

## DEPRESSION, ANXIETY, AND TREATMENT ADHERENCE IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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### **ABSTRACT**

**Background:** Primary open-angle glaucoma (POAG) is a progressive and lifelong treatable chronic optic neuropathy. Psychological comorbidities like depression and anxiety are progressively being identified and can negatively influence treatment compliance, which results in the development of the disease, loss of vision and poor quality of life.

**Objectives:** To establish the extent of depression and anxiety among POAG patients and their relationship with adherence to the treatment in a tertiary care environment.

**Methodology:** This cross-sectional study Conducted at Department of Ophthalmology, Bacha khan Medical College, Mardan.kpk Pakistan from jan 2022 to june 2022. 100 POAG patients aged 40 years and above were involved and were chosen according to the consecutive sampling. Patients who had secondary glaucoma or known psychiatric disease were excluded. PHQ-9 and GAD-7 scales were used to determine depression and anxiety, and MMAS-8 was used to determine adherence. SPSS version 25 was used to analyse data. Quantitative variables were represented in the mean, such as the standard deviation, and qualitative variables in frequencies and percentages. Chi-square and independent t-tests were used to test associations.

**Results:** 100 patients (58 males, 42 females), the mean age was  $59.4 \pm 10.2$  years. Depression and anxiety were observed in 28% and 34% of patients, respectively, while 46% demonstrated poor adherence. Poor adherence was significantly higher in depressed patients (68% vs. 34%;  $p = 0.003$ ) and in anxious patients ( $p = 0.01$ ). Mean adherence scores were lower in depressed patients ( $5.1 \pm 1.3$ ) compared to non-depressed individuals ( $6.8 \pm 1.1$ ;  $p = 0.002$ ). Combined anxiety and depression were associated with the highest non-adherence (72%). Longer disease duration correlated with higher psychological distress and poorer adherence.

**Conclusion:** In POAG, depression and anxiety are common and have a great effect on treatment adherence. It is possible to enhance adherence and clinical outcomes by incorporating mental health assessment into glaucoma care.

**Keywords:** Glaucoma, Depression, Anxiety, Adherence

### **Introduction**

Primary open-angle glaucoma (POAG) is a progressive, chronic optic neuropathy which is characterised by damage to the optic nerve and loss of the visual field. It is still among the main causes of incurable blindness on the planet. Early stages of the disease are usually asymptomatic, a factor that has seen to it that the disease is not diagnosed and treatment is not started on time. The long-term treatment is mainly aimed at reducing the intraocular pressure (IOP) of the eye by use of medications, laser treatment or surgery. Nevertheless, effective management of the disease depends on adherence to the treatment regimens [1,2]. Psychological comorbidities are common with chronic diseases like POAG, especially depression and anxiety. The lifelong treatment of glaucoma, fear of losing eyesight, financial strain, and disability of functioning is among the causes of emotional distress in patients [3]. These mental aspects are being increasingly identified as very important determinants of health outcomes. Depression can also result in a lack of motivation and impaired cognition, as well as a lack of commitment to self-care practices, which can negatively affect medication adherence and follow-up visits. On the same note, anxiety may intensify fears of the progression of the disease and the effectiveness of treatment, which may complicate the way patients adhere [4,5]. It has

been established in several studies that depression and anxiety are more prevalent among glaucoma patients than in the general population. The prevalence reported is generally very varied in terms of the study population, methodology, and assessment instrument. In the developing world, such as Pakistan, it may be even worse since there are fewer healthcare resources, health literacy is low, and there are no mental health support services. Nevertheless, psychological factors of glaucoma are not well studied in everyday clinical practice [6,7]. In POAG patients, treatment adherence is a life-or-death issue when it comes to preventing the progression of the disease and preserving vision. The lack of adherence has also been associated with the aggravation of visual field defects, the risk of blindness, and the elevated cost of healthcare. Several determinants affect adherence, and they include patient (age, education, beliefs), disease (severity, duration) and therapy-related (complexity, side effects) determinants. Another factor that has been underestimated, causing poor adherence, is psychological distress [8,9]. To enhance the treatment of glaucoma, it is critical to comprehend the correlation between depression, anxiety, and treatment adherence. Early detection of patients who are vulnerable to psychological distress could be used to inform clinicians to use specific interventions to treat them, including counselling, education, and behavioural change, as a means of improving adherence. Additionally, the inclusion of mental health screening in the ophthalmology care can help offer a more comprehensive view of the patient [10]. This study will assess the level of depression and anxiety in patients with POAG and determine their influence on treatment adherence. With this association, the study aims to underscore the significance of this phenomenon in addressing psychological health in enhancing clinical outcomes and the quality of life of glaucoma patients.

### **Study Objectives**

To evaluate both depression and anxiety among patients with POAG and their relationship with adherence to treatment and the chosen clinical outcomes in a tertiary care hospital.

### **Materials and Methods**

#### **Study Design & Setting**

The cross-sectional study was a six-month study done at Department of Ophthalmology, Bacha Khan Medical College, Mardan. KPK Pakistan from Jan 2022 to June 2022.

#### **Participants**

One hundred patients diagnosed with primary open-angle glaucoma at the age of 40 years and above were recruited using non-probability consecutive sampling. Patients who went to outpatients in order to get regular follow-ups were invited to take part. Male and female patients were taken into consideration. Cognitively impaired and severely ill systemic participants were well considered and excluded.

#### **Ethical Approval Statement**

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board (IRB)/Ethics Committee of the respective institution prior to the commencement of the study. Written informed consent was obtained from all participants (or their legal guardians, where applicable) before inclusion in the study. Confidentiality and anonymity of participant data were strictly maintained throughout the research process. Participants were assured of their right to withdraw from the study at any stage without any consequences.

#### **Sample Size Calculation**

The reason is that the sample size of 100 patients was determined by a prevalence of 30% of glaucoma patients having depression, with 95% level of confidence and 10% margin of error. The computation was done to provide sufficient power to support the statistically significant relationships among psychological variables and treatment adherence.

#### **Inclusion Criteria**

- Primary open-angle glaucoma that has been diagnosed.

- Age  $\geq 40$  years
- At least 6 months of treatment.
- Willing to give informed consent.

#### **Exclusion Criteria**

- Secondary glaucoma
- Psychiatric disease: diagnosed before.
- Severe visual impairment non-participatory.
- Platters on psychotropic drugs.

#### **Diagnostic and Management Strategy.**

Diagnosis of POAG was established using the measurement of intraocular pressure, optic disc assessment, and visual field. The patients were treated in accordance with the general guidelines, such as topical antiglaucoma medical drugs, frequent follow-ups, and counselling on compliance and disease progression.

#### **Statistical Analysis**

Data were compared with the SPSS version 25. Quantitative variables were indicated in the form of mean and standard deviation, whereas the categorical variables were indicated in frequencies and percentages. Chi-square tests and independent t -tests were used to test the associations between depression, anxiety and adherence, with  $p < 0.05$  being regarded as statistically significant.

#### **Results**

A total of 100 patients were included in the study, comprising 58 males and 42 females. The mean age of participants was  $59.4 \pm 10.2$  years. Depression was identified in 28% of patients, while anxiety was present in 34%. Poor treatment adherence was observed in 46% of participants. Patients with depression showed significantly higher rates of poor adherence (68%) compared to non-depressed patients (34%), with a statistically significant association ( $p = 0.003$ ). Similarly, anxiety was significantly associated with poor adherence ( $p = 0.01$ ). The mean adherence score among depressed patients was  $5.1 \pm 1.3$ , significantly lower than  $6.8 \pm 1.1$  in non-depressed individuals ( $p = 0.002$ ). Patients experiencing both anxiety and depression had the highest non-adherence rate (72%). Although increasing age showed a trend toward poor adherence, it was not statistically significant ( $p = 0.08$ ). Longer disease duration ( $>5$  years) was associated with increased psychological distress and reduced adherence. Furthermore, patients with poor adherence demonstrated more severe visual field defects compared to adherent individuals. Overall, a strong association was observed between psychological comorbidities and reduced compliance with glaucoma treatment.

#### **Intervention Outcome**

Patients who underwent follow-up counselling and adherence education recorded a minor rise in drug adherence and a minor decrease in anxiety levels. These findings are preliminary indications that psychological support can lead to increased adherence and overall disease control in POAG patients, though they were not officially tested as an intervention study.

**Table 1: Demographic and Clinical Characteristics of Patients (n = 100)**

<b>Variable</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Male	58	58%
Female	42	42%
<b>Age Group (years)</b>		
40–50	22	22%
51–60	34	34%
61–70	28	28%

>70	16	16%
<b>Disease Duration</b>		
≤5 years	44	44%
>5 years	56	56%
<b>Mean Age (years)</b>	59.4 ± 10.2	—

Table 1 shows the baseline demographic and clinical characteristics of study participants. The majority were male (58%) and aged between 51–60 years. More than half of patients had disease duration greater than five years.

**Table 2: Prevalence of Depression, Anxiety, and Treatment Adherence (n = 100)**

Variable	Frequency (n)	Percentage (%)
<b>Depression (PHQ-9)</b>		
Present	28	28%
Absent	72	72%
<b>Anxiety (GAD-7)</b>		
Present	34	34%
Absent	66	66%
<b>Treatment Adherence</b>		
Good Adherence	54	54%
Poor Adherence	46	46%

Table 2 illustrates the prevalence of depression, anxiety, and treatment adherence among POAG patients. Anxiety was more common than depression, and nearly half of the patients demonstrated poor adherence to treatment.

**Table 3: Association of Depression and Anxiety with Treatment Adherence**

Variable	Poor Adherence n (%)	Good Adherence n (%)	p-value
<b>Depression</b>			
Present	19 (68%)	9 (32%)	0.003*
Absent	27 (34%)	45 (66%)	
<b>Anxiety</b>			
Present	22 (65%)	12 (35%)	0.01*
Absent	24 (36%)	42 (64%)	

Table 3 demonstrates the association between psychological factors and treatment adherence. Both depression and anxiety were significantly associated with poor adherence (\*p < 0.05), indicating that psychological distress negatively impacts compliance.

**Table 4: Comparison of Mean Adherence Scores**

Variable	Mean ± SD	p-value
Depressed	5.1 ± 1.3	0.002*
Non-Depressed	6.8 ± 1.1	
Anxious	5.4 ± 1.2	0.01*
Non-Anxious	6.6 ± 1.0	

Table 4 compares mean adherence scores between groups. Patients with depression and anxiety had significantly lower adherence scores compared to those without psychological distress (\* $p < 0.05$ ), confirming reduced compliance in affected individuals.

## Discussion

The current Study also shows that there is a high relationship between depression, anxiety, and non-compliance with treatment in patients with primary open-angle glaucoma (POAG). Our study results are in line with the current literature, which revealed that depression (28%) and anxiety (34) are prevalent conditions among glaucoma patients. Recent meta-analysis studies have been conducted on more than 24,000 patients and reported that patients with glaucoma are much more susceptible to depression and anxiety than the general population [11]. The findings support the idea that glaucoma is not an eye disease, but rather possesses significant psychosocial consequences [12]. Variability between and within populations and methods also allows our findings to be similar to recent cross-sectional studies published with wide prevalence rates of depression (6.6%57) and anxiety (12%49) in patients with glaucoma. Likewise, anxiety (42.2%) and depression (34.9) were reported as higher after screening in a 2025 study that implied that psychological disorders in patients with glaucoma are typically underdiagnosed. This is in line with our results, and it means that there should be periodic psychological evaluation during clinical practice [13]. One of the most significant results of our Study is the close relation between depression and a lack of adherence to the treatment. The patients with depression exhibited much higher levels of non-adherence (68%), which is in line with one study in 2021 that showed a direct correlation between the severity of depression and lower adherence to glaucoma medications. The same study also found that depressed patients had a much higher risk of poorer glaucoma severity, and this is additional support for the bidirectional relation found in our study [14,15]. In the same manner, anxiety was also strongly linked with poor compliance in our study ( $p = 0.01$ ). Recent facts indicate that psychological variables, such as anxiety, decreased illness acceptance, and low self-efficacy, are crucial in the determination of adherence behaviours. A 2024 study identified that over half of glaucoma patients demonstrated a lack of good adherence, and such psychological traits as optimism and illness acceptance are effective predictors of improved adherence. These results confirm our observation that a mental health condition is one of the determinants of treatment behavior [16,17]. We also determined that the non-adherence rates among patients with combined depression and anxiety were the highest (72%), which is indicative of an additive effect of the combination of multiple psychological comorbidities. This has been observed to support recent reports stating the cumulative effect of psychological distress on health outcomes in chronic diseases, including glaucoma. Moreover, lack of adherence has been identified to have a direct effect on the development of the disease. Recent 2025 Study provided evidence that reduced medication adherence is linked with worse intraocular pressure management and faster progression of glaucoma, which indicates the clinical importance of our Study [18]. Moreover, we conclude that the duration of the disease correlates with greater psychological distress and worse adherence. This could be attributed to fatigue of treatment and the chronicity of the glaucoma management process. Other past Studies have also indicated that extended period of disease will result in compromised motivation and emotional load [19]. In addition, it has been indicated that adherence and psychological well-being may be enhanced by counselling and educational interventions. As an illustration, lifestyle counselling has demonstrated an ability to improve drug compliance in glaucoma patients and can justify the possible advantage of combined care methods [20]. In general, the results of this Study are in agreement with current evidence in the world, and they underline the vital role of psychological aspects in the management of glaucoma. The given correlation between depression, anxiety, and adherence to treatment stresses the necessity of a multidisciplinary paradigm that

presupposes the inclusion of mental health screening as part of regular ophthalmic practice. Modifying these factors can greatly enhance adherence, minimise the development of diseases and increase the quality of life of POAG patients.

### **Limitations**

The limitations of this Study are that it is a cross-sectional Study design, which does not allow the Studyer to make causal conclusions. It may be impacted by the single-centre environment and the relatively small sample size. There was the risk of bias in responding to self-reported questionnaires. Besides, other possible confounders, including socioeconomic status and comorbidities, have not been thoroughly investigated in this study.

### **Conclusion**

POAG patients experience depression and anxiety that have a profound effect on treatment adherence. Psychological factors also need to be addressed to optimise compliance and clinical outcomes. Mental health screening and supportive interventions integrated into routine glaucoma care would likely increase compliance, decrease disease progression, and eventually improve the quality of life of the patient.

**Disclaimer:** Nil

**Conflict of Interest:** Nil

**Funding Disclosure:** Nil

### **Authors Contributions**

**Concept & Design of Study:** Muhammad Bilal, Shafqat Ali Shah

**Drafting:** Hidayatullah Mahsud

**Data Collection & Data Analysis:** ,Muhammad Tariq

**Critical Review:** Manzoor ali

**Final Approval of version:** All Mentioned Authors Approved.

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