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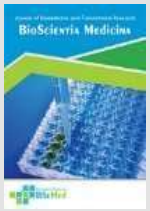

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Impact of Open-Angle Glaucoma Severity on Vision-Related Quality of Life: A Cross-Sectional Study in a Single Center in Indonesia

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A B S T R A C T

Background: Glaucoma is a progressive optic neuropathy characterized by the gradual loss of retinal ganglion cells (RGCs) and their axons, leading to irreversible visual field loss. This study aimed to investigate the relationship between the severity of primary open-angle glaucoma (POAG) and vision-related quality of life (VRQoL) in a single center in Indonesia. **Methods:** A cross-sectional study was conducted at the eye polyclinic of Dr. M. Djamil General Hospital, Padang, Indonesia, from June to August 2024. A total of 54 patients with POAG were included and categorized into mild, moderate, and severe groups based on their cup-to-disc ratio and visual field index (VFI). VRQoL was assessed using the Indonesian version of the National Eye Institute Visual Function Questionnaire (NEI-VFQ 25). **Results:** The mean VRQoL score was significantly lower in the severe group (60.63 ± 13.04) compared to the moderate (81.79 ± 10.42) and mild (85.04 ± 10.52) groups ($p = 0.000$). A strong negative correlation was observed between glaucoma severity and VRQoL ($r = -0.667$, $p = 0.000$). The social functioning subscale showed the strongest correlation with severity ($r = -0.573$, $p = 0.000$). **Conclusion:** The severity of POAG significantly impacts VRQoL, with more severe disease associated with lower QoL scores. The social functioning domain appears to be particularly affected. These findings underscore the importance of comprehensive glaucoma management that addresses not only clinical parameters but also the patient's overall quality of life.

1. Introduction

Glaucoma, a leading cause of irreversible blindness globally, presents a significant public health challenge. This neurodegenerative disease is characterized by the progressive degeneration of retinal ganglion cells (RGCs) and their axons, leading to irreversible visual field loss and potentially blindness. The global prevalence of glaucoma is estimated to be 3.5% in individuals aged 40-80 years, with primary open-angle glaucoma (POAG) being the most prevalent form. In Indonesia, glaucoma is a major cause of visual impairment, with a prevalence of 2.7% in individuals aged 50 years and above. POAG is typically characterized by an open anterior chamber angle, progressive optic nerve damage, and corresponding visual field loss. The diagnosis of POAG is established through clinical evaluations, including optic nerve head assessment (e.g., cup-to-disc ratio, neuroretinal rim assessment), visual field testing (e.g., standard automated perimetry), and gonioscopy to rule out angle closure. The severity of POAG is often classified based on the extent of optic nerve damage and the corresponding visual field loss, which can range from mild to severe.[1,2]

The impact of glaucoma extends beyond visual impairment, significantly affecting various aspects of a patient's life, including their physical, emotional, and social well-being. Vision-related quality of life (VRQoL) is a multidimensional concept that encompasses the impact of vision-related factors on an individual's overall quality of life. It reflects how visual impairment affects daily activities, emotional

well-being, and social interactions. Several studies have demonstrated a strong association between glaucoma and reduced VRQoL. As glaucoma progresses, individuals may experience difficulties with daily tasks such as reading, driving, and recognizing faces, leading to decreased independence, social isolation, and emotional distress. The National Eye Institute Visual Function Questionnaire (NEI-VFQ 25) is a widely used instrument for assessing VRQoL in individuals with eye diseases, including glaucoma. It comprises 25 items that cover various domains of visual function, such as general vision, near and distance activities, social functioning, mental health, role difficulties, dependency, driving, and color and peripheral vision. Each item is scored on a scale of 0-100, with higher scores indicating better VRQoL. The NEI-VFQ 25 has been translated and validated in numerous languages, including Indonesian, making it a valuable tool for cross-cultural research.[3-5]

While the impact of glaucoma on VRQoL has been extensively documented in various populations worldwide, data from Indonesia remains limited. This study aimed to investigate the relationship between the severity of POAG and VRQoL in a single center in Indonesia. By examining the impact of glaucoma severity on various domains of VRQoL, this study aimed to provide valuable insights into the overall burden of glaucoma in Indonesian patients. The findings of this study will contribute to a better understanding of the impact of glaucoma on patients' lives and inform the development of comprehensive management strategies that address not only clinical parameters but also the patient's overall quality of life. Understanding the impact of glaucoma severity on VRQoL is crucial for several reasons. First, it can help clinicians identify patients who are at risk of experiencing a significant decline in their quality of life due to glaucoma. Early identification of these patients allows for timely interventions, such as vision rehabilitation and psychological support, to mitigate the negative impact of glaucoma on their daily lives. Second, assessing VRQoL can help clinicians evaluate the effectiveness of different treatment strategies in improving patients' overall well-being. While clinical measures such as intraocular pressure and visual field loss are essential for monitoring disease progression, they do not fully capture the impact of glaucoma on patients' daily lives. VRQoL assessments provide a patient-centered perspective on the effectiveness of treatment, allowing clinicians to tailor their management strategies to meet the individual needs of each patient.[6-8]

Furthermore, understanding the relationship between glaucoma severity and VRQoL can inform public health initiatives aimed at raising awareness about glaucoma and promoting early detection. By highlighting the significant impact of glaucoma on patients' quality of life, public health campaigns can encourage individuals to seek regular eye exams and adhere to treatment plans. This can lead to earlier diagnosis and treatment, potentially delaying disease progression and preserving quality of life. In addition to its clinical and public health implications, understanding the impact of glaucoma severity on VRQoL can also inform health policy decisions. Policymakers can use this information to allocate resources effectively and develop policies that support the needs of individuals with glaucoma. This may include funding for vision rehabilitation programs, psychological support services, and research into new treatments for glaucoma.[9,10] This study aimed to contribute to the existing body of knowledge on the impact of glaucoma severity on VRQoL by specifically focusing on a single center in Indonesia.

2. Methods

This cross-sectional study was conducted at the eye polyclinic of Dr. M. Djamil General Hospital, a tertiary referral hospital in Padang, West Sumatra, Indonesia. The study was conducted over three months, from June to August 2024. Ethical approval was obtained from the Research Ethics Committee of Dr. M. Djamil General Hospital (approval number DP.04.03/D.XVI.XI/223/2024) before the commencement of the study. The study adhered to the tenets of the Declaration of Helsinki, ensuring the

protection of human subjects and their rights. The study population comprised patients attending the Eye Polyclinic of Dr. M. Djamil General Hospital diagnosed with primary open-angle glaucoma (POAG). A total of 54 participants were included in this study. To ensure the representation of different stages of glaucoma, the sample was stratified into three groups based on disease severity: mild, moderate, and severe, with 18 individuals in each group. This stratification allowed for a more nuanced analysis of the relationship between disease severity and quality of life.

Participants were included in the study based on the following criteria; Age: over 19 years; Diagnosis: Confirmed diagnosis of POAG; Visual Acuity: Best-corrected visual acuity (BCVA) of at least 1/60 in the better eye; Cooperation: Ability to understand and complete the NEI-VFQ 25 questionnaire. The age range was selected to capture the working-age population and those in their early senior years, as glaucoma can significantly impact their quality of life and productivity. Participants were excluded from the study if they met any of the following criteria; History of intraocular surgery (vitreoretinal, ocular trauma, reconstructive oncology surgery, and oculoplasty) within the last three months; Presence of ocular inflammation; Other retinal and optic nerve pathologies besides glaucoma; Presence of systemic diseases such as end-stage heart disease, end-stage renal disease, stroke, or malignancies. These exclusion criteria were implemented to minimize the influence of confounding factors on the assessment of quality of life.

The diagnosis of POAG was established based on comprehensive ophthalmological examinations, including; Optic Nerve Head Assessment: Evaluation of the optic nerve head was performed using slit-lamp biomicroscopy and fundus photography. The cup-to-disc ratio (CDR) was used as a primary parameter to assess the structural damage to the optic nerve; Visual Field Testing: Standard Automated Perimetry (SAP) using the Humphrey Field Analyzer (Carl Zeiss Meditec, Dublin, CA) was employed to evaluate the visual field. The Visual Field Index (VFI) was used to quantify the severity of functional loss; Gonioscopy: Gonioscopy was performed to confirm the presence of an open anterior chamber angle, a defining characteristic of POAG. The severity of glaucoma was graded based on the CDR and VFI values, categorized as follows; Mild Glaucoma: CDR < 0.65 and/or VFI > 91%; Moderate Glaucoma: CDR between 0.70 and 0.85 and/or VFI between 78% and 91%; Severe Glaucoma: CDR > 0.90 and/or VFI ≤ 78%. This classification system, integrating both structural and functional parameters, provides a comprehensive assessment of glaucoma severity.

The Indonesian version of the National Eye Institute Visual Function Questionnaire (NEI-VFQ 25) was used to assess the vision-related quality of life (VRQoL) of the participants. The NEI-VFQ 25 is a well-validated instrument comprising 25 items that evaluate various aspects of visual function and their impact on daily activities, social functioning, and mental well-being. The questionnaire was administered to the participants through face-to-face interviews conducted by trained research personnel. The interviewers were blinded to the severity of glaucoma to prevent bias in the administration and interpretation of the questionnaire. Participants were guided through each item of the questionnaire, and their responses were recorded accurately.

Statistical analysis was performed using SPSS software (version 25.0, IBM Corp., Armonk, NY). Descriptive statistics were used to summarize the demographic and clinical characteristics of the study participants. The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. One-way analysis of variance (ANOVA) was used to compare the mean VRQoL scores among the three groups of glaucoma severity. Post hoc tests, such as the Tukey's Honestly Significant Difference (HSD) test, were performed to identify specific group differences if the ANOVA results were significant. Spearman's rank correlation coefficient was used to assess the correlation between glaucoma severity and the composite VRQoL score, as well as the individual

subscale scores of the NEI-VFQ 25. This non-parametric test was chosen due to the ordinal nature of the glaucoma severity classification. A p-value of less than 0.05 was considered statistically significant for all analyses.

3. Results

Table 1 presents the demographic and clinical characteristics of the 54 participants included in the study. The mean age of the participants was 48.2 years with a standard deviation of 12.6, indicating a fairly wide age distribution. The majority of participants fell within the 40-59 age range (55.6%), with a smaller proportion of younger (<40 years) and older (>60 years) individuals. A higher proportion of participants were female (63%) compared to male (37%). More than half of the participants were employed (55.6%), while the remaining 44.4% were unemployed. This information provides some context regarding the potential impact of glaucoma on daily activities and socioeconomic status. While the majority of participants had POAG (50%), a significant proportion also had juvenile open-angle glaucoma (JOAG - 44.4%). A small percentage (5.6%) had normal-tension glaucoma (NTG). This distribution highlights the diversity of glaucoma types included in the study. The participants were equally distributed across the three severity groups (mild, moderate, and severe), with 33.3% in each group. This equal distribution was intentional to allow for meaningful comparisons between the groups. The mean duration since diagnosis was 3.5 years with a standard deviation of 2.1 years. Most participants were diagnosed within the past 1-6 years (44.4%), with a smaller proportion diagnosed less than a year ago (14.8%) or more than 7 years ago (35.2%).

Table 1. Participants characteristics.

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
Mean ± SD	48.2 ± 12.6	
<40	13	24.1
40-49	15	27.8
50-59	12	22.2
≥60	14	25.9
Gender		
Male	20	37.0
Female	34	63.0
Occupation		
Employed	30	55.6
Unemployed	24	44.4
Diagnosis		
POAG	27	50.0
JOAG	24	44.4
NTG	3	5.6
Glaucoma severity		
Mild	18	33.3
Moderate	18	33.3
Severe	18	33.3
Years since diagnosis (years)		
Mean ± SD	3.5 ± 2.1	
<1	8	14.8
1-3	12	22.2
4-6	15	27.8
≥7	19	35.2

Table 2 presents the mean scores and standard deviations for each subscale of the NEI-VFQ 25, as well as the composite VRQoL score. These scores provide insights into the various aspects of vision-related quality of life among the participants. The lowest scores were observed in the "General health" (54.62 ± 20.64) and "Mental health" (68.52 ± 25.41) subscales. This suggests that glaucoma may be impacting the overall well-being and mental health of the participants. Subscales related to visual function, such as "General vision" (73.98 ± 18.46), "Near vision" (82.01 ± 21.39), and "Far vision" (81.62 ± 21.01), showed relatively higher scores, indicating that participants retain some degree of visual function. The "Social function" subscale had a high score (87.88 ± 18.91), suggesting that glaucoma may have a lesser impact on social interactions compared to other aspects of life. "Dependence on others" (78.54 ± 26.03) and "Driving" (74.77 ± 22.30) had moderate scores, indicating that glaucoma may be affecting the participants' independence in certain activities. The highest scores were observed in "Color vision" (94.44 ± 14.29) and "Peripheral vision" (81.48 ± 24.37), suggesting that these aspects of vision may be relatively less affected by glaucoma. The overall composite VRQoL score was 75.82 ± 15.63. This provides a general indication of the overall impact of glaucoma on the quality of life of the participants.

Table 2. VRQoL scores.

VFQ subscale	**Mean ± SD**
General health	54.62 ± 20.64
General vision	73.98 ± 18.46
Eye pain	63.65 ± 20.78
Near vision	82.01 ± 21.39
Far vision	81.62 ± 21.01
Social function	87.88 ± 18.91
Mental health	68.52 ± 25.41
Role limitations	73.14 ± 25.62
Dependence on others	78.54 ± 26.03
Driving	74.77 ± 22.30
Color vision	94.44 ± 14.29
Peripheral vision	81.48 ± 24.37
VRQoL composite score	**75.82 ± 15.63**

Table 3 presents the results of the statistical analysis comparing VRQoL scores across different glaucoma severity groups. As glaucoma severity increased, the mean VRQoL score decreased; Mild glaucoma: 85.04 ± 10.52; Moderate glaucoma: 81.79 ± 10.42; Severe glaucoma: 60.63 ± 13.04 This suggests a trend where more severe glaucoma is associated with a lower overall quality of life related to vision. The post hoc Test (p-value) test helps determine where the significant differences lie between specific groups. The p-value of 0.736 indicates that there was no statistically significant difference in VRQoL scores between the mild and moderate glaucoma groups. This suggests that the impact on quality of life might not be significantly different in the early stages of glaucoma. The p-value of 0.000 indicates a highly statistically significant difference between the mild and severe glaucoma groups. This strongly suggests that severe glaucoma has a significantly greater negative impact on VRQoL compared to mild glaucoma. The p-value of 0.000 also indicates a highly statistically significant difference between the moderate and severe glaucoma groups. This reinforces the finding that severe glaucoma has a more substantial negative impact on VRQoL compared to less severe stages.

Table 3. The statistical significance of the differences between VRQoL scores across glaucoma severity groups.

Severity	Mean VRQoL Score ± SD	Post-Hoc Test (p-value)
Mild	85.04 ± 10.52	Mild vs. Moderate: 0.736
		Mild vs. Severe: 0.000
Moderate	81.79 ± 10.42	Moderate vs. Severe: 0.000
Severe	60.63 ± 13.04	-

Table 4 presents the results of the correlation analysis between glaucoma severity and the various subscales of the NEI-VFQ 25, as well as the composite VRQoL score. The correlation coefficients (r) range from -0.236 to -0.667. All the coefficients are negative, indicating an inverse relationship between glaucoma severity and VRQoL. This means that as glaucoma severity increases, the scores on the VRQoL subscales tend to decrease. The strength of the correlation varies across the subscales. The strongest correlation is observed for the composite VRQoL score (r = -0.667), followed by "Social function" (r = -0.573) and "Dependence on others" (r = -0.558). This suggests that these aspects of quality of life are most strongly affected by the severity of glaucoma. Moderate correlations are observed for subscales such as "Near vision" (r = -0.548), "Far vision" (r = -0.463), "Mental health" (r = -0.455), "Role limitations" (r = -0.448), "Peripheral vision" (r = -0.473), and "Color vision" (r = -0.429). Weaker correlations are observed for "General vision" (r = -0.301) and "Driving" (r = -0.325). "General health" (r = -0.236) and "Eye pain" (r = -0.198) show the weakest correlations with glaucoma severity. Most of the subscales and the composite VRQoL score show statistically significant correlations with glaucoma severity ($p < 0.05$). This indicates that the observed correlations are unlikely to be due to chance. "General health" (p = 0.086) and "Driving" (p = 0.080) are the only subscales that do not show statistically significant correlations with glaucoma severity.

Table 4. Correlation analysis.

VFQ subscale	Correlation coefficient (r)	p-value
General health	-0.236	0.086
General vision	-0.301	0.027
Eye pain	-0.198	0.151
Near vision	-0.548	0.000
Far vision	-0.463	0.000
Social function	-0.573	0.000
Mental health	-0.455	0.001
Role limitations	-0.448	0.001
Dependence on others	-0.558	0.000
Driving	-0.325	0.080
Color vision	-0.429	0.001
Peripheral vision	-0.473	0.000
VRQoL composite score	-0.667	0.000

4. Discussion

Our study unequivocally demonstrates a significant inverse correlation between the severity of glaucoma and vision-related quality of life (VRQoL) scores. This observation aligns with a substantial body of research that has documented similar trends. To elaborate, as glaucoma progresses and becomes more severe, individuals experience a greater loss of their visual field. This visual field loss, in turn, leads to difficulties in performing various daily activities that

most people take for granted. These activities include reading, recognizing faces, and navigating their surroundings. The challenges posed by these functional limitations extend beyond mere inconvenience. They can contribute to a decreased sense of independence, as individuals may find themselves increasingly reliant on others for assistance. This can lead to social isolation, as the ability to engage in social activities and maintain relationships may be compromised. Furthermore, the cumulative effect of these challenges can result in emotional distress, including feelings of frustration, anxiety, and depression. Ultimately, these factors combine to have a significant negative impact on an individual's overall quality of life. The significant difference in VRQoL scores observed between the mild and severe glaucoma groups in our study serves to underscore the critical importance of early detection and treatment of glaucoma. By taking proactive measures to prevent or delay the progression of the disease, we can effectively mitigate its detrimental effects on quality of life. While our study did not find a statistically significant difference in VRQoL scores between the mild and moderate glaucoma groups, the consistent decline in scores across the spectrum of disease severity is a crucial observation. It suggests that even in its early stages, glaucoma can exert a measurable impact on an individual's quality of life. This underscores the need for a comprehensive approach to eye care that goes beyond simply addressing the physical aspects of the disease. It highlights the importance of incorporating patient education and counseling into glaucoma management to proactively address the potential impact of the disease on daily living and overall well-being, even in cases where the disease is still in its mild stages. In essence, our findings reinforce the understanding that glaucoma is not just an eye disease, it is a condition that can profoundly affect various facets of a person's life. By recognizing the far-reaching impact of glaucoma, healthcare professionals can adopt a more holistic approach to disease management, prioritizing not only the preservation of vision but also the maintenance of overall quality of life. The impact of glaucoma on daily activities can be far-reaching and significantly affect an individual's quality of life. As glaucoma progresses, central and/or peripheral vision loss can make it difficult to read, even with glasses. This can affect activities like reading newspapers, books, medication labels, and even text messages. Individuals may experience eye strain, headaches, and difficulty focusing on the text. This can lead to frustration, decreased enjoyment of reading, and difficulty staying informed. Recognizing faces is a crucial aspect of social interaction. However, glaucoma can impair this ability, making it difficult to identify friends, family members, and colleagues. This can lead to social awkwardness, anxiety, and feelings of isolation. Navigating the environment, both indoors and outdoors, can become challenging with glaucoma. Peripheral vision loss can make it difficult to detect obstacles, steps, and changes in terrain. This can increase the risk of falls, injuries, and accidents. Individuals may feel less confident and more dependent on others for assistance with mobility. Cooking and meal preparation can become more difficult with vision loss. Measuring ingredients, chopping vegetables, and monitoring cooking times can be challenging, increasing the risk of burns and cuts. Individuals may become less inclined to cook, leading to changes in diet and potentially affecting their nutritional intake. Activities like grooming, dressing, and applying makeup can be affected by vision loss. Individuals may struggle to see fine details, leading to difficulties with tasks like shaving, applying eyeliner, or buttoning clothes. This can affect self-esteem and confidence. Many hobbies and leisure activities rely on good vision. Glaucoma can make it difficult to engage in activities like knitting, gardening, playing sports, or watching movies. This can lead to a loss of enjoyment and a decreased ability to participate in activities that were once meaningful. Healthcare professionals should be aware of the wide-ranging impact of glaucoma on daily activities and proactively address these challenges with their patients. Encouraging open communication about the

challenges faced by patients can help identify specific areas where support is needed. Providing access to vision rehabilitation services can help individuals maximize their remaining vision and learn adaptive techniques for daily living. Offering counseling and support can help individuals cope with the emotional and psychological impact of vision loss. Connecting patients with community resources, such as support groups and transportation services, can help them maintain their independence and social connections. By addressing the impact of glaucoma on daily activities, healthcare professionals can help individuals with glaucoma maintain their quality of life and live full and meaningful lives despite the challenges of the disease.[11,12]

A striking finding in our research was the strong correlation between the severity of glaucoma and the social function subscale. This observation underscores the profound impact that glaucoma can have on an individual's ability to actively participate in social activities and maintain meaningful social relationships. To understand this connection, it's important to recognize that visual impairment, a hallmark of glaucoma, can lead to significant difficulties in social interactions. These difficulties can manifest in various ways, such as struggling to read facial expressions, navigate social settings, and engage in conversations. The inability to decipher subtle cues like facial expressions can lead to misunderstandings and misinterpretations in social interactions. It can create a sense of disconnect and hinder the ability to build rapport with others. Navigating social settings, whether it's a crowded room or a simple walk down the street, can become a daunting task for someone with visual impairment. The fear of bumping into objects or people, getting lost, or being unable to identify familiar faces can lead to anxiety and reluctance to participate in social gatherings. Furthermore, engaging in conversations can be challenging when visual cues are limited. Following the flow of conversation, identifying who is speaking, and interpreting body language become more difficult, potentially leading to feelings of exclusion and frustration. Over time, these challenges can lead to social withdrawal and isolation. Individuals with glaucoma may start to avoid social situations altogether, leading to a decline in their social connections and support networks. This isolation can further contribute to feelings of inadequacy and loneliness, ultimately impacting their overall quality of life. In addition to the impact on social function, our study also revealed a strong correlation between glaucoma severity and the dependence on others subscale. This finding highlights the growing reliance on others for assistance with everyday tasks as the disease progresses. Tasks that most people take for granted, such as reading, cooking, or getting dressed, can become increasingly difficult with impaired vision. This loss of independence can have a profound impact on an individual's self-esteem and sense of autonomy. It can lead to feelings of helplessness, frustration, and a loss of control over their own lives. Moreover, the increasing dependence on others can strain relationships with family and friends. Caregivers may experience burnout and frustration, while individuals with glaucoma may feel like a burden to their loved ones. This dynamic can further contribute to social withdrawal and isolation, exacerbating the negative impact on quality of life.[13,14]

Our study revealed that the subscales related to general health and mental health had the lowest scores among the participants. This is a significant finding, as it indicates that glaucoma may be having a profound impact on the overall well-being and mental health of those living with the condition. To fully appreciate the significance of this finding, it's important to understand the multifaceted ways in which glaucoma can affect mental health. The fear of blindness, a very real concern for many glaucoma patients, can be a significant source of anxiety and distress. The progressive nature of the disease, coupled with the knowledge that vision loss is irreversible, can lead to feelings of helplessness, fear, and uncertainty about the future. Furthermore, the burden of treatment can also take a toll on mental

health. Glaucoma requires ongoing management, often involving daily eye drops, regular check-ups, and sometimes surgery. Adhering to these treatment regimens can be challenging and time-consuming, adding another layer of stress to patients' lives. The financial burden of treatment, especially for those without adequate insurance coverage, can also contribute to anxiety and worry. Living with a chronic condition like glaucoma presents numerous challenges that can affect mental well-being. The gradual loss of vision can lead to difficulties in performing daily activities, impacting independence and social interactions. These challenges can contribute to feelings of frustration, isolation, and a diminished sense of self-worth. The link between glaucoma and mental health is well-documented in the literature. Studies have shown that individuals with glaucoma are at a higher risk of experiencing anxiety, depression, and other mental health issues. The chronic stress associated with the disease, coupled with the challenges of adjusting to vision loss, can significantly impact emotional well-being. Our findings, along with the existing body of research, underscore the critical importance of integrating mental health support into glaucoma management. Addressing the psychological and emotional impact of the disease is just as important as managing the physical aspects of the condition. Healthcare professionals should be attuned to the mental health needs of their glaucoma patients. This includes routine screening for anxiety and depression, providing emotional support and counseling, and referring patients to mental health specialists when necessary. Support groups and other community resources can also play a vital role in helping individuals cope with the emotional challenges of living with glaucoma. By recognizing and addressing the mental health impact of glaucoma, we can provide more holistic and patient-centered care. This approach not only improves the overall well-being of individuals with glaucoma but also empowers them to actively participate in their own care and maintain the best possible quality of life.[15,16]

In our study, while the subscales related to visual function generally showed higher scores compared to those assessing general health and mental health, the moderate correlations we observed between these subscales and glaucoma severity suggest that visual impairment plays a significant role in the decline of VRQoL. It's essential to recognize that difficulties with near and far vision can have a cascading effect on various aspects of daily life. These difficulties can affect the ability to engage in activities that many people take for granted, such as reading, watching television, and navigating their surroundings. The impact of these challenges extends beyond mere inconvenience, they can impinge on an individual's independence and overall quality of life. For instance, someone with impaired near vision might struggle to read medication labels, prepare meals, or engage in hobbies that require close-up work. Similarly, difficulties with far vision can make it challenging to recognize faces, navigate safely in crowded environments, or appreciate the beauty of the natural world. These limitations can lead to feelings of frustration, dependence on others, and a reduced ability to participate fully in life, ultimately affecting overall quality of life. Interestingly, our study found a non-significant correlation between glaucoma severity and the driving subscale. This finding, while somewhat unexpected, can be attributed to several factors. One crucial factor is the diversity of our study participants, who had varying levels of driving experience and dependence on driving for their daily activities. Some participants might have been experienced drivers who had developed compensatory strategies to cope with their visual field loss, while others might have been less frequent drivers or had access to alternative modes of transportation. Another crucial factor to consider is the nature of the NEI-VFQ 25 driving subscale itself. This subscale, while useful in assessing general concerns about driving, may not fully capture the complex interplay of visual and cognitive factors that influence driving ability in individuals with glaucoma. It may not adequately assess specific driving-related challenges, such as

difficulty with night driving, glare sensitivity, or judging distances, which can be particularly problematic for glaucoma patients. To gain a more comprehensive understanding of the impact of glaucoma severity on driving behavior and related quality of life, further research employing more specific driving assessments is needed. Such assessments could include on-road driving tests, driving simulators, or specialized questionnaires that delve deeper into the specific visual and cognitive challenges faced by drivers with glaucoma.[17,18]

Our findings have significant implications for clinical practice, emphasizing the need for a more holistic and patient-centered approach to glaucoma management. This approach should consider not only the clinical parameters of the disease but also its profound impact on patients' daily lives and overall well-being. Incorporating routine assessment of vision-related quality of life (VRQoL) in glaucoma patients is crucial. This goes beyond casual inquiries about their well-being and necessitates the use of validated instruments, such as the NEI-VFQ 25, to systematically evaluate the impact of glaucoma on various aspects of patients' lives. These aspects include their visual function, social interactions, mental health, and independence. By routinely assessing VRQoL, healthcare providers gain valuable insights into the unique challenges faced by each patient. This enables them to identify individuals who may be struggling with the disease's impact and who could benefit from additional support and tailored interventions. Vision rehabilitation encompasses a range of services and devices designed to help individuals with vision loss optimize their remaining vision and adapt to their changing visual abilities. Magnifiers, specialized glasses, and other assistive devices can help individuals perform daily tasks with greater ease and independence. Occupational therapists can provide training in adaptive techniques for daily living, such as navigating the home environment, using public transportation, and managing medications. Glaucoma can significantly impact mental health, leading to anxiety, depression, and other emotional challenges. Providing access to psychological counseling can be instrumental in helping patients. Counselors can help patients develop coping strategies to manage the emotional and psychological challenges associated with living with glaucoma. Counseling can provide a safe and supportive space for patients to express their feelings, address their concerns, and develop strategies for managing their emotional well-being.By addressing the mental health impact of glaucoma, psychological counseling can contribute to an improved overall quality of life. Connecting with others who share similar experiences can be invaluable for individuals with glaucoma. Patients can share their experiences, challenges, and triumphs with others who understand what they are going through. Support groups can be a valuable source of information about glaucoma, its management, and available resources. Connecting with others can help combat feelings of isolation and loneliness, fostering a sense of belonging and shared purpose. By proactively addressing the impact of glaucoma on patients' quality of life, healthcare providers can empower them to navigate the challenges of the disease more effectively. This approach enables patients to maintain the best possible level of functioning and well-being, ensuring that they not only live with glaucoma but thrive despite it. Our findings have significant implications for public health initiatives aimed at reducing the burden of glaucoma in the community. A major obstacle in glaucoma management is the lack of awareness among the general population. Many people are unaware of the risks, symptoms, and potential consequences of glaucoma, leading to delayed diagnosis and treatment. This delay can have devastating consequences, as glaucoma is a leading cause of irreversible blindness worldwide. Public health campaigns should prioritize educating the public about glaucoma, using clear and accessible language to explain the disease, its risk factors, and the importance of early detection. Regular comprehensive eye exams are crucial for detecting glaucoma in its early stages, even before noticeable

symptoms appear. Certain groups are at higher risk of developing glaucoma, including individuals over the age of 40, those with a family history of glaucoma, people of African or Hispanic descent, and individuals with certain medical conditions, such as diabetes and high blood pressure. While early-stage glaucoma often has no noticeable symptoms, it's important to be aware of potential warning signs, such as gradual loss of peripheral vision, seeing halos around lights, and eye pain. By increasing public awareness about glaucoma, we can empower individuals to take proactive steps to protect their vision and seek timely medical attention when necessary. Early detection of glaucoma is paramount for preserving vision and preventing irreversible damage. Public health initiatives should focus on encouraging individuals to get their eyes checked regularly, even in the absence of noticeable symptoms. Collaborating with community health centers, eye care providers, and other organizations can help expand the reach of glaucoma screening programs. Offering free or low-cost glaucoma screenings can remove financial barriers to early detection, particularly for underserved populations. Focusing outreach efforts on high-risk populations can increase the effectiveness of early detection programs. By promoting early detection, we can ensure that individuals with glaucoma receive timely treatment, minimizing the risk of vision loss and its associated impact on quality of life. Access to quality eye care is essential for the effective management of glaucoma. However, many people, especially those in underserved communities, face significant barriers to accessing affordable and timely eye care services. Supporting initiatives that provide access to affordable eye care services, such as community health clinics and vision insurance programs, can help remove financial barriers to care. Strengthening community health programs that offer eye care services can improve access to care, particularly in underserved areas. Advocating for policies that improve access to eye care for all, such as expanding insurance coverage and increasing funding for community health programs, can help ensure that everyone has the opportunity to receive the care they need. By improving access to care, we can reduce health inequities and ensure that everyone, regardless of their socioeconomic status or geographic location, has the opportunity to receive timely and effective glaucoma treatment. Investing in public health initiatives that prioritize awareness, early detection, and access to care is a crucial step towards reducing the burden of glaucoma in our communities. By empowering individuals with knowledge, promoting early detection, and removing barriers to care, we can help individuals with glaucoma maintain their vision and quality of life.[19,20]

5. Conclusion

This study confirms that the severity of primary open-angle glaucoma (POAG) has a significant impact on vision-related quality of life (VRQoL) in patients. Specifically, more severe glaucoma is strongly correlated with lower VRQoL scores. This highlights the detrimental effect of advancing glaucoma on patients' overall well-being and daily functioning. Our findings also indicate that social functioning is particularly vulnerable to the effects of glaucoma. This underscores the importance of considering the social implications of the disease, in addition to its physical effects, when managing patients with POAG. Importantly, even patients with mild glaucoma may experience a measurable impact on their quality of life. This emphasizes the need for early and comprehensive glaucoma management to mitigate the disease's effects and preserve patients' quality of life, even in the initial stages of the disease. In conclusion, this study provides valuable insights into the relationship between POAG severity and VRQoL. Our findings have important implications for clinical practice and public health initiatives, highlighting the need for a holistic approach to glaucoma management that considers both the clinical and psychosocial aspects of the disease.

6. References

1. Cheng H-C, Guo C-Y, Chen M-J, Ko Y-C, Huang N, Liu CJ-L. Patient-reported vision-related quality of life differences between superior and inferior hemifield visual field defects in primary open-angle glaucoma. JAMA Ophthalmol. 2015; 133(3): 269–75.
2. Kumar S, Ichhpujani P, Singh R, Thakur S, Sharma M, Nagpal N. The impact of primary open-angle glaucoma: Quality of life in Indian patients. Indian J Ophthalmol. 2018; 66(3): 416–9.
3. Napo A, Kéita F, Guirou N, Boro A, Aboubacar H, Konandji F, et al. Assessment of quality of life in patients with primary open-angle glaucoma in urban areas. Mali Med. 2019; 34(3): 34–8.
4. Napo A, Kéita F, Guirou N, Boro A, Aboubacar H, Konandji F, et al. Assessment of quality of life in patients with primary open-angle glaucoma in urban areas. Mali Med. 2019; 34(3): 34–8.
5. Kumar S, Thakur S, Ichhpujani P. The impact of primary open-angle glaucoma: Comparison of vision-specific (National Eye Institute Visual Function Questionnaire-25) and disease-specific (Glaucoma Quality of Life-15 and Viswanathan 10) patient-reported outcome (PRO) instruments. Indian J Ophthalmol. 2019; 67(1): 83–8.
6. Marino PF, Rossi GCM, Campagna G, Capobianco D, Costagliola C, On Behalf Of Qualicos Study Group. Effects of citicoline, homotaurine, and vitamin E on contrast sensitivity and visual-related quality of life in patients with primary open-angle glaucoma: a preliminary study. Molecules. 2020; 25(23): 5614.
7. Sesar I, Pušić-Sesar A, Jurišić D, Sesar A, Merdžo I, Ćavar I. Health-related quality of life in primary open-angle glaucoma patients. Acta Clin Croat. 2020; 59(4): 623–31.
8. Zhang Y, Bian A, Hang Q, Zhou Q. Optical quality assessed by Optical Quality Analysis System in Chinese primary open-angle glaucoma patients and its correlations with psychological disturbances and vision-related quality of life. Ophthalmic Res. 2021; 64(1): 15–21.
9. Song D, Jiang JH, Chen YZ, Zhou WH, Zhang SD, Ye C, et al. Quality of life of patients with primary open-angle glaucoma based on EQ-5D in Wenzhou. Zhonghua Yan Ke Za Zhi. 2021; 57(3): 207–14.
10. Samuelson TW, Singh IP, Williamson BK, Falvey H, Lee WC, Odom D, et al. Quality of life in primary open-angle glaucoma and cataract: An analysis of VFQ-25 and OSDI from the iStent inject® pivotal trial. Am J Ophthalmol. 2021; 229: 220–9.
11. Oduneye FC, Musa KO, Agboola SA, Idowu OO, Onakoya AO. The quality of life of medically versus surgically treated primary open-angle glaucoma patients at a Nigerian hospital. Middle East Afr J Ophthalmol. 2022; 29(1): 7–14.
12. Nayyar S, Kumar S, Rehman O, Ichhpujani P, Singla E. Impact of moderate and severe primary open-angle glaucoma on quality of life due to activity limitation. Indian J Ophthalmol. 2022; 70(2): 552–7.
13. Marceta E, Sarenac-Vulovic T, Petrovic N, Vulovic D, Trenki M, Randjelovic D, et al. Quality of life of patients with primary open-angle glaucoma, primary angle closure glaucoma, and pseudoexfoliation glaucoma in Central Serbia. Vojnosanit Pregl. 2023; 80(10): 852–9.
14. Ismail AMA, Saif HFAEA, Taha MM. Effect of alternate nostril breathing exercise on autonomic functions, ocular hypertension, and quality of life in elderly with systemic hypertension and high-tension primary open-angle glaucoma. Geriatr Nurs. 2023; 52: 91–7.

15. Gordon MO, Gao F, Burkland J, Huecker JB, Gardiner SK, Ramulu P, et al. Quality of life and primary open-angle glaucoma in the ocular hypertension treatment study. JAMA Ophthalmol. 2024; 142(10): 935–42.
16. Dayanand A, Muraraiah S, Naik YU, Khayoom NS. Pharmaco-therapeutic factors influencing the quality of life in patients on anti-glaucoma medications for the treatment of primary open-angle glaucoma: a cross-sectional study. TNOA J Ophthalmic Sci Res. 2024; 62(2): 191–6.
17. Floriani I, Quaranta L, Rulli E, Katsanos A, Varano L, Frezzotti P, et al. Health-related quality of life in patients with primary open-angle glaucoma. An Italian multicentre observational study. Acta Ophthalmol. 2015; 94(5): e278–86.
18. Bailey LA, Okereke OI, Kawachi I, Cioffi GA, Pasquale LR, Kang JH. Ophthalmic and glaucoma treatment characteristics associated with changes in health-related quality of life before and after newly diagnosed primary open-angle glaucoma in Nurses' Health Study participants. J Glaucoma. 2016; 25(3): e220-8.
19. Riva I, Legramandi L, Katsanos A, Oddone F, Rulli E, Roberti G, et al. Influence of sociodemographic factors on disease characteristics and vision-related quality of life in primary open-angle glaucoma patients: The Italian primary open angle glaucoma study (IPOAGS). J Glaucoma. 2018 Sep; 27(9): 776–84.
20. Chun YS, Sung KR, Park CK, Kim HK, Yoo C, Kim YY, et al. Comparison of vision-related quality of life between normal tension glaucoma and primary open-angle glaucoma. J Glaucoma. 2022; 31(5): 322–8.