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Social, personal and medical factors influencing treatment delay for patients with primary glaucoma during the COVID-19 pandemic: a qualitative interview study

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ABSTRACT

Background Primary glaucoma patients faced many difficulties that affected their treatment during the COVID-19 pandemic. Glaucoma treatment often starts with prescription eye-drops. However, delays in ophthalmic therapy often occur due to poor awareness of the dangers of glaucoma, which subsequently leads to irreversible visual field defects and eventual blindness.

Objective This study aimed to explore the social, personal and medical factors that contributed to barriers in the treatment of primary glaucoma during the COVID-19 pandemic, with the overarching goal of providing insights to develop measures that can identify the barriers of the treatment process and prevent consequent adverse outcomes.

Methods We adopted a phenomenological approach and used purposive sampling to recruit 122 patients into our study. Face-to-face, semistructured, one-on-one interviews were conducted in a private office. The data were analysed using Colaizzi's seven-step method. In cases where classification was difficult, consensus was reached among the three researchers who formed the core assessment team.

Results A total of 122 glaucoma patients experienced delayed pharmaceutical treatment during the outbreak. Delays were longer among females and patients over 75 years old, highlighting that treatment delays were a significant issue for glaucoma patients during the COVID-19 pandemic, particularly for older females. Coding of the transcripts yielded three themes (eight subthemes): (1) the impact of social support on glaucoma pharmaceutical treatment: (a) the inability to seek pharmaceutical treatment alone and (b) online reservation and payment requirements; (2) the impact of personal reasons on glaucoma pharmaceutical treatment: (c) fear of being infected with COVID-19, (d) being infected with COVID-19 or coming into contact with COVID-19 patients, (e) being busy with work or life; (3) the impact of medical resources on glaucoma pharmaceutical treatment: (f) abnormal diagnosis and treatment processes, (g) insufficient medical manpower and (h) insufficient communication from medical staff.

Conclusions To prevent medication delays and potential irreversible damage to the visual field in primary glaucoma patients during health crises, it is essential to further explore personalised strategies for coping with the impact of pandemics. Special attention should be given to glaucoma patients facing significant life burdens, such as the elderly and females, and efforts should be made to increase their awareness of the risks of glaucoma. Future studies could explore the feasibility of providing more support to glaucoma patients, such as online payment and appointment scheduling options, to reduce delays and alleviate patient anxiety.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study is the first to identify the key treatment barriers faced by glaucoma patients during the COVID-19 pandemic.
⇒ Impartiality in data collection was ensured by the use of an interview guide.
⇒ Data saturation in purposive sampling was achieved, including age, sex, primary caregiver and health insurance.
⇒ The study was conducted entirely in China, and the findings may not be fully generalisable to other countries or regions.
⇒ Not all interviews were recorded, as some participants expressed concerns about having their conversations recorded.

INTRODUCTION

Glaucoma is a chronic eye disease characterised by progressive, irreversible damage to the optic nerve, leading to severe vision loss and eventual blindness. The primary modifiable risk factor for the onset and progression of glaucoma is intraocular pressure (IOP), and IOP reduction remains the cornerstone of glaucoma therapy.[1–3] Early intervention is crucial in glaucoma management, as it can significantly reduce

the disease burden and delay its progression. Glaucoma treatment primarily focuses on lowering IOP, either by decreasing aqueous humour production or enhancing its drainage through the trabecular meshwork and uveoscleral pathways.[4–6]

Globally, glaucoma is a major public health concern. The disability-adjusted life-years attributed to glaucoma increased by 81% from 1990 to 2017,[7] and approximately 70 million people were affected by the disease in 2020. Projections estimate that by 2040, the number of glaucoma patients will rise to 112 million, with 5.7 million visually impaired and 3.1 million blind as a result of the disease.[8] A systematic review and meta-analysis have further highlighted the growing burden of glaucoma, especially in China, where the disease burden is expected to increase significantly in the next three decades.[9]

The onset of the COVID-19 pandemic exacerbated the glaucoma burden, as restrictions implemented to prevent virus transmission led to the suspension of routine medical visits and procedures, including those for glaucoma patients.[10–14] The pandemic unfolded in two key stages in China: the initial outbreak in December 2019 in Wuhan, followed by the emergence of the Omicron variant in January 2022.[15–17] During this period, glaucoma treatment was severely affected, particularly due to delays in both medical consultations and elective procedures.[18] Laser and surgical treatments were often postponed for non-urgent cases, while medication therapy was maintained as essential.[19] However, inadequate or delayed medication therapy for glaucoma is associated with significant long-term risks, including irreversible vision loss.[20]

Gallo and Pack first described the concept of 'diagnosis and treatment delay' in cancer,[21] and the phrase was later used in other medical fields. Eissa *et al* divided medical delays in glaucoma treatment into three stages: patient delay, diagnosis delay and treatment delay.[22] Other studies have since categorised glaucoma medical delays into patient delay and healthcare provider delay, with the latter including delay in service for treatment and monitoring.[23] The concept of 'medical delay' became prominent during the COVID-19 pandemic. Non-urgent ophthalmologic care was largely suspended during the pandemic, and only patients with urgent or emergent problems were examined. Many glaucoma outpatient visits were cancelled, leading to the largest glaucoma medical delay in recent years.[10]

Many studies have indicated that patients' adherence to ocular hypertensive medication was affected by the pandemic.[24 25] In this study, we explored the potential effects of the pandemic on treatment delays by interviewing glaucoma patients to determine the underlying factors that led to such delays. Insights from our findings may help improve early interventions for glaucoma and reduce the incidence of consequent adverse outcomes.

METHODS

Study design

This qualitative study was conducted using a phenomenological approach. The analysis began with identifying key meanings, followed by the categorisation and interrelation of these meanings.[26] We conducted in-depth semi-structured interviews to collect information on barriers to pharmaceutical treatment during the COVID-19 pandemic. Our team members searched the PubMed electronic database in January 2022 using the following search terms: COVID-19 OR COVID 2019 OR COVID-19 AND glaucoma AND seeking care OR treatment delay OR compliance. The aim of this search was to generate a comprehensive list of factors leading to glaucoma patients' delays in pharmaceutical treatment. In addition, we combined the theory of purposive sampling,[27] including age, sex, primary caregiver and health insurance, to ensure that we had as rich data as possible. The Consolidated Criteria for Reporting Qualitative Research, a 32-item checklist, was used in our study.[28] The core research team (HL, WL and LS) reviewed all the coding, generated initial themes, developed themes and refined, defined and named the final themes.

Study participants

Participants were recruited through public announcements at the hospital between February and June 2022. Eligible participants were Chinese-speaking individuals. We conducted one-on-one phone conversations with all potential participants to confirm their availability for the interview and ensure they could arrive at the hospital on time. Participant recruitment continued until data saturation was reached. We invited 122 primary glaucoma patients at Tianjin Medical University Eye Hospital (a tertiary eye hospital in Tianjin, China) to participate in this study. The inclusion criteria were as follows: (1) a glaucoma diagnosis,[4] (2) having experienced a pharmaceutical treatment delay during the COVID-19 pandemic and (3) the willingness to discuss the barriers encountered in detail.

Confidentiality and anonymity were assured through anonymous interviews and the deidentification of all data during transcription. Written informed consent was obtained from the participants after providing a detailed explanation of the study. A senior researcher performed face-to-face, semistructured, one-on-one interviews in a private office. Each interview with a single patient lasted about 30–50 min, and APP XunFei Hearing was used to record and transcribe the text. If participants had concerns about the recording, the interviewer took handwritten notes directly. During the interview, non-linguistic expressions, such as facial expression, tone and gesture, were recorded by the interviewer.

Theoretical framework

In this study, we defined the term 'treatment delay' as the interval between the confirmed diagnosis of glaucoma and the initiation of therapy.[13] Our investigation focused

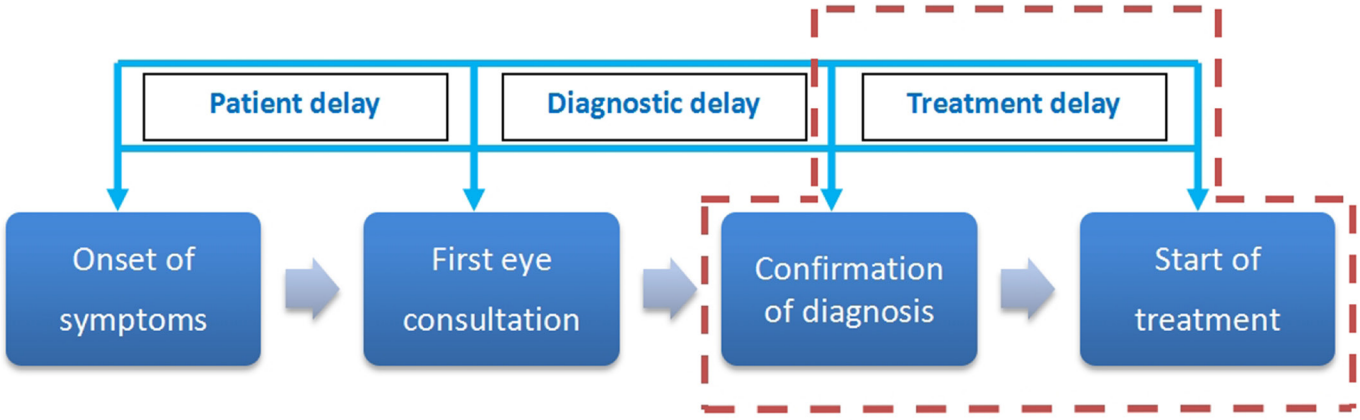

Figure 1 Theoretical basis of treatment delay. Our investigation of pharmaceutical treatment delay was conducted after the diagnosis of glaucoma.

on delays in pharmaceutical treatment. Our theoretical framework is shown in figure 1.

Interview guide and data collection

We developed a semistructured interview guide (online supplemental appendix 1) based on barriers to patient treatment during the COVID-19 pandemic. 10 glaucoma patients were interviewed in the pilot phase of the study to ensure that all the questions were comprehensible and clear. Each interview lasted 30–50 min and adhered to the interview outline. The interviewer received training in qualitative research. These 10 participants were excluded from the analysis. The interviews with the 122 participants began on 1 March 2022 and were completed on 22 July 2022.

Data analysis

A core research team consisting of a nursing management expert, a glaucoma expert and a nursing expert with a background in qualitative research was established. The anonymous transcripts were read multiple times to gain a comprehensive understanding of their content and to identify meaningful units. These units were then imported into NVivo V.12 software to highlight significant statements. The data were analysed using Colaizzi's seven-step method.[29] The meaning units were condensed, and similar content was assigned the same codes. Codes were compared based on their similarities and differences and categorised into subthemes and major themes. In cases where opinions were not unified regarding the clustering of themes, the core research team (HL, WL and LS) discussed the similarities and differences in the codes to reach a consensus on the classification.

Demographic information on the participants was analysed using the Wilcoxon rank-sum test and the Kruskal-Wallis H test. Analyses were performed with IBM SPSS Statistics V.27, and a $p<0.05$ was considered statistically significant.

Patient and public involvement

None.

RESULTS

The demographic information of the participants is presented in table 1, which shows their demographic characteristics and the duration of their pharmaceutical treatment delays.

The analysis of the interview transcripts yielded three major themes: (1) the impact of social support on glaucoma pharmaceutical treatment, (2) the impact of personal reasons on glaucoma pharmaceutical treatment and (3) the impact of medical resources on glaucoma pharmaceutical treatment. The frequency of each theme is shown in figure 2.

The impact of social support on glaucoma pharmaceutical treatment

The first major theme included two subthemes: the inability to seek pharmaceutical treatment independently (45/122, 36.89%) and difficulties with online reservations and payments (33/122, 27.05%). In this study, glaucoma treatment delays were longer among patients older than 75 years ($p<0.001$). 40 patients were aged ≥75 years. Among them, 25 patients (62.50%) indicated that they needed their children's help to travel to the hospital, undergo treatment procedures and make decisions regarding glaucoma treatment. Excerpts from the interviews illustrating the two aforementioned subthemes are shown in table 2.

The impact of personal reasons on glaucoma pharmaceutical treatment

The second major theme included three subthemes: fear of being infected with COVID-19 (51/122, 41.80%), fear of contact with COVID-19 patients (15/122, 12.30%) and being busy with work or life (9/122, 7.38%).

In this study, glaucoma treatment delays were longer among females than males ($p<0.05$). A difficulty frequently mentioned by female glaucoma patients was that their grandchildren, who were taking online classes at home during the COVID-19 pandemic,

Table 1 Demographic information of the participants

Patient group		Number of patients, n (%)	Median delay in days (minimum, maximum)	Wilcoxon rank sum test/ Kruskal-Wallis H test
Gender	Male	52 (42.6)	10 (3, 30)	
	Female	70 (57.4)	14 (5, 60)	Z=−2.006, p=0.045
Age (years)	≤40	5 (4.1)	5 (3, 14)	
	41–60	34 (27.9)	10 (3, 21)	
	61–74	43 (35.2)	10 (5, 30)	
	≥75	40 (32.8)	14 (6, 60)	χ^2=18.701, p<0.001
Caregiver	Spouse	103 (84.5)	12 (3, 60)	
	Children	7 (5.7)	14 (6, 31)	
	No one	6 (4.9)	13.5 (5, 30)	
	Parents	6 (4.9)	10 (3, 21)	χ^2=1.303, p=0.728
Medicare	Yes	115 (94.3)	12 (3, 60)	
	No	7 (5.7)	14 (7, 31)	Z=−1.313, p=0.189

needed to be looked after, so they were unable to visit the doctor regularly.

Among the 51 glaucoma patients who were worried about being infected with COVID-19, 31 (60.78%) said they would avoid going to the hospital if there was a risk of infection, and 5 (9.80%) mentioned that even if they went blind in one eye, they would still have vision in the other. Table 3 shows sample excerpts from the interviews illustrating the three aforementioned subthemes.

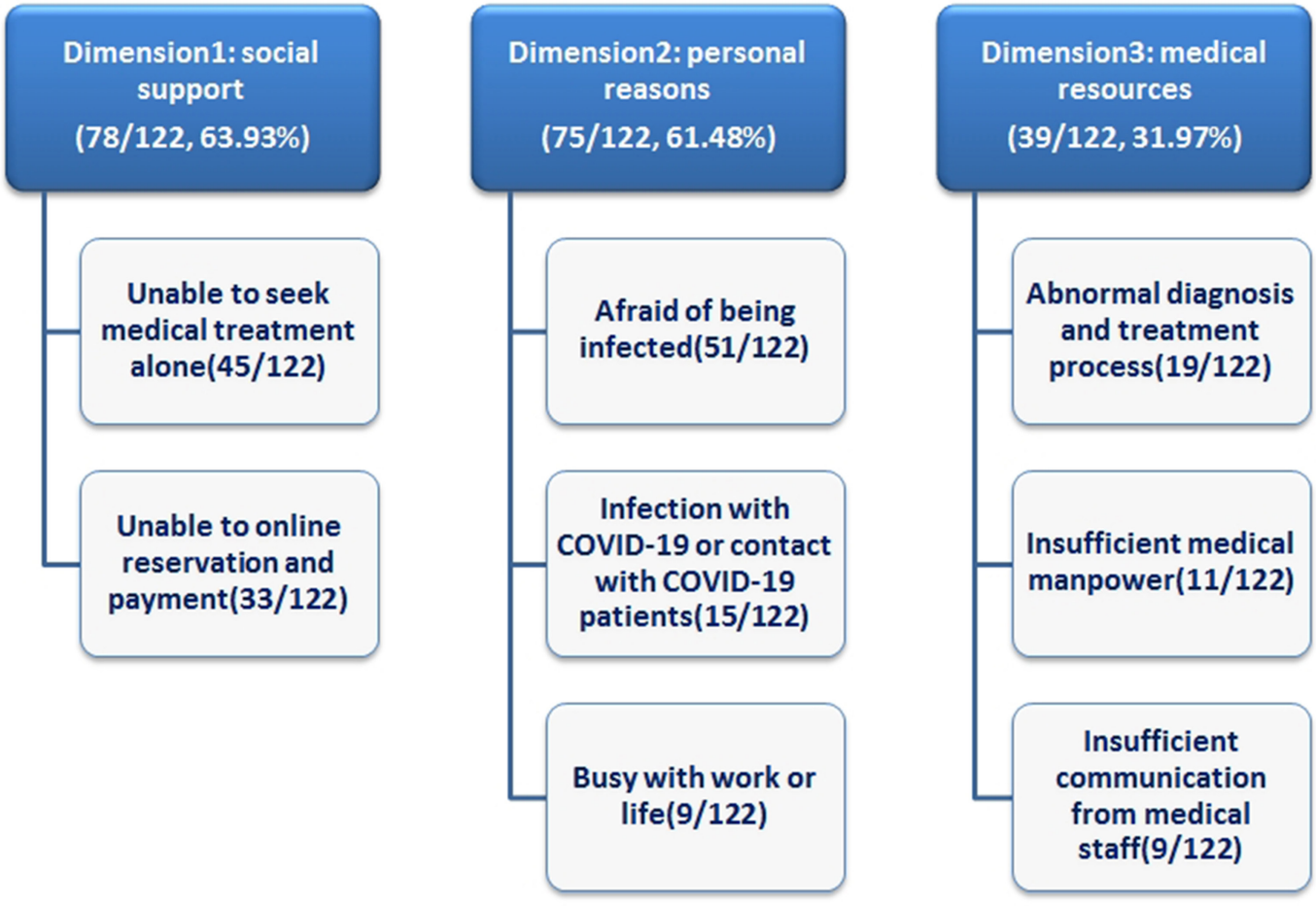

Figure 2 The frequency of the three major themes and the number of glaucoma patients involved in each subtheme.

Table 2 Major theme 1: the impact of social support on glaucoma pharmaceutical treatment

Subthemes	Content of the interview
Unable to seek medical treatment alone	During the epidemic, it was inconvenient to come to the hospital to get prescriptions because I was unwilling to take the bus. My child took leave and drove me there, so I had no choice but to wait for my child's day off. (P65)
	Entering the hospital required scanning a QR code to fill in information and presenting a health code, which I could not handle. Therefore, I needed to have my child accompany me to the hospital when they had free time. (P6)
	I have never been married, and now there is an epidemic. I feel that it is too difficult for me to go to the hospital alone for treatment. I will wait for the epidemic to improve so that my relatives accompany me. (P109)
Unable to make reservations or payments online	I don't know how to make an appointment. If I want to go to the hospital, I have to have the children accompany me. It depends on the children's availability. They are all very busy with work, and my daughter has to take care of her children, so she doesn't have time. (P81)

Table 3 Major theme 2: the impact of personal reasons on glaucoma pharmaceutical treatment

Subthemes	Content of the interview
Afraid of being infected	I am afraid of being infected and do not dare to go to the hospital to get prescriptions. There are too many patients in the hospital, and some even take off their masks to drink water, which is too dangerous. (P64)
	I am not sure if the hospital disinfection measures are sufficient. I entered into the hospital wearing gloves because I had to come into contact with many facilities, and I am not sure if there were any viruses on these facilities. (P36)
	I don't know if the hands of the medical staff are thoroughly disinfected. They will come into contact with me, and I am afraid of being infected. (P105)
Infection with COVID-19 or contact with COVID-19 patients	When I took a nucleic acid test, I found it to be positive and was transferred to a designated hospital for treatment by the medical emergency centre. My symptoms were not severe, but I had to wait in the hospital for negative test results. About 10 days later, I was sent home, but I couldn't go out. I was quarantined at home, waiting for a doctor to come and collect my nucleic acid test. This resulted in a delay of 20 days. (P75)
Busy with work or life	I am very busy with work. It was already difficult to find a job during the epidemic, and pharmaceutical treatment required me to take time to go to the hospital to get prescriptions. I still want to wait until the epidemic has passed and my work is stable before going for treatment. (P84)
	I was stuck out of town on a business trip due to the epidemic and didn't bring my eye medication with me. I waited for two weeks before returning home to start taking medication. (P40)
	My child is just half a year old, and no one can take care of him for me. I dare not take the child to the hospital to get prescriptions, so I can only wait for my husband to have a break before going to the hospital. (P50)
	During the epidemic, the school was suspended. My two grandchildren took online classes at home. I had to take care of them. (P15)

Table 4 Major theme 3: The impact of medical resources on glaucoma pharmaceutical treatment

Subthemes	Content of the interview
Abnormal diagnosis and treatment process	My doctor was quarantined at home due to the lockdown, and the appointment was scheduled with a substitute doctor, not the one I wanted to see. As soon as I saw this situation, I didn't get a prescription and wanted to wait until later. (P88)
	The doctor I had appointment with stopped receiving patients, and the hospital called to inform me about it and asked me to choose another doctor. I made a new appointment, which caused a delay of a few days. (P1)
Insufficient medical manpower	The medical staff were particularly busy, and I felt completely different from before the epidemic. They were all busy with disinfection, and I felt that medication treatment might not be the best choice during this period, so I haven't taken any medication. (P110)
	Many medical staff were sent out to provide support and there were only some on-duty medical staff in the hospital. I waited for about a month before the outpatient department returned to normal. (P74)
Insufficient communication from medical staff	My neighbourhood was on lockdown, and I was told that I could not go out. I called the hospital to cancel my appointment, but it took me a long time to get through. Afterwards, the hospital didn't contact me again, so the situation kept dragging on. (P94)
	When I saw a doctor at the outpatient clinic, I had many questions that were not yet answered. When I asked the doctor what to do if it was inconvenient to come for a follow-up examination, the doctor's answer was particularly vague. I thought I would wait until the epidemic improved a bit and not take medication in a hurry. (P26)
	The outpatient doctor was wearing a mask and a face shield, and there was a barrier on the medical instrument between me and the doctor. I couldn't hear clearly when the doctor spoke. I repeatedly asked the doctor questions, and the doctor's answers were very simple. I couldn't understand, so I didn't dare to take medication. (P121)
	My eyes have always been very good. Recently, because of COVID-19 prevention measures, drinking more water has led to high intraocular pressure. After a period of time, my eyes should be fine. (P53)

The impact of medical resources on glaucoma pharmaceutical treatment

The third major theme included three subthemes: abnormal diagnosis and treatment processes (19/122, 15.57%), insufficient medical manpower (11/122, 9.02%) and insufficient communication from medical staff (9/122, 7.38%). 11 glaucoma patients mentioned inadequate medical manpower, 6 had problems with the temporary closure of clinics and 4 rejected treatment options provided by other glaucoma doctors. Sample excerpts from the interviews illustrating the three aforementioned subthemes are shown in table 4.

DISCUSSION

This study explored patients' perspectives regarding primary glaucoma pharmaceutical treatment delays caused by the challenges encountered during the COVID-19 pandemic. Some difficulties identified here have not been reported in previous studies. For example, the patients interviewed noted that medical manpower was insufficient, which affected their treatment decisions. Children took online classes at home, which led to the burden of taking care of them, and it was inconvenient to go out for pharmaceutical treatment.

The pandemic prevention policy was a major influencing factor,[30] but patients appeared to accept the policy restrictions. Many even planned to treat their glaucoma once the outbreak was over, with half of the participants mentioning it and viewing it as an unavoidable circumstance. This factor suggested that treatment delay was severe during the COVID-19 epidemic.[11 24 31]

In previous studies,[12] researchers focused on various barriers faced by older glaucoma patients, such as medication availability, financial difficulties, side effects of eye-drops,

lockdown restrictions and transportation issues. However, no study has specifically addressed the impact of life and work burdens on glaucoma patients. In our study, patients aged 75 and above experienced the longest treatment delays. Most participants in this group reported that they lacked the ability to seek medical care independently and required assistance from their children, such as obtaining health codes and arranging private transportation to the hospital. According to the interviews, 33 patients expressed difficulty in using the electronic health code and self-service medical systems. Although hospital staff could provide assistance, patients were still apprehensive, which led to delays in seeking timely treatment. The delay times were similar between the 41–60 age group and the 61–74 age group, with a median delay of 10 days. The primary barrier for both groups was being busy with work or life, with the majority of patients in the 61–74 age group reporting that they needed to take care of their grandchildren.

In this study, we found that the majority of patients experienced relatively short delays in treatment. However, even delays of less than 60 days can have significant clinical implications for patients with advanced glaucoma or poorly controlled IOP. In such cases, even brief interruptions in treatment can lead to further damage to the optic nerve, potentially accelerating vision loss and resulting in additional visual field defects. This, in turn, can severely impact patients' quality of life and place a greater burden on their families and society as a whole. Therefore, even short delays should not be underestimated, especially in patients with more severe or progressing disease.

In addition, we found that female patients experienced a greater burden in daily life, as more of them mentioned heavy housework in interviews. This suggests that life burdens are a common factor contributing to treatment delays among glaucoma patients.[32] Delays were longer among females and patients over 75 years old, highlighting that treatment delays were a significant issue for glaucoma patients during the COVID-19 pandemic, particularly for older females.

Fear of being infected was the most important issue, mentioned by 41.8% of the patients, which is consistent with other research results.[33–35] However, these patients lacked awareness of the severity of glaucoma. Most patients stated that they did not feel the urgency in treating glaucoma because even if one eye was damaged, the other would maintain normal vision, and they were not aware that glaucoma could cause blindness. Additionally, there were misconceptions regarding glaucoma treatment among these patients, such as the belief that glaucoma does not require emergency treatment if it does not currently affect vision. In addition, six glaucoma patients mentioned that they did not accept the diagnosis of glaucoma, and reported that they had drunk large amounts of water to relieve symptoms (such as dry mouth and sore throat) of COVID-19 infection. They mistakenly attributed their IOP increase to excessive water intake. Believing that their IOP would naturally decrease once their infection symptoms subsided and their water consumption returned to normal, they refused to accept glaucoma treatment. This highlights significant misconceptions among glaucoma patients regarding the necessity of treatment and the potential risks of delaying it.

In the interviews, 11 patients mentioned inadequate medical manpower. The shortage of medical personnel was a serious global issue during the COVID-19 pandemic. Patients and medical staff responded differently to this insufficiency. Patients felt insecure, and medical staff were under significant pressure, creating a vicious cycle. This finding aligns with the findings of many studies.[36–38] According to this study, the theme of insufficient medical resources revealed that 30 patients experienced significant anxiety due to the temporary cancellation of outpatient services and the shortage of the medical staff. This ultimately led to a lack of confidence in treatment and delays in seeking care. During the COVID-19 pandemic, the prolonged shortage of manpower became the new normal. Therefore, addressing manpower shortages remains an urgent issue during epidemics.

Strengths and limitations

To the best of our knowledge, this is the first in-depth qualitative exploration of the treatment barriers experienced by glaucoma patients during the COVID-19 pandemic. Semistructured interviews were conducted in this study. Most participants were engaged during the interviews and were able to recall many details of the treatment delay process. Some participants deviated from the interview outline but still provided detailed descriptions, allowing the data to reach saturation quickly and ensuring that the interview results were meaningful.

The limitations of this study include the fact that all participants were recruited during the early emergence of the Omicron (BA.1) variant on 8 January 2022, in Tianjin, China, amid a large wave of infections. As a result, many patients suspended all outings, including eye clinic visits, leading to a smaller sample size than originally planned. However, this period highlighted the significant issue of delayed treatment among glaucoma patients, making the findings specifically reflective of the COVID-19 period.

Additionally, this approach does not fully capture the relative frequency of treatment delays among glaucoma patients during the COVID-19 pandemic. The findings may not fully represent the views of all participants, as some individuals, particularly those who were more vocal about their experiences, were eager to share their stories of delayed treatment, whereas others were less inclined to share their experiences.

CONCLUSIONS

Delays in ophthalmological treatment for glaucoma can lead to irreversible damage to visual function. The findings of this study highlight several factors contributing to treatment delays, including social, personal

and medical resource-related barriers, which were exacerbated during the COVID-19 pandemic. Based on these findings, we recommend identifying personalised strategies to mitigate the impact of pandemics on glaucoma care. Special attention should be given to patients facing significant life burdens, such as the elderly and females, and efforts should be made to increase their awareness of the risks of glaucoma. Future studies could explore the feasibility of providing more support to glaucoma patients, such as online payment and appointment scheduling options, to reduce delays and alleviate patient anxiety.

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Contributors HL acted as guarantor, she interviewed patients and was a major contributor in writing the manuscript. HL, WL and LS contributed to the study design, protocol, analysis and obtained ethical approval. YL, DH, JY and SH undertook recruitment and wrote the manuscript text. TB prepared figures 1 and 2. SL, PZ, QL, YX and JS transcribed the recording into the text. Data analysis was performed by SB. All authors read and approved the final manuscript.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the Medical Ethics Committee of Tianjin Medical University Eye Hospital: 2021KY(L)-60. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

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