https://doi.org/10.37939/jrmc.v27i2.1910

Depression And Anxiety In Glaucoma Patients Using Mono Drug Therapy Vs Polydrug Therapy

Aaiza Tahir[1], Muhammad Waqas Ahmed[2], Summaya Khan[3], Omar Zafar[4], Muhammad Haroon Sarfraz[5], Muhammad Shahid Tarar[6]

Abstract

Objective: To evaluate the frequency of depression, anxiety, and stress scores among glaucoma patients and assess factors attributing to severe scores.
Methodology: This Analytical, Cross-sectional study was conducted at the Armed Forces Institute of Ophthalmology from June 2020 to July 2021. Data was collected through nonprobability consecutive sampling. Individuals with diagnosed primary open-angle glaucoma were selected irrespective of age and gender. Dass-21 (self-assessment scale) was used in Urdu to document patient scores for anxiety, depression, and stress.
Results: The frequency of males (n=204, 54%) and females (n=173, 45.8%) in the two groups was almost the same (p=0.164). The mean age in the mono-drug group (mean= 48.81±10.58 years) was slightly lower than the polydrug group (mean=53.67±11.16years) (p=0.000018). Overall depression score of the sample fell in the severe category (score=21-27), with individuals showing more depression scores in the poly group (n=99, 26%) than in the mono drug group (n=76, 20%) (p=0.000002). Individuals on polydrug therapy showed severe scores for depression, anxiety, and stress.
Conclusion: Among the glaucoma patient, those on polydrug therapy have higher incidences of anxiety among young patients and depression among older patients. This not only causes poor compliance to treatment but also increases the risk of progression of glaucoma hence augmenting the crippling effects of the disease.
Keywords: Depression, anxiety, DASS-21, Glaucoma

[1] Resident Eye, Armed Forces Institute of Ophthalmology; [2] Resident Psychiatry, Armed Forces Institute of Mental Health; [3] Consultant, Armed Forces Institute of Ophthalmology; [4] Associate Professor, Armed Forces Institute of Ophthalmology; [5] Consultant POF Hospital, Wah [6] Consultant Oculoplastic Surgery, Armed Forces Institute of Ophthalmology; **Correspondence:** Dr Aaiza Tahir, Postgraduate Trainee, Armed Forces Institute of Ophthalmology, Rawalpindi. **Email: dr.aaiza@hotmail.com**
Cite this Article: Tahir, A., Ahmed, M. W., Khan, S., Zafar, O., Sarfraz, M. H., & Tarar, M. S. (2023). Depression and anxiety in glaucoma patients using mono drug therapy vs polydrug therapy . *Journal of Rawalpindi Medical College*, *27*(2). https://doi.org/10.37939/jrmc.v27i2.1910.
Received February 14, 2022; accepted May 03, 2023; published online June 24, 2023

1. Introduction

Glaucoma is a potentially progressive optic neuropathy with corresponding visual field defects in which intraocular pressure may be raised. This debilitating disease is divided into open-angle and closed-angle types, both types can have primary or secondary causes. Open-angle glaucoma (OAG) is a pervasive, progressive, irreversible, and multifactorial optic neuropathy for which a significant risk factor is raised intraocular pressure (IOP).[1] Treatment regimens of glaucoma include both mono-drug therapy and polydrug therapy. Both need to be used for prolonged periods causing stress, demotivation, and loss of will in the patients.

Individuals who are suffering from chronic illnesses are more likely to develop depressive symptoms. Depression, anxiety, and stress worldwide are more prevalent among patients with cancer, heart disease, diabetes, stroke, and respiratory issues than in the general population. Undiagnosed depression is now becoming a serious concern in primary care, present simultaneously with the burden of chronic diseases.[2] A study documented that increased glaucoma knowledge and reduced depression (P<0.09 for each) influenced to cause better adherence to glaucoma medication.[3] Therefore, clinicians must be trained to recognize depression among patients with chronic illnesses. Psychoeducation regarding depression should be provided to patients with chronic ailments.[2] It is documented that anxiety, negativity, and stress perceptions regarding the possibility of deteriorating glaucoma led to inadequate motivation, increasing treatment dropout rates. [4] According to Xinxin Zhang et al. in November 2017, there is a statistically significant association between anxiety and depression. Both are more common among younger age groups.[5] According to a study, up to 50% of patients with glaucoma face depression.[6] Not only his but it is also suggested that these factors may contribute to the worsening of the disease. A study reflected that anxiety increases the risk of glaucoma advancement with IOP profile derangement and disc

hemorrhage[7]. The quality of life of glaucoma patients is low due to lengthy follow-ups and treatments and the threat of losing vision. The build-up of anxiety leads to 30 to 64% of patients' quality of life. Depression prevails in 10.9 to 30 % of individuals. The possible reason is not only visual function decline but also the possibility of future function loss.[8]

The study's rationale was to identify the factors that may contribute to patient stress, anxiety, and depression, leading to poor compliance with therapy in glaucoma patients. Since the first step towards improving patient disease knowledge, and treatment compliance, the disease outcome is to identify the sources or causes that may demotivate the patient.

2. Materials & Methods

It was a cross-sectional questionnaire-based study and was approved by the Ethical Review Committee of the Armed Forces Institute of Ophthalmology. Well, informed consent was obtained from all participants. The participants were recruited between July 2020 and June 2021. All subjects were of Asian ethnicity. A total of 377 patients were recruited. (Sample size was calculated using the Rao soft sample size calculator margin of error of 5 %, confidence interval of 95%, and population of 20,000). Sampling was done using the convenient sampling technique. This study included 377 patients with Primary Open Angle Glaucoma patients from the outpatient department. Glaucoma was diagnosed based on characteristic optic disc changes and characteristic visual field defects demonstrated on the Humphrey Visual Field Analyzer with or without raised intraocular pressure. Gonioscopy was performed to confirm the presence of POAG at the time of enrollment. All patients were capable of reading and understanding the Urdu language. Participants with any debilitating eye disease such as vision-disturbing cataracts, or other forms of glaucoma were excluded. In Addition, patients with physical and mental disabilities, patients already diagnosed to have depression and anxiety, and on treatment were also excluded.

Data was collected using a validated Urdu translation of DASS -21[9] (a self-reporting questionnaire with a Likert scale) distributed among patients reporting in outpatient departments fulfilling the inclusion mentioned above and exclusion criteria. Demographic and necessary details were recorded from all participants of the study.

Statistical analysis was done with the help of a statistical package for social sciences (SPSS 17.0) for Windows. The data was described in terms of mean +/- SD (standard deviation). Data were analyzed using descriptive statistics for frequency measures. Chi-square was used for the comparison of frequencies among the sample. Independent samples t-test was used for population age mean calculation.

3. Results

The total sample was divided into two groups for the convenience of comparison of factor frequency based on the history of instilling mono drugs for glaucoma (n=188, 49.8%) and poly drugs for glaucoma (n=189 50%). The frequency of males (n=204, 54%) and females (n=173, 45.8%) in the two groups was almost the same (p=0.164). The mean age in the mono-drug group (mean= 48.81±10.58 years) was slightly lower than the polydrug group (mean=53.67±11.16years) (p=0.000018). Overall depression score of the sample fell in the severe category (score=21-27), with more individuals showing severe depression scores in the poly group (n=99, 26%) than in the mono drug group (n=76, 20%) (p=0.000002). There was a shift to severe depression scores documented by individuals with glaucoma with increasing age, showing more scores in the polydrug category. However, mild depression scores were reported by individuals for mono-drug compared to polydrug use. A similar trend was seen for education and job categories among the sample. Individuals from lower income reported mild depression scores for mono-drug treatment and severe scores for polydrug treatment. A similar trend was seen in subsequently higher income groups—individuals with more years of disease documented severe depression scores. (Tables 1 and 2).

Anxiety scores were recorded higher by male individuals than females, with severe anxiety scores for the polydrug group than the mono-drug group. Anxiety in early age groups was more with poly drugs. However, the older age group reflected less anxiety to poly drug medication. Anxiety score was affected more towards severe anxiety score with the usage of polytherapy for glaucoma. More individuals showed moderate anxiety scores in both monotherapy and

multiple drug therapy categories in literate and illiterate individuals. Businessmen and government servants revealed that more individuals scored in the mild to moderate anxiety scores for mono and poly drugs. Housewives also had the same severity of anxiety for both therapy regimens. However, retired govt servants and teachers showed more moderate anxiety scores, which were higher in polydrug treatment.

A moderate anxiety score was seen in most patients from different income groups with more scores in polydrug therapy, which shows almost alike trend in all income groups. A similar trend was noted for individuals with more family members dependent on them. The results of the duration of the disease reflected that a shorter period of the disease might be associated with more anxiety than even mono-drug therapy. However, with passing years, the anxiety scores increase for polytherapy for glaucoma. Career-wise more individuals reported severe to very severe stress from polydrug treatment, including housewives. Within income groups, the stress of disease or therapy was said to be mild to moderate. Since most patients are on single-drug treatment in the early years of illness, the results showed that more patients reported anxiety in mono-drug treatment in less than three years of their disease. Patients with a longer than three years history reported more stress for polydrug treatment. (Tables 3 and 4)

Table-1 Frequency of variables distribution with depression classes

Variables			**D**epression **S**core				Total	P-value
			10-13 (mild)	14-20 (Moderate)	21-27 (severe)	>28 (very severe)		
GENDER	Male	monodrug	40	14	40	1	95	0.00015
		polydrug	22	29	45	13	109	
	Female	monodrug	40	10	36	7	93	0.00005
		polydrug	13	2	54	11	80	
AGE GAP (years)	30 to 40	Mono drug	24	14	16	0	54	0.16
		polydrug	12	10	20	0	42	
	41-50	monodrug	18	0	14	0	32	0.00009
		polydrug	0	0	18	2	20	
	51-60	monodrug	34	10	26	5	75	0.0004
		polydrug	3	2	14	9	28	
	≥61	monodrug	4	0	20	3	27	0.04
		polydrug	20	19	47	13	99	
EDUCATION	Illiterate	Mono drug	71	14	66	8	159	0.00001
		polydrug	35	26	87	24	172	
	Literate	monodrug	9	10	10	0	29	0.015
		polydrug	0	5	12	0	17	
		polydrug	35	25	78	21	159	

Table-2 Frequency of variables distribution with depression classes

Variables			Depression Score				Total	P-value
			10-13 (mild)	14-20 (Moderate)	21-27 (severe)	>28 (very severe)		
Job	businessman	Mono drug	21	7	6	0	34	0.099
		polydrug	14	3	6	4	27	
	Govt servant	Mono drug	34	9	27	1	71	0.004
		polydrug	6	5	27	2	40	
	Retired govt servants	Mono drug	2	2	21	2	27	0.249
		polydrug	0	6	33	5	44	
	housewife	Mono drug	9	1	11	0	21	0.127
		polydrug	15	15	28	2	60	
	teacher	Mono drug	14	5	11	5	35	0.001
		polydrug	0	2	5	11	18	
Income (rupees)	<30000	Mono drug	49	24	47	6	126	<0.0001
		polydrug	3	5	47	2	57	
	30000-60000	Mono drug	28	0	20	1	49	0.00013
		polydrug	32	24	41	11	108	
	≥60000	Mono drug	3	0	9	1	13	0.01
		polydrug	0	2	11	11	24	
Dependent individuals in family	less than 3 person	Mono drug	33	13	47	6	86	0.01
		polydrug	1	4	22	1	28	
	more than 3	Mono drug	47	11	29	2	102	0.000001
		polydrug	34	27	77	23	161	
Duration of disease	<3 yrs.	Mono drug	80	24	56	8	168	0.00002
		polydrug	0	6	21	3	30	
	>3 yrs.	Mono drug	0	0	20	0	20	0.0003
		polydrug	35	25	78	21	159	

Table-3 Frequency of variables distribution with anxiety classes

Variables			Anxiety score				Total	P-value
			8-9 (mild)	10-14 (Moderate)	15-19 (severe)	>20 (very severe)		
Gender	male	Mono drug	39	34	11	11	95	0.308
		polydrug	31	47	15	16	109	
	female	Mono drug	14	45	21	13	93	0.001
		polydrug	0	46	14	20	80	
Age gap	30 to 40	Mono drug	31	8	13	2	54	<0.0001
		polydrug	0	16	6	20	42	
	41-50	Mono drug	7	24	0	1	32	0.000021
		polydrug	0	9	11	0	20	
	51-60	Mono drug	10	45	10	10	75	0.192
		polydrug	1	22	1	4	28	
	≥61	Mono drug	5	2	9	11	27	<0.0001
		polydrug	30	46	11	12	99	
Education	illiterate	Mono drug	52	63	22	22	159	0.001
		polydrug	27	93	18	34	172	
	literate	Mono drug	1	16	10	2	29	0.001
		polydrug	4	0	11	2	17	
		polydrug	27	69	29	34	159	

Table-4 Frequency of variables distribution with anxiety classes

Variables			anxiety score				Total	P-value
			8-9 (mild)	10-14 (Moderate)	15-19 (severe)	>20 (very severe)		
Job	businessman	Mono drug	25	9	0	0	34	0.027
		polydrug	13	8	5	1	27	
	Govt servant	Mono drug	22	29	11	9	71	0.637
		polydrug	10	16	10	4	40	
	Retired govt servant	Mono drug	5	14	5	3	27	0.07
		polydrug	5	35	2	2	44	
	housewife	monodrug	1	11	3	6	21	0.316
		polydrug	3	18	11	28	60	
	Teacher	monodrug	0	16	13	6	35	0.009
		polydrug	0	16	1	1	18	
Income	less than 30000	monodrug	36	47	30	13	126	0.00013
		polydrug	1	30	13	13	57	
	30000-60000	monodrug	10	27	2	10	49	0.07
		polydrug	30	39	16	23	108	
	greater than 60000	monodrug	7	5	0	1	13	0.00008
		polydrug	0	24	0	0	24	
Dependent individuals in family	less than 3 person	monodrug	0	16	6	6	28	0.02
		polydrug	23	38	24	14	99	
	more than 3	monodrug	30	41	8	10	89	0.04
		polydrug	31	77	23	30	161	
Duration of disease	<3 yrs	monodrug	51	70	32	15	168	0.001
		polydrug	4	24	0	2	30	
	>3 yrs	monodrug	2	9	0	9	20	0.04
		polydrug	27	69	29	34	159	

The results showed a similar trend of stress scores being documented high by more individuals for polydrug treatment concerning gender, age, and education status. (Tables 5 and 6)

Table-5 Frequency of variables distribution with stress classes

Variables			Stress Score				Total	P-value
			15-18 (mild)	19-25 (Moderate)	26-33 (severe)	>34 (very severe)		
Job	business man	monodrug	0	3	31	0	34	<0.0001
		polydrug	13	0	9	5	27	
	Govt servant	monodrug	19	31	18	3	71	0.00009
		polydrug	21	2	11	6	40	
	Retired govt servant	Mono drug	12	8	6	1	27	0.03
		polydrug	14	4	22	4	44	
	house wife	monodrug	4	7	6	4	21	0.001
		polydrug	8	3	44	5	60	
	teacher	monodrug	0	19	13	3	35	<0.0001
		polydrug	15	0	2	1	18	
Income	less than 30000	Mono drug	1	52	70	3	126	<0.0001
		polydrug	19	2	27	9	57	
	30000-60000	monodrug	22	16	4	7	49	<0.0001
		polydrug	30	7	59	12	108	
	greater than 60000	monodrug	12	0	0	1	13	0.231
		polydrug	22	0	2	0	24	
Dependent individuals in family	less than 3 person	monodrug	1	52	43	3	99	<0.0001
		polydrug	14	0	11	3	28	
	more than 3	monodrug	34	16	31	8	89	0.01
		polydrug	57	9	77	18	161	
Duration of disease	<3 yrs	monodrug	25	65	73	5	25	<0.0001
		polydrug	18	2	10	0	18	
	>3 yrs	monodrug	10	3	1	6	20	0.001
		polydrug	53	7	78	21	159	

Table-6 Frequency of variables distribution with stress classes

Variables			Stress Score				Total	P-value
			15-18 (mild)	19-25 (Moderate)	26-33 (severe)	>34 (very severe)		
Job	business man	monodrug	0	3	31	0	34	<0.0001
		polydrug	13	0	9	5	27	
	Govt servant	monodrug	19	31	18	3	71	0.00009
		polydrug	21	2	11	6	40	
	Retired govt servant	monodrug	12	8	6	1	27	0.03
		polydrug	14	4	22	4	44	
	house wife	monodrug	4	7	6	4	21	0.001
		polydrug	8	3	44	5	60	
	teacher	monodrug	0	19	13	3	35	<0.0001
		polydrug	15	0	2	1	18	
Income	less than 30000	monodrug	1	52	70	3	126	<0.0001
		polydrug	19	2	27	9	57	
	30000-60000	monodrug	22	16	4	7	49	<0.0001
		polydrug	30	7	59	12	108	
	greater than 60000	monodrug	12	0	0	1	13	0.231
		polydrug	22	0	2	0	24	
Dependent individuals in family	less than 3 person	monodrug	1	52	43	3	99	<0.0001
		polydrug	14	0	11	3	28	
	more than 3	monodrug	34	16	31	8	89	0.01
		polydrug	57	9	77	18	161	
Duration Of Disease	<3 yrs	monodrug	25	65	73	5	25	<0.0001
		polydrug	18	2	10	0	18	
	>3 yrs	monodrug	10	3	1	6	20	0.001
		polydrug	53	7	78	21	159	

5. Discussion

Individuals with chronic diseases have high incidences of psychological disturbances. Once diagnosed with a chronic disease, the diagnosis itself is a source of anxiety/ depression due to poor prognosis, lifelong need for treatment, social and financial burden, functional limitation and possible debilitations in future. Fallacy and bewilderment further cause a delay in presentation with late stages of disease (POAG).[11] Our results showed that more females marked severe depression than males, and overall, polydrug users reported higher depression scores. A similar trend was seen for education, job categories, income, and a greater number of years of the disease. Zhang X et al. reported that depression and anxiety both were reported more in females.[5] Similar to our study, Abe RY et al. documented that women are at higher risk for anxiety and depression (OR: 5.25, p=0.015) with glaucoma.[12]Lim et al also reported that female glaucoma patients were more likely to suffer from depression when compared to the age-matched male population.[13]

In our study, individuals at a younger age also showed less depression. Old age was associated with more depression susceptibility. The probable reason is that younger individuals are more concerned about a longer life span and disability caused by the disease. However, Zhang et al. inadequately justified any correlation of age with depression or anxiety. Further, they also documented that anxiety and depression are significantly associated with education and understanding of the disease. Similar to our results showing more depression among illiterate due to inadequate awareness of disease and outcomes. ($p = 0.049$ and $p = 0.016$, respectively).[5]

Our results revealed that 26% of patients in the poly-drug therapy group and 20% in the mono-drug therapy group showed depressive symptoms. Contrary to our results, a study showed that glaucoma had no association with depression (Odds ratio 1.10, 95%-CI 0.50–2.38, $p = 0.80$) or anxiety (1.48, 95%-CI 0.63–3.30, $p = 0.35$)[10]. The results stated by Kausar et al are in agreement with our study results that glaucoma patients had low scores of quality of life with more pronounced effects on mental health.[14]

Another study supported our results of the presence of higher depression and anxiety scores in individuals with glaucoma. It was documented that there exists a relation between glaucoma and depression, while advanced disease stage, older age, and female sex contributed to depression in patients with glaucoma.[11,15] Chen YY et al. also supported the results and documented that depression was associated with female gender, low income, and living alone among glaucoma patients. [16] Hence, looking after these factors may help improve patient compliance and improve depression, stress, and anxiety. A cross-sectional study done by Onwubiko et al stated that poor education, low personal income, and high treatment costs were also associated with poor adherence to glaucoma treatment. [17]

Our results showed that anxiety was documented more severely in the younger age group while depression was older. This was supported by a study reporting that with increasing age, the knowledge of disease grows. Hence, the anxiety also decreases and is valid for the duration of the disease. A study showed that improved knowledge about the disease and its treatment significantly reduced anxiety than controls (−0.60 logits, $P = 0.02$). [18] Also, in early age groups and with lesser disease duration, individuals are generally not experienced with disease and management and fear loss of vision at an early age, causing anxiety and stress. (Both $P<0.0001$)[19]. Hence to avoid this, patient education in understanding the disease and its management and simplifying the drug regime will lower anxiety and increase patient adherence.[20] Lately Shin et al have reported that depression and anxiety lead to the progression of glaucoma.[21] If stress is not identified, it leads to anxiety and depression, which shows the person to further aggravation of the vision loss. It's a vicious cycle that has a downstream where the outcomes become lethal.[22]

Our study has a few limitations, since the DASS-21 performance was filled by the patients at the time of data collection, the scores might have changed with time and data was collected from one institute. Despite these limitations, we believe that our study provides valuable information regarding depression and anxiety in glaucoma patients, and with better info care compliance to therapy can be improved.

5. Conclusion

Among the glaucoma patient, those on polydrug therapy have higher incidences of anxiety among young patients and depression among older patients. Old age, low income, and lesser knowledge contribute more towards depression. This not only causes poor compliance with treatment but also increases the risk of the progress of glaucoma hence augmenting the crippling effects of the disease. Providing effective information regarding disease progression, tailoring the treatment regimen taking into account the risk factors

and effective psychological support can help reduce the ill effect on the mental health of glaucoma patients.

CONFLICTS OF INTEREST- None

Financial support: None to report.
Potential competing interests: None to report
Contributions:
A.T, M.W.A - Conception of study
A.T - Experimentation/Study Conduction
A.T, M.W.A, M.H.S - Analysis/Interpretation/Discussion
M.W.A - Manuscript Writing
S.K, M.S.T - Critical Review
M.S.T - Facilitation and Material analysis

References

1. Bertaud S, Aragno V, Baudouin C, Labbé A. Le glaucome primitif à angle ouvert [Primary open-angle glaucoma]. Rev Med Interne. 2019 Jul;40(7):445-452. French. doi: 10.1016/j.revmed.2018.12.001.
2. Li H, Ge S, Greene B, Dunbar-Jacob J. Depression in the context of chronic diseases in the United States and China. Int J Nurs Sci. 2018 Nov 29;6(1):117-122. doi: 10.1016/j.ijnss.2018.11.007.
3. Sanchez FG, Mansberger SL, Newman-Casey PA. Predicting Adherence With the Glaucoma Treatment Compliance Assessment Tool. J Glaucoma. 2020 Nov;29(11):1017-1024. doi: 10.1097/IJG.0000000000001616
4. Robin AL, Muir KW. Medication adherence in patients with ocular hypertension or glaucoma. Expert Review of Ophthalmology. 2019 Sep 3;14(4-5):199-210. DOI: 10.1080/17469899.2019.1635456
5. Zhang X, Olson DJ, Le P, Lin FC, Fleischman D, Davis RM. The Association Between Glaucoma, Anxiety, and Depression in a Large Population. Am J Ophthalmol. 2017 Nov;183:37-41. doi: 10.1016/j.ajo.2017.07.021.
6. Gamiochipi-Arjona JE, Azses-Halabe Y, Tolosa-Tort P, Lazcano-Gómez G, Gonzalez-Salinas R, Turati-Acosta M, García-Huerta M, Jiménez-Román J. Depression and Medical Treatment Adherence in Mexican Patients With Glaucoma. J Glaucoma. 2021 Mar 1;30(3):251-256. doi: 10.1097/IJG.0000000000001739.
7. Shin DY, Jung KI, Park HYL, Park CK. The effect of anxiety and depression on the progression of glaucoma. Sci Rep. 2021 Jan 19;11(1):1769. doi 10.1038/s41598-021-81512-0.
8. Liu ML, Wang YX. [The prevalence of blindness caused by primary angle closure glaucoma in middle-aged Chinese population: a systematic review and meta-analysis]. Zhonghua Yan Ke Za Zhi. 2017 May 11;53(5):373-377. Chinese. doi: 10.3760/CMA.j.issn.0412-4081.2017.05.010.
9. Le MTH, Tran TD, Holton S, Nguyen HT, Wolfe R, Fisher J. Reliability, convergent validity and factor structure of the DASS-21 in a sample of Vietnamese adolescents. PLoS One. 2017 Jul 19;12(7):e0180557. doi 10.1371/journal.pone.0180557.
10. Rezapour J, Nickels S, Schuster AK, Michal M, Münzel T, Wild PS, Schmidtmann I, Lackner K, Schulz A, Pfeiffer N, Beutel ME. Prevalence of depression and anxiety among participants with glaucoma in a population-based cohort study: The Gutenberg Health Study. BMC Ophthalmol. 2018 Jun 28;18(1):157. doi: 10.1186/s12886-018-0831-1
11. Onwubiko SN, Nwachukwu NZ, Muomah RC, Okoloagu NM, Ngwegu OM, Nwachukwu DC. Factors associated with depression and anxiety among glaucoma patients in a tertiary hospital South-East Nigeria. Niger J Clin Pract. 2020 Mar;23(3):315-321. doi: 10.4103/njcp.njcp_140_19.
12. Abe RY, Silva LNP, Silva DM, Vasconcellos JPC, Costa VP. Prevalence of depressive and anxiety disorders in patients with glaucoma: a cross-sectional study. Arq Bras Oftalmol. 2021 Jan-Feb;84(1):31-36. doi: 10.5935/0004-2749.20210006.
13. Lim NC, Fan CH, Yong MK, Wong EP, Yip LW. Assessment of Depression, Anxiety, and Quality of Life in Singaporean Patients With Glaucoma. J Glaucoma. 2016 Jul;25(7):605-12. doi: 10.1097/IJG.0000000000000393.
14. Kausar A, Ali M, Masud H, Akhtar F. Vision-related quality of life in Pakistani subjects with early or moderate glaucoma. Int Health. 2018 Nov 1;10(6):517-523. doi: 10.1093/inthealth/ihy052.
15. Stamatiou ME, Kazantzis D, Theodossiadis P, Chatziralli I. Depression in glaucoma patients: A review of the literature. Semin Ophthalmol. 2022 Jan 2;37(1):29-35. doi: 10.1080/08820538.2021.1903945.
16. Chen YY, Lai YJ, Wang JP, Shen YC, Wang CY, Chen HH, Hu HY, Chou P. The association between glaucoma and risk of depression: a nationwide population-based cohort study. BMC Ophthalmol. 2018 Jun 22;18(1):146. doi: 10.1186/s12886-018-0811-5.
17. Vélez-Gómez MC, Vásquez-Trespalacios EM. Adherence to topical treatment of glaucoma, risk and protective factors: A review. Arch Soc Esp Oftalmol (Engl Ed). 2018 Feb;93(2):87-92. English, Spanish. doi: 10.1016/j.oftal.2017.07.012.
18. Skalicky SE, D'Mellow G, House P, Fenwick E; Glaucoma Australia Educational Impact Study Contributors. Glaucoma Australia educational impact study: a randomized short-term clinical trial evaluating the association between glaucoma education and patient knowledge, anxiety and treatment satisfaction. Clin Exp Ophthalmol. 2018 Apr;46(3):222-231. doi: 10.1111/ceo.13016. Epub 2017 Aug 11
19. Otori Y, Takahashi G, Urashima M, Kuwayama Y; Quality of Life Improvement Committee. Evaluating the Quality of Life of Glaucoma Patients Using the State-Trait Anxiety Inventory. J Glaucoma. 2017 Nov;26(11):1025-1029. doi: 10.1097/IJG.0000000000000761.
20. Meier-Gibbons F, Töteberg-Harms M. Influence of Cost of Care and Adherence in Glaucoma Management: An Update. J Ophthalmol. 2020 Apr 8;2020:5901537. doi: 10.1155/2020/5901537
21. Shin DY, Jung KI, Park HYL, Park CK. The effect of anxiety and depression on progression of glaucoma. Sci Rep. 2021 Jan 19;11(1):1769. doi: 10.1038/s41598-021-81512-0.
22. Sabel BA, Wang J, Cárdenas-Morales L, Faiq M, Heim C. Mental stress as consequence and cause of vision loss: the dawn of psychosomatic ophthalmology for preventive and personalized medicine. EPMA J. 2018 May 9;9(2):133-160. doi: 10.1007/s13167-018-0136-8