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Glaucoma and Dry Eye Syndrome Impact on Quality of Life: What We Know?

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ABSTRACT

Dry eye syndrome (DES) and glaucoma are two chronic eye diseases that require continuous and long-term use of topical drugs. These diseases can cause decreased quality of life from various aspects such as visual, psychological, long-term treatment, and economic burdens. This study proposed to review the chronic eye disease impact on patients' quality of life. There are several questionnaires created to quantify these data. In conclusion, many studies have reported a significant reduction in quality of life in people with DES and glaucoma.

Keywords: dry eye syndrome; glaucoma; quality of life

INTRODUCTION

Chronic eye disease is a common problem and requires long-term therapy.[1] Dry eye syndrome (DES) is the most common chronic eye disease in clinical practice worldwide, with prevalence ranging from 5-50%.[2] DES affects approximately five million people aged >50 years.[3] In Indonesia, a recent study by Noor et al. stated that the prevalence of DES was 22.4%, mainly in the elderly population.[4] Besides DES, another chronic eye disease that causes a decrease in quality of life is glaucoma. Glaucoma is the second leading cause of blindness in the world after cataracts.[5] It is estimated that 60 million people worldwide experience optic neuropathy due to glaucoma, with the highest prevalence of open-angle glaucoma in African and Asian populations.[6] It is estimated that in 2020, Southeast Asia had a glaucoma prevalence of 8.32 million, and it continues to increase with a projected prevalence in 2040 of 11.9 million.[7] Glaucoma in Indonesia had a prevalence in 2007 of 0.46%, with glaucoma outpatients visits in Indonesia increased from 65,774 (2015) to 427,091 (2017).[8]

DES and glaucoma are similar in terms of continuous and long-term use of topical drugs, discomfort symptoms, risk of blindness, community stigma regarding the worse prognosis, and concerns about permanent vision problems. To relieve the DES symptoms such as dry and itchy eyes, generally, patients are given topical artificial tears regularly, several times a day. Whereas in glaucoma, early treatment is essential to reduce and maintain normal intraocular pressure (IOP). This condition can be achieved by medication or non-medication, whereas later is less common in clinical practice. Problems related to long-term routine treatment can affect treatment adherence, worsening IOP, and depression. Glaucoma is also associated with depressive conditions and worsens by the increment of patient age, chronic use of anti-glaucoma treatment, limited daily activities, and disabilities in family and workplace roles. Glaucoma management is still insufficient, causing the quality of life to remain low.[9,10]

Some contributing factors arise from the anti-glaucoma drugs, such as the expensive cost, the difficulty of usage, administration time, and the doses.

Quality of life is a multidimensional concept related to physical, psychological/mental, and social aspects. DES and glaucoma require regular daily and long-term therapy. It can certainly affect the patients' quality of life. Meanwhile, few studies link chronic eye disease with quality of life. To determine the relationship, we conduct a review of the quality of life for chronic eye disease.

DISCUSSION

A. Basic knowledge

DES is a multifactorial disease on the eye's surface, characterized by tear film instability leading to eye symptoms. [2,11] The etiology of DES can result from excessive evaporation, both from intrinsic and extrinsic factors, deficiency of aqueous humor, and environmental conditions. The symptoms are eye discomfort, foreign/gritty sensation, burning, red and itchy eyes, epiphora, photophobia, visual disturbances, eye pain, headache, and eye strain. DES is a chronic condition that requires long-term medical management, such as artificial tears and, if necessary topical anti-inflammatories like topical cyclosporine and low doses of corticosteroids.[12–16] Glaucoma is a group of eye disorders with characteristics of progressive degeneration of the optic nerve, retinal ganglion cell atrophy, thinning of the retinal nerve fiber layer, and increased optic disc excavation.[17] Long-term topical therapy with/without surgery is an option for glaucoma management. The most common topical therapies used are beta-blockers and prostaglandin analogs to regulate intraocular pressure. However, long-term use of topical drugs can affect the surface of the tear film and can lead to other diseases, worsening the quality of life.[2]

B. Dry eyes related-quality of life questionnaires

(1) *Impact of Dry Eye on Everyday Life (IDEEL):*

Unlike other questionnaires, IDEEL is longer (57 questions) and comprehensive by presenting three modules: the effect of DES on daily life, the satisfaction of DES treatment, and disturbing DES symptoms. There are questions with yes/no answers and the remaining with four or five Likert scale answers, with a total score of 0-100 points for each module. Internal consistency of Cronbach's alpha = 0.70-0.97 and a reliability test-retest coefficient of 0.70-0.88. The disadvantage of IDEEL is no cut-off value for DES. It was reported that the severity of DES could be classified into mild, moderate, and severe, with a consecutive mean score of 40 (± 7.5), 50.6 (± 11.0), and 64.3 (± 8.0).[2,3,18]

(2) *National Eye Institute's Visual Function Questionnaire (NEI VFQ-25)*:

This questionnaire focuses on secondary visual impairment of DES and other diseases such as cataracts, macular degeneration, diabetic retinopathy, glaucoma, and vision loss due to stroke. There are 25 questions related to visual domains such as vision severity (in general, distance and near vision, driving, and color vision), eye pain scale, as well as non-visual domains such as general health, mental health, independence, social functioning, and limitations social roles.[2] Each question is answered on a scale of 0-100, but there is no cut-off value for DES. Internal consistency of Cronbach's alpha = 0.71-0.85 and reliability test-retest coefficient 0.57-0.88.

(3) *Dry Eye-Related Quality-of-Life Score (DEQS)*:

This questionnaire consists of 15 questions, each consisting of six sub-questions regarding the subjective symptoms of DES and nine questions regarding their effect on daily activities for the last one week. Each question is divided into column A for frequency and column B for the degree of severity. The answers in column A are based on a five-point scale from never (score 0) to always (score 4), while in column B on a four-point scale from scores 1-4. The maximum total for the patient's QoL is 100 points obtained by the total score in column B multiplied by 25, divided by the number of valid answered scores. The cut-off for DES was 15. Cronbach's internal consistency alpha = 0.83-0.93 and the reliability test-retest coefficient 0.81-0.93. The disadvantage is that DEQS is only available in the Japanese language.[18]

C. Glaucoma-related quality of life questionnaires

Quality of life can be assessed subjectively using a questionnaire filled out independently by the patient. Mainly, glaucoma-related questionnaires can be divided into non-specific glaucoma (general vision) and glaucoma-specific.

(1) *National Eye Institute's Visual Function Questionnaire - 25 (NEI VFQ-25)*:

NEI VFQ-25 is a shortened version of NEI VFQ-51. The NEI VFQ-25 is frequently used to assess the vision-specific quality of life. In addition, this questionnaire has been validated for use in multiple languages. The NEI VFQ-25 questionnaire is used as the standard for assessing the quality of life of glaucoma patients because it can assess the overall quality of life. However, the disadvantage of this questionnaire is more challenging to use than the glaucoma-specific questionnaire.[19,20]

(2) *European Quality of Life in 5 Dimension (EQ-5D):*

EQ-5D evaluates general health by assessing five essential aspects: mobility, self-care, regular activity, pain/discomfort, and anxiety/depression. Three types of EQ-5D questionnaires can be used: EQ-5D-3L (level), EQ-5D-5L, and EQ-5D-Y (Youth). EQ-5D-3L divides the problem from each domain into three levels: none, some, and extreme/unable to. Meanwhile, the EQ-5D-5L divides each domain into five levels of problems. Finally, EQ-5D-Y is used for children/adolescents and can be divided into three levels of problems. The EQ-5D questionnaire is the most widely used in the UK.[21,22]

(3) *36-items Short Form (SF-36)*:

The SF-36 questionnaire has a total of 36 questions which can be divided into eight domains: physical function, obstacles due to physical problems, emotional disturbances, pain in the body, general health, social function, vitality, and mental health.[22]

(4) *WHOQOL-BREF*:

WHOQOL-BREF is a quality of life instrument developed by WHO and is a shortened version of WHOQOL-100. WHOQOL-BREF is easy to use because it only contains 26 questions. In general, this questionnaire divides the quality of life into four main domains: physical health, psychological, social relationships, and environment. In addition, WHOQOL-BREF has been translated and validated in multiple languages, including Bahasa Indonesia. Therefore, this questionnaire can be used to assess the quality of life of people with glaucoma.[19]

(5) *Glaucoma Quality of Life - 15 (GQL-15)*:

GQL-15 is a specific questionnaire for glaucoma that can evaluate the impact of glaucoma, which is a binocular visual field disorder, quality of life, and general visual function. This questionnaire contains 15 questions and is an abbreviated version of the original questionnaire, which contained 62 questions. GQL-15 has four aspects: near and central vision, peripheral vision, outdoor mobility, and glare/dark adaptation. The maximum value obtained from this questionnaire is 75, and the minimum value is 15. The higher GQL-15 value represents the patient's lower quality of life. Philipin's study explained that GQL-15 is more specific and easier to use than other glaucoma-specific questionnaires. Compared to the NEI VFQ-25, this questionnaire is shorter, easier, and faster to use.[20]

(6) *9-items Glaucoma Activity Limitation (GAL-9)*:

GAL-9 contains nine questions taken from the GQL-15, considering that these questions better reflect the impact of glaucoma on visual function. GAL-9 correlated well with visual acuity and visual field scores. Compared to the GQL-15, the GAL-9 is faster to use because of the fewer questions.[22]

D. Quality of life in dry eyes and glaucoma patients

(1) *Visual health and physical health problems*:

The DES affects visual quality by blurred/fluctuating vision, glare, disturbed night vision, and sleep disturbances.[2,11] Kawashima et al. reported that out of 672 respondents aged 26-64 years, complaints of poor sleep quality related to DES in men (OR 3.21 [95% CI 1.56-6.63]) and women (OR 1.74 [95% CI 1.08-2.82]).[23,24]

Meanwhile, the visual effects of glaucoma include visual impairment, visual fields, and color contrast sensitivity. Research by Munish et al. showed that the results of the quality of life of glaucoma patients were low, compared to the control group, and the more severe the glaucoma impairment (according to the magnitude of visual field and visual disturbances), the quality of life are getting worse ($p < 0.005$). This cross-sectional study used a GQL-15 questionnaire with 50 healthy vision (control) and 50 chronic glaucomas in India. The average GQL-15 results in control patients were 15.02 ± 0.14, mild chronic glaucoma patients were 18.2, moderate chronic glaucoma patients

were 32.2, and severe chronic glaucoma patients were 43.2 (p <0.005).[25] Similar results were found in a cross-sectional study in Ethiopia, where the most significantly different domains were peripheral visual field and dark/glare adaptation (p <0.0001).[26] In addition to affecting vision, glaucoma also affects the activities of daily living. The daily activities decrease parallel with the severity of the patient's degree of glaucoma.[27]

(2) *Mental health problems*:
DES is often associated with chronic red eyes, which negatively impacts psychological aspects, affecting mental health, which refers to the comorbidity of anxiety disorders and social phobia.[2] Wan et al. showed that among a broad population with depression and anxiety, dominated by DES.[28] This result is also in line with the study in Groningen with a sample of 662 DES patients, which stated that depression is common in DES and is related to its severity (p<0.001), and a study in Beijing which stated a significant depression risk associated with DES (p=0.028).[29,30] In addition, DES also affects cognitive processes (p=0.01), learning, and concentration due to fluctuating visual disturbances, causing a decreased reading rate and disrupting work productivity which requires long-term visual concentration.[2,11,30] DES patients also miss recreational opportunities such as exercise due to fluctuating vision, reducing the accuracy and fixation in moving objects.[2]

The psychological effects of glaucoma can be fear of blindness, fear of being a family burden, anxiety, and depression. Research by Fatrin et al. at the Cicendo Eye Hospital showed a moderate correlation between glaucoma and psychosocial conditions.[31] Similar results in the study by Webin et al. in Guangzhou showed that the glaucoma patient group's social function and mental health were significantly lower (p <0.05) than the control group.[27] Gagrani et al. in India show glaucoma patients have decreased quality of life. This study explains that meditation for 45 minutes/day for six weeks can improve the quality of life of glaucoma patients compared to control patients.[32] Besides meditation, ocular yoga can also reduce stress and improve the quality of life in glaucoma patients.[33]

(3) *Treatment-related problems*:
The burden of long term management of DES can affect treatment compliance in patients, especially the elderly population, especially those with pathological neurodegenerative and autoimmune diseases (dementia, Parkinson's disease, multiple sclerosis, and rheumatoid arthritis) inabilities to apply eye drops independently, thus indirectly becoming dependent on others and becoming a social burden for the family.[2]

The side effects of glaucoma treatment can arise from topical pharmacological management, such as palpebral dermatitis, scarring of the lacrimal system, discomfort related to drug administration, inflammation of the conjunctiva, changes in the epithelium of the conjunctiva, disturbances of the surface and corneal endothelium, and blurred vision. In addition, Glaucoma-related Ocular Surface Disease (G-OSD) is a complication that can arise from long-term use of anti-glaucoma drops. In addition, cumulative use of anti-glaucoma drugs and preservatives in the drug can disrupt the balance of the tear film.[9,34]

(4) *Financial problems*:
The long-term management of DES is also a significant direct and indirect economic burden. Directly through visits/treatment controls, medical costs, and palliative supplements; indirectly through decreased work productivity.[2,3]

For example, a study in Japan stated that the indirect detrimental effect of decreased vision on DES is presenteeism or decreased productivity when workers are present but not fully productive (p <0.05).[11,35] This presenteeism is equivalent to 91 days in mild DES patients, 94.9 days in moderate DES, and 128.2 days in severe DES. Meanwhile, absenteeism or not coming to work or leaving work too early is equivalent to 8.4 days/year in mild DES to 14.2 days/year in severe DES.[3]

Glaucoma can burden the economy directly or indirectly. The direct impact is in control costs to the eye clinic, the cost of IOP-lowering drugs, and other glaucoma procedures. The indirect impact is transportation costs for medical treatment and loss of income due to absenteeism.[36] A study by Laser in Glaucoma and Ocular Hypertension (LiGHT) in 2019 showed that the costs spent on drugs for open-angle glaucoma and ocular hypertension in the UK were £465 (equivalent to IDR8,505,612 with an exchange rate on April 26, 2019, amounting to £1 equals to IDR18,291.64) for one person during the three years of research.[37] The use of topical glaucoma medications in the United States showed an average cost of around $1,610 (equivalent to IDR23,669,608 with an exchange rate on October 29, 2020, amounting to $1 equals to IDR14,701.62) to $3,751 (equivalent to IDR 55,114,776) for one person during two years of research.[38]

CONCLUSION

DES affects the quality of life by fluctuating vision, whereas glaucoma affects the quality of life by the severity of glaucoma impairment and blindness. These diseases can cause decreased quality of life from various aspects such as visual, psychological, long-term treatment, and economic burdens.

This review is essential for clinicians who are involved in the management of chronic eye disease. Ophthalmologists often focus on signs and only treat the disease, but the patients' quality of life is usually neglected. We need to be vigilant and aware of each patient's well-being and functionality. Eye medication alone is insufficient and requires multidisciplinary management from ophthalmology, psychiatry, and other related fields.

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