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Original Research Article

Effect of Severity & Duration of Anxiety on IOP in Diagnosed Patients of Chronic Anxiety

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Abstract:

Background: Intraocular pressure (IOP) is a crucial factor in the development of glaucoma and other eye conditions, with various physiological, environmental, and systemic factors influencing it. Anxiety, through the activation of the body's stress response, has been linked to elevated IOP, potentially contributing to ocular pathologies such as glaucoma. This study aims to evaluate the impact of anxiety severity and symptom duration on IOP in patients diagnosed with chronic anxiety.

Methods: A cross-sectional, observational study was conducted on 72 patients with chronic anxiety attending the Psychiatry OPD. Anxiety severity was assessed using the Hamilton Anxiety Rating Scale, categorizing patients into mild, moderate, and severe anxiety groups. IOP was measured using a Goldmann Applanation Tonometer, and the results were statistically analyzed to determine the relationship between anxiety severity, symptom duration, and IOP.

Results: The study found that IOP was highest in the severe anxiety group (17.90 ± 2.20 mm Hg) and lowest in the mild anxiety group (14.42 ± 1.85 mm Hg). Duration of symptoms influenced IOP, with the highest IOP recorded in the 3-6 months duration group for severe anxiety and the >12 months group for mild anxiety. Statistically significant differences were observed between the severe and mild anxiety groups ($p < 0.05$).

Conclusion: The study indicates that increased severity of anxiety is associated with higher IOP, and the duration of symptoms also influences these levels. Chronic anxiety could contribute to increase IOP, potentially heightening the risk for glaucoma and other ocular conditions. Routine glaucoma screening is recommended for chronic anxiety patients.

Keywords: Intraocular pressure (IOP), Anxiety, Glaucoma, Chronic anxiety.

Introduction

Intraocular pressure (IOP) is a key determinant of ocular health, influenced by various factors, including systemic, environmental, and individual physiological conditions. Age, gender, ethnicity, refractive error, environmental factors like exposure to cold air, gravity, dietary patterns, and physical exertions such as the Valsalva maneuver all contribute to variations in IOP. Additionally, systemic conditions like hypertension, diabetes, and obesity, along with diurnal and postural changes, play significant roles in determining IOP levels. [1]

In individuals predisposed to glaucoma, "normal" IOP may be redefined as the pressure level that does not result in glaucomatous damage to the optic nerve head. [1] Leydhecker et al. (1958) reported a mean IOP of 15.80 ± 2.57 mm Hg using Schiötz tonometry in a large sample of 10,000 individuals aged 10-69 years without known eye diseases. [2] Similarly, Shiose and Kawase (1986) documented mean IOP values of 14.60 ± 2.52 mm Hg for men and 15.04 ± 2.33 mm Hg for women using applanation tonometry in a cohort of over 90,000 participants. [3] based on these and subsequent studies, the normal IOP range is widely accepted as 10-21 mm Hg. [4]

IOP is a crucial factor in glaucomatous optic atrophy, which is the second leading cause of irreversible blindness globally, with an estimated 8 million cases of bilateral blindness reported in 2010. [4] Although other factors contribute, elevated IOP is considered a significant driver of retinal ganglion cell damage in glaucoma. Anxiety, characterized by a heightened physiological response to perceived threats, activates the sympathetic-adrenomedullary axis, leading to the release of stress hormones like cortisol and catecholamines. These stress responses may

influence IOP regulation, as adrenocortical steroids and catecholamines are known to affect ocular pressure. [1] Chronic stress can induce behavioral changes such as poor sleep patterns, disrupted circadian rhythms, dietary modifications, smoking, reduced physical activity, and increased caffeine intake, all of which may transiently spike IOP levels. [5] Over time, persistent stress may contribute to systemic hypertension, elevate episcleral venous pressure, and impair aqueous humor drainage, further increasing IOP. This study investigates the impact of anxiety severity and symptom duration on IOP levels in patients diagnosed with chronic anxiety. It aims to quantify mean IOP values across varying anxiety grades and symptom durations, providing insights into potential ocular health risks in this population.

Materials and Methods

Study Design

- **Type of Study**: Hospital-based, cross-sectional, observational study.
- **Study Duration**: 6 months (September 2023 to February 2024).
- **Sample Size**: 72 patients diagnosed with chronic anxiety.

Inclusion Criteria

- Patients with a confirmed diagnosis of chronic anxiety attending the Psychiatry OPD.
- Patients who provided informed consent.
- Patients capable of specifying the duration of their anxiety symptoms.

Exclusion Criteria

- Patients with debilitating anxiety that hindered participation in the study.
- Unconscious or uncooperative patients.
- Non-consenting patients.

Study Technique

1. Patient Categorization:

- Anxiety levels were assessed using the **Hamilton Anxiety Rating Scale (HAM-A)**.
- Patients were classified into three groups based on their HAM-A scores:
  - **Mild Anxiety**: HAM-A score < 17.
  - **Moderate Anxiety**: HAM-A score 18–24.
  - **Severe Anxiety**: HAM-A score 25–56.

2. Symptom Duration Subgroups:

Within each anxiety group, patients were further divided based on the duration of their anxiety symptoms into:

- < 3 months.
- 3–6 months.
- 6 months to ≤ 12 months.
- 12 months.

3. IOP Measurement:

Instrument Used: Goldmann Applanation Tonometer.

Measurement Conditions:

- Conducted between 10:00 AM and 1:00 PM to minimize diurnal variation.
- Patients were seated in a relaxed position.

Procedure:

- Intraocular pressure (IOP) was measured for both eyes, and the average IOP (right and left eye) was recorded for analysis.

4. Statistical Analysis: Data was analyzed using **IBM SPSS software**.

- Descriptive statistics such as mean, standard deviation, and percentiles were calculated.
- Comparative analysis between groups (mild vs. moderate, mild vs. severe, and moderate vs. severe) was performed using independent t-tests.
- A significance level of $p < 0.05$ was considered for statistical significance.

Ethical Considerations: Institutional ethical committee approval was obtained prior to the study. Informed consent was taken from all participants, and patient confidentiality was maintained throughout the study

Results and Observations

Table 1: Descriptive Statistics of Intraocular Pressure (IOP)

Parameter	Value (mm Hg)
Mean IOP	15.54
Standard Error of Mean	0.29
Standard Deviation	2.47
Variance	6.08
Skewness	0.693
Std. Error of Skewness	0.28
Range	10.5
Minimum	12.0
Maximum	22.5

Percentile (25th)	13.50
Percentile (50th/Median)	15.00
Percentile (75th)	17.00

Table 2: Mean IOP across Anxiety Groups

Anxiety Group	Mean IOP (mm Hg)	Standard Deviation (mm Hg)
Mild Anxiety	14.42	1.85
Moderate Anxiety	14.61	1.86
Severe Anxiety	17.90	2.20

Table 3: Mean IOP across Anxiety Symptom Duration in Severe Group

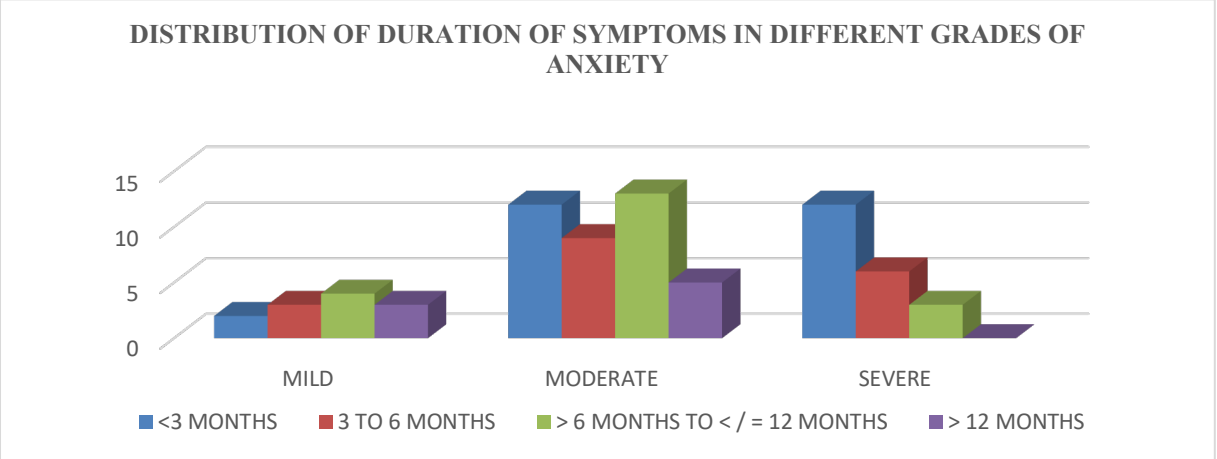
Duration of Symptoms (Severe Anxiety)	Mean IOP (mm Hg)	Standard Deviation (mm Hg)
< 3 months	17.33	2.11
3–6 months	18.67	2.32
> 6 to ≤ 12 months	18.25	2.15
> 12 months	17.50	2.05

Table 4: Mean IOP across Anxiety Symptom Duration in Moderate Group

Duration of Symptoms (Moderate Anxiety)	Mean IOP (mm Hg)	Standard Deviation (mm Hg)
< 3 months	15.00	2.18
3–6 months	14.00	1.90
> 6 to ≤ 12 months	14.20	1.95
> 12 months	14.80	2.46

Table 5: Mean IOP across Anxiety Symptom Duration in Mild Group

Duration of Symptoms (Mild Anxiety)	Mean IOP (mm Hg)	Standard Deviation (mm Hg)
< 3 months	14.10	1.70
3–6 months	14.50	0.50
> 6 to ≤ 12 months	13.80	1.90
> 12 months	16.83	2.02



Picture 1: Showing duration of symptoms in different grades of anxiety

Table 6: Statistical Analysis of IOP Differences between Groups

Comparison	t-Value	p-Value	Statistical Significance
Mild vs. Severe	-4.62	0.000031	Significant
Moderate vs. Severe	-6.13	< 0.00001	Significant
Mild vs. Moderate	-0.324	0.37	Not Significant

Table 6 presents the statistical analysis of intraocular pressure (IOP) differences between the anxiety groups (mild, moderate, and severe):

1. **Mild vs. Severe**: The t-value of -4.62 and a p-value of 0.000031 indicate a significant difference in IOP between the mild and severe anxiety groups. This suggests that patients with severe anxiety have significantly higher IOP compared to those with mild anxiety.

2. **Moderate vs. Severe**: The t-value of -6.13 and a p-value of less than 0.00001 show a highly significant difference between the moderate and severe anxiety groups. This implies that severe anxiety leads to higher IOP compared to moderate anxiety.
3. **Mild vs. Moderate**: The t-value of -0.324 and a p-value of 0.37 indicate that there is no significant difference in IOP between the mild and moderate anxiety groups. This suggests that IOP levels in these two groups are similar.

Discussion:

In this study, we examined the impact of anxiety severity and symptom duration on intraocular pressure (IOP) in patients diagnosed with chronic anxiety. We found that increased severity of anxiety was significantly associated with higher IOP, particularly in those with severe anxiety. This study suggests that the physiological effects of anxiety, such as the activation of the sympathetic nervous system and the release of stress hormones like cortisol and catecholamines, may influence ocular pressure regulation. The study's findings are consistent with existing literature indicating that anxiety and stress can lead to fluctuations in IOP, particularly in individuals with predisposing factors for eye conditions such as glaucoma. Elevated cortisol and catecholamine levels have been shown to affect ocular blood flow, and in turn, IOP, by altering the dynamics of the aqueous humor production and drainage systems in the eye [1]. Our results also align with previous studies that report higher IOP values in individuals under stress or with anxiety disorders [2,3].

The statistical analysis of our data revealed that the severe anxiety group had the highest mean IOP (17.90 mm Hg) compared to the mild anxiety group (14.42 mm Hg), with a significant difference observed between the two groups ($p < 0.05$).

This finding is in line with other studies indicating a correlation between high anxiety and increased IOP [4]. Additionally, the study showed that longer duration of symptoms, especially in the 3-6 months duration category, also led to higher IOP in patients with severe anxiety. This suggests that chronic anxiety may have a cumulative effect on IOP, potentially leading to long-term ocular health risks such as glaucoma. Similar studies have found that prolonged stress or anxiety can exacerbate ocular pressure, contributing to conditions like glaucoma over time [5,6].

Interestingly, moderate anxiety did not show a statistically significant difference in IOP when compared with mild anxiety ($p = 0.37$), highlighting the potential complexity of anxiety-related IOP changes. It is possible that anxiety's effect on IOP is not linear, and other factors, such as genetic predispositions, lifestyle, and concurrent medical conditions, could modify this relationship [7]. This is further supported by studies that suggest IOP variation may be influenced by a multitude of factors, including genetics, medication use, and body position, which could interact with anxiety-related effects [8].

Our findings emphasize the need for careful monitoring of IOP in patients with chronic anxiety, particularly those with severe symptoms and prolonged duration. Given the significant association between anxiety and increased IOP, routine screening for glaucoma should be considered in individuals with chronic anxiety to detect early changes in ocular pressure, preventing possible damage to the optic nerve.

Furthermore, clinicians should be aware of the potential for increased IOP during acute anxiety episodes, as fluctuations in stress levels could lead to temporary spikes in ocular pressure [9-14].

However, our study has some limitations. First, it is a cross-sectional design, which does not allow us to draw conclusions about causality. Future longitudinal studies are needed to explore how chronic anxiety affects IOP over time and whether interventions aimed at reducing anxiety could have a beneficial effect on IOP. Additionally, while we controlled for diurnal variations in IOP by measuring pressure at a consistent time, other potential confounders such as the use of medications and comorbidities like hypertension were not thoroughly examined.

Conclusion:

In conclusion, our study provides evidence that increased severity and duration of anxiety are associated with higher IOP, suggesting that chronic anxiety could be a risk factor for elevated ocular pressure, which may contribute to glaucoma and other ocular conditions. These findings highlight the importance of routine glaucoma screening in patients with chronic anxiety.

Further research is required to better understand the underlying mechanisms driving these associations and the long-term effects of anxiety on ocular health.

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