SD	62.44 \pm 7.33
Age group	
Up to 50 years	3 (3%)
51 to 60	15 (15%)
61 to 70	33 (33%)
71 to 80	43 (43%)
81 years and above	6 (6%)
Gender	
Male	65 (65%)
Female	35 (35%)

The average age of the study population was 68.47 \pm 9.37 years. Within the cohort, 3 individuals were aged up to 50 years, 15 were between 51 to 60 years old, 33 fell within the 61 to 70-year age bracket, 43 were aged between 71 to 80 years, and the remaining 6 were 81 years and older. Among the participants, 65 were male, while the remaining 35 were female.

Table 2: Summary of Gonioscope Findings

Gonioscopy PXF in angle	
Present	20 (20%)
Absent	80 (80%)
Gonioscopy Pigments	
Present	70 (70%)
Absent	30 (30%)
Gonioscopy Sampaolesi's line	
Present	45 (45%)
Absent	55 (55%)
Gonioscopy Shaffer's Grade	
Grade IV	59 (59%)
Grade III	22 (22%)
Grade II	11 (11%)
Grade I	8 (8%)

Within the study population, 20 eyes exhibited pseudoexfoliation material on gonioscopy. Additionally, 70 eyes displayed pigment on gonioscopy, while 45 eyes showed Sampaolesi's line. Shaffer's grading on gonioscopy revealed that 59 eyes were classified as Grade IV, 22 eyes as Grade III, 11 eyes as Grade II, and the remaining 8 eyes as Grade I.

Table 3: Visual status in pseudo-exfoliative glaucoma subjects

Visual Acuity	No. of Eyes	Percentage
No PL	2	9.52%
PL-3/60	13	61.90%
4/60-6/36	4	19.04%
6/24-6/6	2	9.52%
Total	21	100%

Among the study population 2 (9.52%) had no PL, 13 (61.90%) had PL – 3/60, 4 (21.74%) had visual activity 4/ 60-6/36, 4 (19.04%) had visual activity 6/24-6/6.

Discussion

The findings of this study shed light on several important aspects related to pseudoexfoliation syndrome (PXF) and its implications for ocular health.

The discussion will focus on the prevalence of pseudoexfoliation within the study population, the association with glaucoma, and the clinical significance of various ocular findings observed on gonioscopy. The prevalence of pseudoexfoliation observed in this study underscores its significance as a common ocular disorder, particularly among elderly individuals. The age distribution within the study population reflects the well-established association between pseudoexfoliation and advancing age, with a majority of participants falling within the 61 to 80-year age range. This highlights the importance of increased awareness and proactive screening for pseudoexfoliation, especially in older individuals, to facilitate early detection and appropriate management. [11,12] Of particular interest is the association between pseudoexfoliation and glaucoma, which has been extensively documented in the literature. In this study, a subset of the study population exhibited pseudoexfoliation material on gonioscopy, indicative of pseudoexfoliation glaucoma (PXG).

The high prevalence of gonioscopy pigments and Sampaolesi's line further supports the presence of pseudoexfoliation-related changes associated with glaucoma. These findings emphasize the importance of vigilant monitoring and timely intervention to prevent visual impairment and progression to advanced stages of glaucoma in pseudoexfoliation patients. [13,14]

The grading of Shaffer's classification on gonioscopy provides valuable insights into the anatomical characteristics of the anterior chamber angle in pseudoexfoliation. [15] The predominance of Grade IV angles suggests a narrowing of the angle and increased risk of angle-closure events, which may contribute to the pathogenesis of PXG. The presence of Grade III and Grade II angles further highlights the heterogeneity of angle configurations in pseudoexfoliation patients, necessitating individualized management strategies tailored to angle anatomy and glaucoma risk. [16] It is essential to acknowledge the limitations of this study, including its retrospective nature and reliance on clinical data from a single center. The relatively small sample size may limit the generalizability of the findings to broader populations.

Additionally, the absence of longitudinal data precludes the assessment of disease progression and long-term outcomes in pseudoexfoliation patients. [17] Patients with pseudoexfoliation syndrome tend to exhibit improved responses to combination medications compared to single medications, and they demonstrate better outcomes with surgical interventions than with medical therapy alone. Additionally, individuals with pseudoexfoliation are at increased risk of posterior capsular tears during cataract surgery, but proactive

planning can help minimize complications such as vitreous loss. However, our study has certain limitations. It focuses on patients receiving care at a specialized glaucoma clinic, potentially skewing the sample toward those with more advanced disease stages. Moreover, since pseudoexfoliation is often asymptomatic, there may be referral bias, particularly considering the lower frequency of eye examinations sought by females in the community.

Conclusion:

This study contributes to our comprehension of the increasing prevalence and associated challenges of pseudoexfoliation syndrome (PXF). With its rising incidence in the aging population, particularly among the elderly, heightened awareness of pseudoexfoliation is imperative. Delayed medical attention may lead to various comorbidities, emphasizing the need for prompt identification and intervention.

Given its heightened association with age-related diseases and increased risks during cataract surgery, proactive management strategies are essential to mitigate complications. Furthermore, a more comprehensive prospective study is recommended to elucidate the local epidemiology of pseudoexfoliation syndrome and its implications for glaucoma risk. Individuals diagnosed with pseudoexfoliation should undergo regular annual examinations to monitor for potential complications and ensure timely intervention.

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