



RESEARCH ARTICLE

Ocular Manifestations in Patients with Chronic Obstructive Pulmonary Disease Attending a Tertiary Care Centre

Sheel Mani^{1*}, Pragya Prasoon², Pankaj Kumar³, Prem Prakash⁴

ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is a progressive inflammatory airway disorder associated with significant systemic manifestations. Chronic hypoxia, smoking, oxidative stress, and vascular abnormalities in COPD can affect ocular structures and lead to various ophthalmic complications. Early identification of ocular manifestations in COPD patients is important to prevent visual morbidity and improve quality of life.

Aim: To evaluate the ocular manifestations in patients with Chronic Obstructive Pulmonary Disease attending a tertiary care centre.

Materials and Methods: A retrospective observational study was conducted at Government Medical College and Hospital, Purnea, Bihar, India, from April 2025 to March 2026 among 110 diagnosed COPD patients. Detailed ophthalmological examination records including visual acuity, slit-lamp examination, intraocular pressure measurement, and fundoscopy were reviewed. Data regarding demographic characteristics, smoking history, severity of COPD, and ocular manifestations were analyzed. Statistical analysis was performed using SPSS version 26.0. A p-value <0.05 was considered statistically significant.

Results: The majority of patients belonged to the age group of 51–60 years (38.2%). Male predominance was observed (72.7%). Cataract (40.9%) was the most common ocular manifestation followed by dry eye disease (30.0%), hypertensive retinopathy (18.2%), glaucoma (12.7%), and diabetic retinopathy (10.9%). Dry eye disease was significantly associated with smoking history and severe COPD (p<0.05). Increased intraocular pressure was observed in patients receiving prolonged corticosteroid therapy (p=0.021).

Conclusion: Ocular manifestations are common among COPD patients, with cataract and dry eye disease being the predominant findings. Regular ophthalmic screening in COPD patients is essential for early diagnosis and management of vision-threatening complications.

Keywords: Chronic obstructive pulmonary disease; Ocular manifestations; Cataract; Dry eye disease; Glaucoma; Retinopathy

Indian J. Pharm. Biol. Res. (2026): <https://doi.org/10.30750/ijpbr.14.3.30>

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of chronic morbidity and mortality worldwide and represents a significant public health burden.[1] COPD is characterized by persistent airflow limitation associated with chronic inflammatory response of the airways and lungs to harmful particles and gases.[2]

The World Health Organization estimates COPD to be among the leading causes of death globally.[3] Smoking remains the most important risk factor for development of COPD, although environmental pollution, occupational exposure, and biomass fuel exposure also contribute significantly.[4]

COPD is now recognized as a systemic disease with extrapulmonary manifestations involving cardiovascular, musculoskeletal, neurological, metabolic, and ocular systems.[5] Chronic hypoxemia, oxidative stress, systemic inflammation, endothelial dysfunction, and long-term

¹Senior Resident, Department of ophthalmology, Government Medical College and Hospital, Purnea, Bihar, India

²Senior Resident, Department of ophthalmology, Government Medical College and Hospital, Purnea, Bihar, India

³Senior Resident, Department of TB and Chest, Government Medical College and Hospital, Purnea, Bihar, India

⁴Associate Professor & HOD, Department of Medicine, Government Medical College and Hospital, Purnea, Bihar, India

Corresponding Author: Sheel Mani, Senior Resident, Department of ophthalmology, Government Medical College and Hospital, Purnea, Bihar, India . E-mail: sheelmani4312@gmail.com

How to cite this article: Mani S, Prasoon P, Kumar P, Prakash P. Ocular Manifestations in Patients with Chronic Obstructive Pulmonary Disease Attending a Tertiary Care Centre. Indian J. Pharm. Biol. Res. 2026;14(3):177-182.

Source of support: Nil

Conflict of interest: None.

Received: 20/05/2026 **Revised:** 03/06/2026 **Accepted:** 13/06/2026

Published: 24/07/2026

corticosteroid therapy contribute to development of ocular abnormalities in COPD patients.[6]

Several ocular manifestations have been reported in COPD patients including cataract, dry eye disease, glaucoma, retinal vascular changes, hypertensive retinopathy, diabetic retinopathy, and age-related macular degeneration.[7] Chronic smoking and oxidative stress accelerate lens protein denaturation and cataract formation.[8]

Dry eye disease is frequently observed among COPD patients because of chronic smoking, environmental exposure, reduced tear film stability, and prolonged oxygen therapy.[9] Tear film abnormalities can significantly impair ocular surface integrity and visual comfort.[10]

Retinal vascular changes are also common due to chronic hypoxia and vascular endothelial dysfunction associated with COPD.[11] Retinal arteriolar narrowing, venous dilatation, and increased retinal vascular tortuosity have been reported in severe COPD cases.[12]

Long-term systemic or inhalational corticosteroid therapy in COPD patients may predispose to steroid-induced glaucoma and posterior subcapsular cataract.[13] Elevated intraocular pressure associated with corticosteroid use remains an important concern in chronic respiratory disease management.[14]

Therefore, the present study was undertaken to evaluate the ocular manifestations among COPD patients attending Government Medical College and Hospital, Purnea, Bihar, India.

MATERIALS AND METHODS

Study Design

- Retrospective observational study.
- Study Place
- Department of Ophthalmology in collaboration with Department of Pulmonary Medicine, Government Medical College and Hospital, Purnea, Bihar, India.

Study Duration

- April 2025 to March 2026.
- Sample Size
- 110 patients.

Inclusion Criteria

- Diagnosed cases of COPD.
- Patients aged above 40 years.
- Patients with complete ophthalmological records.

Exclusion Criteria

- Patients with pre-existing ocular trauma.
- Patients with congenital ocular disorders.
- Incomplete hospital records.

Study Procedure

Hospital records of COPD patients were reviewed retrospectively. Demographic data, smoking history, duration of COPD, corticosteroid therapy, and ophthalmological examination findings were collected.

Detailed ocular evaluation included

- Visual acuity assessment
- Slit-lamp examination
- Schirmer's test
- Tear film breakup time (TBUT)
- Intraocular pressure measurement
- Fundus examination
- Severity of COPD was classified according to GOLD guidelines.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Descriptive statistics were expressed as mean $\pm$ standard deviation, frequency, and percentage. Chi-square test and independent t-test were used for analysis. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 110 patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD) attending Government Medical College and Hospital, Purnea, Bihar, India, were included in the present retrospective study conducted from April 2025 to March 2026.

Table 1: Age-wise Distribution of Study Participants (n=110)

Age Group (Years)	Number of Patients	Percentage (%)
41–50	20	18.2
51–60	42	38.2
61–70	34	30.9
>70	14	12.7
Total	110	100

Table 2: Gender Distribution of Study Participants

Gender	Number of Patients	Percentage (%)
Male	80	72.7
Female	30	27.3
Total	110	100

Table 3: Distribution According to Severity of COPD

Severity of COPD	Number of Patients	Percentage (%)
Mild	18	16.4
Moderate	46	41.8
Severe	34	30.9
Very Severe	12	10.9
Total	110	100

Table 4: Smoking Status Among COPD Patients

Smoking Status	Number of Patients	Percentage (%)
Smokers	84	76.4
Non-smokers	26	23.6
Total	110	100

Table 5: Ocular Manifestations Among COPD Patients

Ocular Manifestation	Number of Patients	Percentage (%)
Cataract	45	40.9
Dry Eye Disease	33	30.0
Hypertensive Retinopathy	20	18.2
Glaucoma	14	12.7
Diabetic Retinopathy	12	10.9
Age-related Macular Degeneration	9	8.2

Table 6: Distribution of Cataract Types Among COPD Patients (n=45)

Type of Cataract	Number of Patients	Percentage (%)
Nuclear Cataract	22	48.9
Posterior Subcapsular Cataract	14	31.1
Cortical Cataract	9	20.0
Total	45	100

Table 7: Association Between Severity of COPD and Dry Eye Disease

Dry Eye Present	Dry Eye Absent	Total	Severity of COPD
16	48	64	Mild/Moderate
17	29	46	Severe/Very Severe
33	77	110	Total
Value			Statistical Parameter
5.61			χ^2 value
0.018			p-value
Significant			Significance

Table 8: Association Between Corticosteroid Therapy and Raised Intraocular Pressure

Corticosteroid Therapy	Raised IOP Present	Raised IOP Absent	Total
Present	12	38	50
Absent	2	58	60
Total	14	96	110
Statistical Parameter	Value		
χ^2 value	5.31		
p-value	0.021		
Significance	Significant		

Table 9: Visual Acuity Status Among COPD Patients

Visual Acuity Status	Number of Patients	Percentage (%)
Normal Vision ($\geq 6/18$)	71	64.5
Reduced Vision ($< 6/18$)	39	35.5
Total	110	100

Age-wise Distribution of Study Participants

The majority of study participants belonged to the age group of 51–60 years accounting for 42 (38.2%) patients, followed by 61–70 years with 34 (30.9%) patients. The mean age of study participants was 59.8 ± 9.6 years (Table 1, Figure 1).

Gender Distribution of Study Participants

Among the 110 COPD patients included in the study, 80 (72.7%) were males and 30 (27.3%) were females, showing marked male predominance (Table 2, Figure 2).

The image part with relationship ID r1d7 was not found in the file.

Figure 1: Age-wise distribution of study participants showing highest prevalence in the 51–60 years age group.

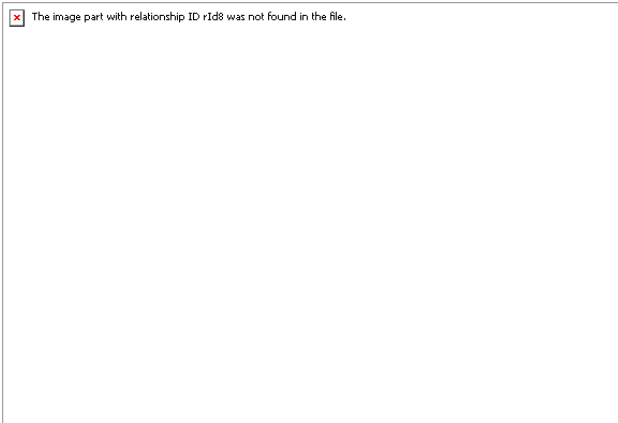


Figure 2: Gender distribution of COPD patients demonstrating marked male predominance.

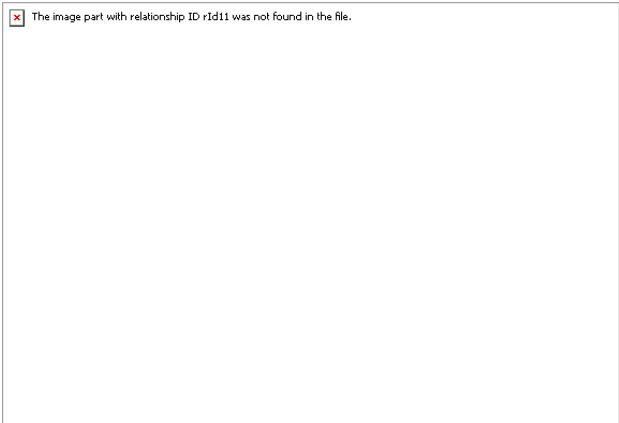


Figure 5: Frequency of ocular manifestations among COPD patients, with cataract being the most common finding.

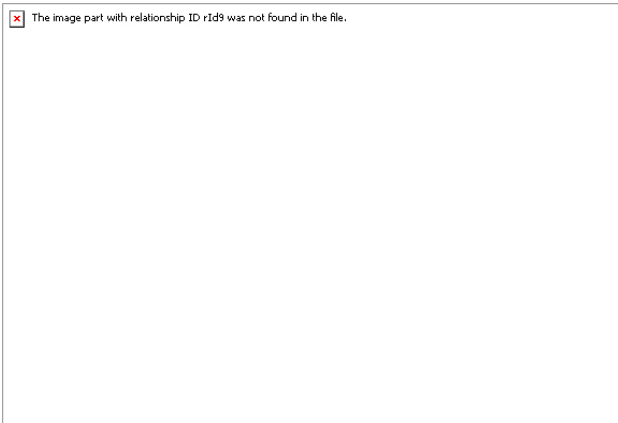


Figure 3: Distribution of COPD severity according to GOLD classification.



Figure 6: Distribution of cataract types among COPD patients showing predominance of nuclear cataract.

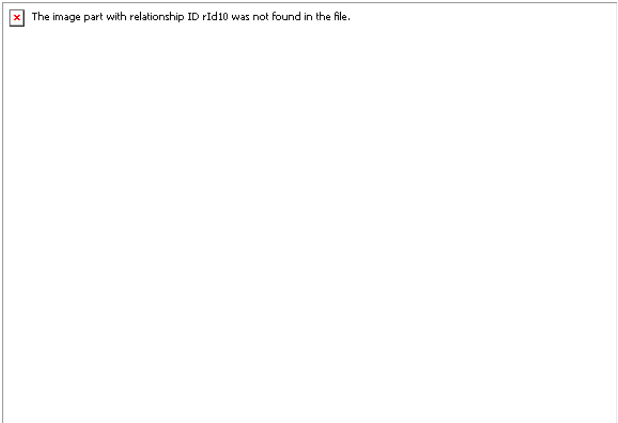


Figure 4: Smoking status among COPD patients showing majority were smokers.

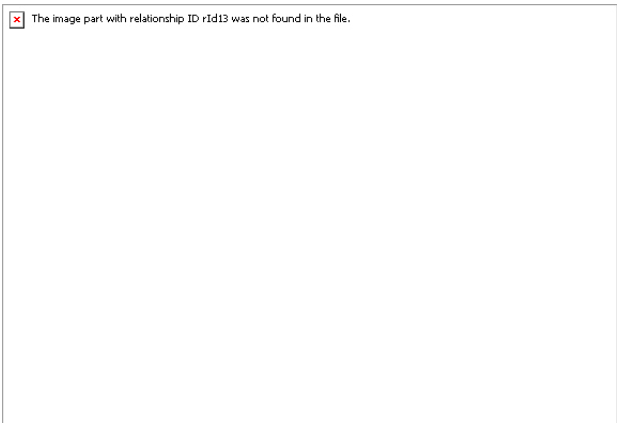


Figure 7: Association between COPD severity and dry eye disease showing higher prevalence in severe COPD.

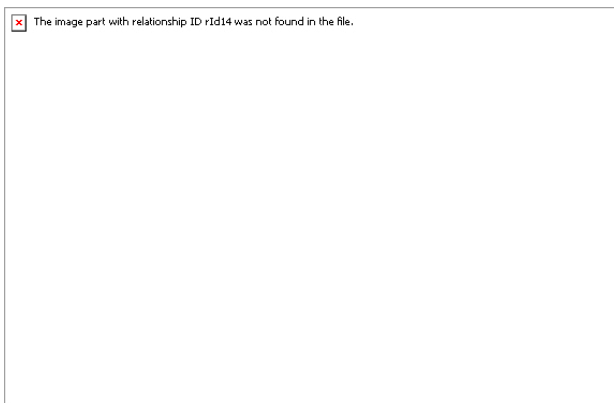


Figure 8: Association between corticosteroid therapy and raised intraocular pressure among COPD patients.



Figure 9: Visual acuity status among COPD patients showing reduced vision in a considerable proportion of cases.

Distribution According to Severity of COPD

Based on GOLD classification, moderate COPD was the most common category observed in 46 (41.8%) patients followed by severe COPD in 34 (30.9%) patients (Table 3, Figure 3).

Smoking Status Among COPD Patients

History of smoking was present in 84 (76.4%) patients whereas 26 (23.6%) patients were non-smokers (Table 4, Figure 4).

Ocular Manifestations Among COPD Patients

Cataract was the most common ocular manifestation observed in 45 (40.9%) patients followed by dry eye disease in 33 (30.0%) patients. Hypertensive retinopathy was observed in 20 (18.2%) patients, glaucoma in 14 (12.7%) patients, diabetic retinopathy in 12 (10.9%) patients, and

age-related macular degeneration in 9 (8.2%) patients (Table 5, Figure 5).

Distribution of Cataract Types Among COPD Patients

Among the 45 patients diagnosed with cataract, nuclear cataract was the most common type observed in 22 (48.9%) patients followed by posterior subcapsular cataract in 14 (31.1%) patients and cortical cataract in 9 (20.0%) patients (Table 6, Figure 6).

Association Between Severity of COPD and Dry Eye Disease

Dry eye disease was significantly more common among patients with severe and very severe COPD. The association was statistically significant ($\chi^2 = 5.61$, $p = 0.018$) (Table 7, Figure 7).

Association Between Corticosteroid Therapy and Raised Intraocular Pressure

Raised intraocular pressure was significantly associated with prolonged corticosteroid therapy among COPD patients ($\chi^2 = 5.31$, $p = 0.021$) (Table 8, Figure 8).

Visual Acuity Status Among COPD Patients

Reduced visual acuity ($<6/18$) was observed in 39 (35.5%) patients whereas normal visual acuity ($\geq 6/18$) was observed in 71 (64.5%) patients (Table 9, Figure 9).

DISCUSSION

COPD is increasingly recognized as a systemic inflammatory disorder associated with multiple extrapulmonary manifestations including ocular complications.[15] The present study evaluated ocular manifestations among COPD patients attending a tertiary care centre in Bihar.

The majority of patients in the present study belonged to the age group of 51–60 years. Similar observations were reported by Mishra et al. and Gupta et al., who documented increased prevalence of COPD among middle-aged and elderly populations.[16,17]

Male predominance observed in the present study correlates with findings reported by Bhandari et al. and Ravikumar et al., probably due to higher smoking prevalence among males.[18,19]

Cataract was the most common ocular manifestation observed in the present study. Similar findings were reported by Kelly et al. and Christen et al., who demonstrated increased risk of cataract formation among chronic smokers and COPD patients.[20,21]

Dry eye disease observed in 30% patients may be attributed to chronic smoking, environmental pollutants, oxidative stress, and prolonged oxygen therapy. Comparable

findings were documented by Sahai et al. and Moss et al.[22,23]

The significant association between severe COPD and dry eye disease observed in the present study supports the hypothesis that chronic hypoxia and systemic inflammation contribute to ocular surface abnormalities.[24]

Raised intraocular pressure associated with prolonged corticosteroid therapy observed in the present study is comparable with findings reported in previous ophthalmological studies.[25]

The present study emphasizes the importance of routine ophthalmic screening among COPD patients for early diagnosis and management of potentially vision-threatening complications.

CONCLUSION

Ocular manifestations are common among COPD patients, with cataract and dry eye disease being the predominant findings. Severe COPD and prolonged corticosteroid therapy were significantly associated with ocular complications. Routine ophthalmological evaluation should be incorporated into COPD management protocols for early identification and treatment of ocular morbidity.

REFERENCES

1. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for diagnosis, management and prevention of chronic obstructive pulmonary disease: 2024 report. GOLD; 2024.
2. Vogelmeier CF, Criner GJ, Martinez FJ, Anzueto A, Barnes PJ, Bourbeau J, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 report. *Am J Respir Crit Care Med*. 2017;195(5):557-82.
3. World Health Organization. Chronic obstructive pulmonary disease (COPD) [Internet]. Geneva: WHO; 2023 [cited 2026 May 29]. Available from: <https://www.who.int>
4. Salvi S, Barnes PJ. Chronic obstructive pulmonary disease in non-smokers. *Lancet*. 2009;374(9691):733-43.
5. Barnes PJ, Celli BR. Systemic manifestations and comorbidities of COPD. *Eur Respir J*. 2009;33(5):1165-85.
6. MacNee W. Pathogenesis of chronic obstructive pulmonary disease. *Proc Am Thorac Soc*. 2005;2(4):258-66.
7. Agrawal R, Murthy S, Sangwan V. Ocular manifestations of systemic diseases. *Indian J Ophthalmol*. 2014;62(3):253-8.
8. Christen WG, Glynn RJ, Manson JE, Ajani UA, Buring JE. A prospective study of cigarette smoking and risk of cataract in men. *JAMA*. 1992;268(8):989-93.
9. Sahai A, Malik P. Dry eye: prevalence and attributable risk factors in a hospital-based population. *Cont Lens Anterior Eye*. 2005;28(3):87-91.
10. Moss SE, Klein R, Klein BEK. Prevalence of and risk factors for dry eye syndrome. *Arch Ophthalmol*. 2000;118(9):1264-8.
11. Cheung CY, Zheng Y, Hsu W, Lee ML, Lau QP, Mitchell P, et al. Retinal vascular tortuosity, blood pressure, and cardiovascular risk factors. *Ophthalmology*. 2011;118(5):812-8.
12. van Gestel YR, Flu WJ, van Kuijk JP, Hoeks SE, Bax JJ, Sin DD, et al. Retinal vascular changes in chronic obstructive pulmonary disease. *Respir Med*. 2010;104(3):412-7.
13. Urban RC Jr, Cotlier E. Corticosteroid-induced cataracts. *Surv Ophthalmol*. 1986;31(2):102-10.
14. Tripathi RC, Parapuram SK, Tripathi BJ, Zhong Y, Chalam KV. Corticosteroids and glaucoma risk. *Drugs Aging*. 1999;15(6):439-50.
15. Mishra A, Verma RK, Singh A, Kumar P. Ocular manifestations in patients with chronic obstructive pulmonary disease. *Indian J Chest Dis Allied Sci*. 2018;60(2):89-94.
16. Gupta R, Singh M, Sharma A, Yadav RK. Clinical profile of chronic obstructive pulmonary disease patients attending a tertiary care hospital. *Int J Med Sci Public Health*. 2017;6(4):721-5.
17. Bhandari S, Sharma S, Meena RK, Sharma R. Smoking and systemic manifestations in chronic obstructive pulmonary disease. *J Assoc Physicians India*. 2016;64(5):44-8.
18. Ravikumar P, Reddy SC, Kumar V, Prasad K. Retinal vascular changes in chronic obstructive pulmonary disease. *Indian J Ophthalmol*. 2019;67(7):1124-8.
19. Kelly SP, Thornton J, Edwards R, Sahu A, Harrison RA. Smoking and cataract: review of causal association. *Eye (Lond)*. 2005;19(9):935-44.
20. Christen WG, Glynn RJ, Ajani UA, Schaumberg DA, Buring JE, Hennekens CH. Smoking cessation and risk of age-related cataract in men. *Arch Ophthalmol*. 2000;118(7):1036-42.
21. Moss SE, Klein R, Klein BEK. Long-term incidence of dry eye syndrome in older adults. *Ophthalmology*. 2008;115(11):1910-5.
22. Agrawal R, Murthy S, Sangwan V. Ocular surface disorders associated with systemic disease. *Indian J Ophthalmol*. 2015;63(8):635-42.
23. Cheung CY, Ikram MK, Klein R, Wong TY. Retinal microvascular abnormalities and chronic obstructive pulmonary disease severity. *Ophthalmology*. 2012;119(4):780-6.
24. Onyedum CC, Chukwuka JC. Ocular complications associated with chronic obstructive pulmonary disease. *Niger J Clin Pract*. 2017;20(10):1284-9.
25. Urban RC Jr, Cotlier E. Steroid-induced ocular complications and management. *Surv Ophthalmol*. 1986;31(2):102-10.