

Glaucoma Medication and its Relationship with Depression

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ABSTRACT

Glaucoma is a disease of progressive degeneration of the optic nerve which is the second leading cause of blindness worldwide, results in irreversible blindness. The only therapy proven to be effective is giving the medication for lowering intraocular pressure. This treatment is not curing glaucoma and must be done for lifelong. In glaucoma patients, it is found they experience depression and one of the factors is drug treatment itself. Therefore, this study was conducted to determine the relationship between the treatment given to glaucoma patients and the depression that appears in patients. The literature review was done in December 2022 by searching database from Google Scholar, PubMed, and ScienceDirect with key concepts “glaucoma”, “depression”, and “medication”. In conclusion, there is a link between glaucoma patients' drug activities and the development of depression. Patients may experience depression due to a variety of interrelated factors, including their understanding of and adherence to their medication, its dosage, cost, and type of drug.

Keywords: glaucoma; depression; medication

INTRODUCTION

Glaucoma is a disease of progressive degeneration of the optic nerve characterized by disappearing retinal ganglion cells, thinning retinal nerve fiber layer, and progressive excavation of the optic disc. The progressive loss of retinal ganglion cells results in increased visual field impairment in the form of vision loss and even blindness as well as functional impairments such as color perception and difficulty in reading [1]. The disease, which is the second leading cause of blindness worldwide, results in irreversible blindness [2]. In 2020, 3.61 million people will be blind and 4.14 million people will have moderate to severe visual impairment due to glaucoma [3].

Intraocular pressure reduction is the only therapy proven to be effective in preventing glaucoma progression. In patients with open-angle glaucoma, intraocular pressure can be reduced with regularly applied eye drops [1]. The class of drugs used are prostaglandin analogs, beta-blockers, carbonic anhydrase inhibitors, alpha-2 agonists, miotic agents, rho-kinase inhibitors, and nitric-oxide donor drugs [4].

The treatment does not cure glaucoma or restore vision, but only aims to prevent the condition from worsening. Since glaucoma is a degenerative disease, medication must be administered daily from the time the patient is diagnosed with glaucoma for the rest of their lives [5]. In glaucoma patients, it is found they experience depression [6][7]. Many factors trigger depression in patients.

One of the triggering factors is related to glaucoma drug treatment [8]. Therefore, this study was conducted to determine the relationship between the treatment given to glaucoma patients and the depression that appears in patients.

METHODS

The following literature review was formed by searching, collecting, and analyzing various studies. Searches were done using Google Scholar, PubMed, and ScienceDirect with key concepts we used were “glaucoma”, “depression” and “medication”. The literature search was done in December 2022.

RESULTS

Patient's Knowledge and Drug Compliance

The patient's level of knowledge of the type of treatment therapy provided affects the mental state of the patient. Patients with a higher level of education have a better awareness of their condition and actively seek information so that they can understand the consequences of the decisions chosen. With their knowledge, they have realistic expectations while increasing their confidence in healthcare providers. These well-informed patients are more mentally prepared and more receptive to treatment, which influences patients' adherence to therapy [9].

Patients who do not have a strong belief in the treatment become a strong reason for deliberate non-adherence such as in administering eye drops on time and monitoring the

dosage. Treatment adherence has significant implications for the cost-effectiveness of treatment [10]. The ease with which patients can access medication therapy also affects the level of medication adherence, both in terms of medication services and how the medication is used. Patients with poor adherence have symptoms of depression. Depression arises because patients have difficulty using eye drops. After all, the limited visual field makes them have poor dexterity [11][12].

With this limitation, they are more often dependent on people around them so the level of dependence increases. This decrease in independence results in increased depression in patients [13]. It can be seen that during the COVID-19 pandemic people with glaucoma have higher levels of depression than those without glaucoma due to not being able to access direct care, use of eye drops, and disease monitoring which affects low self-management in patients so it is negatively correlated with depression [14].

Number of Drug

The amount of drug therapy with the use of more than 3 types of antiglaucoma drugs is significantly correlated with poorer quality of life, the fewer drug combinations used, the lower the level of depression in patients [15][16]. The number of drug combinations also affects the price of drugs that are not cheap, causing an economic burden for glaucoma patients [10].

Drug Cost

Economic burden is the only predictor of decreased quality of life in glaucoma patients. Poor economic status is often accompanied by decreased treatment persistence and increased psychological distress and increases with disease progression [17]. It can be seen that insufficient monthly income is significantly associated with the occurrence of depression [18]. Difficulty in paying fees is associated with an increase in depression scores as patients become unable to access the treatment, they are due and cause the glaucoma condition to progress for the worse. Given the known association between glaucoma progression and socioeconomic barriers to healthcare in underserved communities, these results suggest that the increased prevalence of depression in these communities may be related to the inability to meet the financial demands of glaucoma treatment [13].

Type of Drug

Timolol maleate eye drops, a non-selective b-blocker, can cause depression in glaucoma patients. Withdrawing from them or switching to betaxolol hydrochloride eye drops can help (a β -1 selective β -blocker). Although no study has performed statistical analysis to assess the relationship between the use of oral carbonic anhydrase inhibitors and depression, depression has been included as one of the side effects of these medications [19].

A case report also suggests a connection between topical ophthalmic β -adrenoceptor antagonists and depression. Treatment in the first instance used betaxolol 0.5%. (1 drop per day). He started to worry if the eye drops had any side effects after attributing the commencement of his sadness to glaucoma. He initially experienced fatigue, a loss of humor, trouble sleeping, and a lack of libido. Mr. X. claimed that his mood improved after switching to latanoprost from his previous drops. Within 48 hours, according to Mr.X, he felt happier and had more energy. In the second instance, the man's depressive symptoms included fatigue, sleep issues, obsessive thinking, social disengagement, anhedonia, loss of libido, and appetite decrease but no weight gain [20].

Another study found that approximately 1 in 10 people getting topical timolol for the treatment of persistent glaucoma had significant depressive disorder (MDD). Patients receiving prostaglandin analogs had lower prevalence rates than controls. Patients receiving β -blocker therapy were 6.4 times more likely to experience depression compared to those receiving prostaglandin analogs, according to the odds ratio produced by logistic regression, a method that modifies the odds ratio to account for the simultaneous effects of age, gender, and glaucoma duration [21].

Another investigation revealed that patients using β -blockers had higher Self-Rating Depression Scale (SDS) scores than those who weren't [22]. The β -blocker timolol used in conjunction with the prostaglandin analog travoprost also caused patients to have symptoms of depression that were likened to a dark cloud enveloping them, along with exhaustion, difficulties focusing, sleep disruptions, loss of libido, and decreased appetite. At a follow-up exam a month later, eating and sleep patterns were judged to be 70% better after the two-drug combination was stopped and replaced with a different regimen of travoprost, brimonidine tartrate, and brinzolamide [23].

ACKNOWLEDGMENT

We acknowledge the outstanding assistance of our supervisor and the numerous sources we used to gather information for this research, all of which helped us gain a deeper understanding of the subject.

REFERENCES

- [1] Schuster, A. K., Erb, C., Hoffmann, E. M., Dietlein, T., & Pfeiffer, N. (2020). The diagnosis and treatment of glaucoma. *Deutsches Ärzteblatt International*, 117(13), 225.
- [2] Centers for Disease Control and Prevention. Available from: <https://www.cdc.gov/visionhealth/resources/features/glaucoma-awareness.html#:~:text=Glaucoma%20is%20a%20group%20of,results%20in%20increased%20eye%20pressure.>
- [3] Burton, M. J., Jacqueline, R., Marques, A. P., Bourne, R. A., Congdon, N., Jones, I., Tong, B. A. M. A., Arunga, S., Bachani, D., Bascaran, C., Bastawrous, A., Blanchet, K., Braithwaite, T., Buchan, J. C., Cairns, J., Cama, A., Chagunda, M., Chuluunkhuu, C., Cooper, A., Crofts-Lawrence, J., Dean, W. H., Denniston, A. K., Ehrlich, J. R., Emerson, P. M., Evans, J. R., Frick, K. D., Friedman, D. S., Furtado, J. M., Gichangi, M. M., Gichuhi, S., Gilbert, S. S., Gurung, R., Habtamu, E., Holland, P., Jonas, J. B., Keane, P. A., Keay, L., Khanna, R. C., Khaw, P. T., Kuper, H., Kyari, F., Lansingh, V. C., Mactaggart, I., Mafwiri, M. M., Mathenge, W., McCormick, I., Morjaria, P., Mowatt, L., Muirhead, D., Murthy, G. V. S., Mwangi, N., Patel, D. B., Peto, T., Qureshi, B. M., Salomão, S. R., Sarah, V., Shilio, B. R., Solomon, A. W., Swenor, B. K., Taylor, H. R., Wang, N., Webson, A., West, S. K., Wong, T. Y., Wormald, R., Yasmin, S., Yusufu, M., Silva, J. C., Resnikoff, S., Ravilla, T., Gilbert, C. E., Foster, A., & Faa, H. B., 2021, 'The Lancet Global Health Commission on Global Eye Health: Vision Beyond 2020', *The Lancet Global Health Commission*, 9(4), pp 506.
- [4] Dietze, J., Blair, K., & Havens, S. J. (2022). *Glaucoma. StatPearls* [Internet].

- [5] National Eye Institute. Available from: <https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/glaucoma/glaucoma-medicines>.
- [6] Chen, Y. Y., Lai, Y. J., Wang, J. P., Shen, Y. C., Wang, C. Y., Chen, H. H., ... & Chou, P. (2018). The association between glaucoma and risk of depression: a nationwide population-based cohort study. *BMC ophthalmology*, 18(1), 1-8.
- [7] Naufal, F., Gajwani, P., Medina, R., Dutson, M., Mariotti, S. P., & West, S. K. (2021). Knowledge of patient emotional health status: impact on clinical care in glaucoma and retinal services. *BMJ open ophthalmology*, 6(1), e000640.
- [8] Gamiochipi-Arjona, J. E., Azses-Halabe, Y., Tolosa-Tort, P., Lazcano-Gómez, G., Gonzalez-Salinas, R., Turati-Acosta, M., ... & Jiménez-Román, J. (2021). Depression and Medical Treatment Adherence in Mexican Patients with Glaucoma. *Journal of Glaucoma*, 30(3), 251-256.
- [9] Chandramohan, H., Wan Abdul Halim, W. H., Azizi, H. A., Tiak, H. S., Zainal Rain, S. L., Abdul Rahman, G. Y., & Khialdin, S. M. (2017). Quality of Life and Severity of Glaucoma: A Study Using Glaucol-36 Questionnaire at Universiti Kebangsaan Malaysia Medical Centre (UKMMC). *International Medical Journal*, 24(1).
- [10] Loon, S. C., Jin, J., & Jin Goh, M. (2015). The relationship between quality of life and adherence to medication in glaucoma patients in Singapore. *Journal of glaucoma*, 24(5), e36-e42.
- [11] Jayawant, S. S., Bhosle, M. J., Anderson, R. T., & Balkrishnan, R. (2007). Depressive symptomatology, medication persistence, and associated healthcare costs in older adults with glaucoma. *Journal of glaucoma*, 16(6), 513-520.
- [12] Spencer, S. K., Shulruf, B., McPherson, Z. E., Zhang, H., Lee, M. B., Francis, I. C., ... & Agar, A. (2019). Factors affecting adherence to topical glaucoma therapy: a quantitative and qualitative pilot study analysis in Sydney, Australia. *Ophthalmology Glaucoma*, 2(2), 86-93.
- [13] Thau, A. J., Rohn, M. C., Biron, M. E., Rahmatnejad, K., Mayro, E. L., Gentile, P. M., ... & Hark, L. A. (2018). Depression and quality of life in a community-based glaucoma-screening project. *Canadian Journal of Ophthalmology*, 53(4), 354-360.
- [14] Zhou, W., Lin, H., Ren, Y., Lin, H., Liang, Y., Chen, Y., & Zhang, S. (2022). Mental health and self-management in glaucoma patients during the COVID-19 pandemic: a cross-sectional study in China. *BMC ophthalmology*, 22(1), 1-8.
- [15] Wu, N., Kong, X., Gao, J., & Sun, X., 2019, 'Vision-related quality of life in glaucoma patients and its correlations with psychological disturbances and visual function indices', *Journal of Glaucoma*, 28(3), 207-215.
- [16] Wu, N., Kong, X., & Sun, X., 2022, 'Anxiety and depression in Chinese patients with glaucoma and its correlations with vision-related quality of life and visual function indices: a cross-sectional study', *BMJ open*, 12(2), e046194.
- [17] Zhou, C., Qian, S., Wu, P., & Qiu, C. (2014). Quality of life of glaucoma patients in China: sociodemographic, clinical, and psychological correlates—a cross-sectional study. *Quality of Life Research*, 23(3), 999-1008.
- [18] Ajith, B.S., Najeeb, N., John, A. and Anima, V.N., 2022, 'Cross sectional study of depression, anxiety and quality of life in glaucoma patients at a tertiary centre in North Kerala', *Indian Journal of Ophthalmology*, 70(2), p.546.
- [19] Mabuchi, F., Yoshimura, K., Kashiwagi, K., Yamagata, Z., Kanba, S., Iijima, H., & Tsukahara, S. (2012). Risk factors for anxiety and depression in patients with glaucoma. *British Journal of Ophthalmology*, 96(6), 821-825.
- [20] Schweitzer, I., Maguire, K., & Tuckwell, V. (2001). Antiglaucoma medication and clinical depression. *Australian & New Zealand Journal of Psychiatry*, 35(5), 569-571.
- [21] Bali, S. J., Parmar, T., Arora, V., Ichhpujani, P., Sagar, R., & Dada, T. (2011). Evaluation of major depressive disorder in patients receiving chronic treatment with topical timolol. *Ophthalmologica*, 226(3), 157-160.
- [22] Kong, X., Yan, M., Sun, X., & Xiao, Z. (2015). Anxiety and depression are more prevalent in primary angle closure glaucoma than in primary open-angle glaucoma. *Journal of glaucoma*, 24(5), e57-e63.
- [23] Schweitzer, I., Maguire, K., & Ng, C. H. (2008). A case of melancholic depression induced by beta-blocker antiglaucoma agents. *Med J Aust*, 189(7), 406-407.