Original Article

# A Pilot Study on Knowledge, Attitude, and Practice Regarding the Use of Dietary Supplements as Adjuvant Therapy for Glaucoma

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## ABSTRACT

**Purpose:** To find out knowledge, attitude, and practice among ophthalmologists regarding nutritional supplements in the management of glaucoma.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** Lotus Eye Hospital and the College of Optometry.

**Methods**: A questionnaire-based cross-sectional pilot study was conducted. All questions in the 4-section questionnaire were mandatory. A Google form was created to share the questionnaire with potential participants. The final questionnaire link was emailed, distributed, and posted on social media to ophthalmologists. Final analysis was done after the data was manually entered into an excel sheet. Chi-square test was used to find out any association of knowledge, attitude, and practice based on years of experience, gender, and place of practice. P value < 0.05 was considered statistically significant.

**Results:** Out of 156 ophthalmologists, there were 99 males and 57 females. The average age was 41.88±6.15 years. Only 57.5% had good to fair knowledge, 25% had a positive attitude towards the role of nutritional supplements in glaucoma management, and practice patterns showed that only 30% prescribed supplements. The commonly prescribed supplements were Lutein, Zeaxanthin, flavonoids, and Omega3. A statistically significant 73% of respondents worked in private hospitals and 27% in public hospitals (p=0.005). With standard glaucoma therapies, 58% of respondents with 6-10 years of experience did not prescribe nutritional supplements. Limitations of the study include included a relatively small sample of 156 ophthalmologists, limiting the generalizability of the findings to a broader population. The distribution of the questionnaire via email and social media may have introduced selection bias, as only those with internet access and willingness to participate were included. Reliance on self-reported responses may lead to response bias, as participants might overstate or understate their knowledge, attitudes, and practices. The study did not assess whether the use of nutritional supplements by the ophthalmologists led to improved patient outcomes, which limits the practical implications of the findings. Addressing these limitations in future studies, such as through larger sample sizes, randomized designs, and longitudinal approaches, could provide more robust and generalizable insights into the role of nutritional supplements in glaucoma management.

**Conclusion:** The study results indicate that only 1 in 3 ophthalmologists administer supplements as adjuvant therapy for glaucoma. Randomized controlled trials of nutritional supplements as glaucoma adjuvant therapy can improve ophthalmologists' knowledge, attitude, and practice.

**Key words:** Glaucoma, Ophthalmologist, Nutrition, knowledge, attitude, and practice.

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## INTRODUCTION

About 11.2 million Indians over the age of 40 years have glaucoma.[1] Glaucoma is a progressive optic neuropathy that causes retinal ganglion cell death.[2] High intraocular pressure (IOP), age, family history, high myopia, etc. are key risk factors for glaucoma. Despite normal IOP, many individuals proceed with normal-tension glaucoma (NTG).[3] One study found glaucomatous visual field progression in 38.9% patients with NTG.[4] Early detection of glaucomatous optic neuropathy (GON) prevents visual field loss, visual impairment, falls, motor vehicle accidents, and a major impact on quality of life.[5]

Raised IOP is the greatest modifiable risk factor for GON, however normal pressures can cause gradual damage. On the other hand, ocular hypertension without glaucoma has been reported. Vascular theory suggests insufficient ocular blood flow as cause of GON.[6] Studies show that glaucoma patients have slower blood flow in the retina and optic nerve head (ONH). Thus, fluctuating ocular blood flow causes unstable oxygen delivery and mild reperfusion injury, making it more harmful than a stable decrease.[7] Nutritional therapy can stabilize ocular blood flow and slow glaucoma progression. Oxidative stress increases trabecular meshwork resistance to aqueous humor outflow, causing higher IOP. Similarly, inflammation and ischemia, can lead to retinal ganglion cell death in glaucoma.[8,9] Neuro protection and neuro degeneration are key glaucoma treatments.[9] Such medicines prevent retinal ganglion cell injury by targeting their molecular route. Ischemia, oxidative stress, inflammation, and other chemicals that prevent or slow apoptosis are directly neuro protective while reducing IOP indirectly degenerates neurons. Anti-glaucoma drugs focus more on IOP reduction, while complimentary glaucoma treatments include nutrients that preserve biological systems and benefit neuro protection and eye health through many routes.[10] A recent study suggests that dietary supplements may affect IOP, ocular blood flow, inflammation, and oxidative stress, which could be targeted for glaucoma adjunct therapy.[11] Nutritional supplements were tested on IOP, ocular blood flow, oxidative stress, and glutamate neurotoxicity. It was found that nutritional supplements lowered IOP, reduced visual field loss, improved blood flow, and reduced ganglion cell complex thinning and improving retinal sensitivity. Iron, magnesium, and other minerals have been linked to glaucoma in previous research.[12] Flavonoids increase ocular blood flow and delay vision deterioration. Forskolin lower IOP. Citicoline boosts retinal function and Saffron extract lowers IOP. Role of Astaxanthin in reducing Ganglion cell complex thinning is also documented. Similarly, Niacin is reported to improve glaucoma inner retinal function.[12,14]

Despite adequate evidence of the benefits, Indian ophthalmologists do not prescribe nutritional supplements, as shown in the focused group discussions done prior to this study. The objective of this study was to determine the knowledge, attitude, and practice (KAP) of Indian ophthalmologists regarding nutritional supplements in conventional glaucoma treatment. KAP studies have shown to be useful in understanding the gap in prescription trends and the findings could be useful in making recommendations for better management of Glaucoma.[15]

## METHODS

A questionnaire-based cross-sectional pilot study was conducted to assess ophthalmologists' knowledge, attitude, and practice of nutritional supplements in traditional glaucoma treatment. After a thorough literature review, a short survey with open-ended questions was conducted among glaucoma specialists to understand adjuvant therapy for glaucoma. Following this, a questionnaire was developed, and content validation was done by Optometry and ophthalmology faculty members. Lotus Eye Hospital and the College of Optometry's Ethics Committee authorized it (No. LCOO-ETH/PG/20218/7-01). A 25-item questionnaire was developed and validated, the value for Cronbach's alpha for the survey was $\alpha$=.87. Section 1 collected socio-demographic data with 9 questions. This included type of practice, years of experience, and qualifications along with the contact information. Section 2 assessed knowledge of nutritional supplements as glaucoma adjuvant therapy with 8 questions. Section 3 assessed attitude with 5 questions while section 4 assessed nutritional supplement prescription with 3 questions. Knowledge and practice-based questions were yes/no and some were open-ended. Attitude related questions were on a 5-point Likert scale. A scalar-scoring method was used to measure knowledge as poor, fair, and good levels of knowledge, attitude, and practice (KAP) patterns.[15]

The calculated sample size was 149 responses based on a study by Bali J et. al on Indian

ophthalmologists using a formula for an exploratory study.[16] This was done by estimating the number of ophthalmologists in India as 30,000 and keeping the margin of error at 8% with a confidence interval of 95%. Ophthalmologists practicing in India were included in the study. However, those practicing outside India or retired from service were excluded.

A Google form was created to share the questionnaire with potential participants. The final questionnaire link was emailed, distributed, and posted on social media to ophthalmologists with an explanation before enrolment. Informed consent was included in the survey introduction. The questionnaire and consent form were given to all Indian ophthalmologists via Google Forms. Unresponsive recipients received a follow-up email after 2 weeks. Participants had to complete all four questionnaire sections. Final analysis was done after the data was manually entered into an excel sheet.

## RESULTS

The data entered in MS Excel was converted into a numerical form for analysis using SPSS software v26 (IBM Corporation, USA). Chi-square test was used to find out any association of knowledge, attitude, and practice based on years of experience, gender, and place of practice. P value < 0.05 was considered statistically significant. Out of 156 ophthalmologists, there were 99 males and 57 females. Demographic data is shown in table 1.

KAP results based on the scalar scoring revealed that only 57.5% had good to fair knowledge and 42.5% had poor knowledge about the role of nutritional supplements in the management of glaucoma. Attitude scores showed that only 25% had a positive attitude. The practice patterns further mirrored the knowledge and attitude, with only 30% of them prescribing supplements. The commonly prescribed supplements were Lutein, Zeaxanthin, flavonoids, and Omega.[3] For those who did not prescribe, the price and effectiveness of supplements were among the leading barriers. Table 2 shows details of KAP in supplement prescriptions.

**Table 1:** *Demographic data of age, gender, years of experiences and type of practice.*

| Demographics | N=156 |
|---|---|
| Age in years, Mean ± SD (range) | 41.88 ± 6.15 |
| Gender | |
| Male | 99 (63%) |
| Female | 57 (37%) |
| Current job title | |
| Resident | 35 (22%) |
| Specialist | 68 (44%) |
| Consultant | 53 (34%) |
| Years of experience | |
| 0-2 years | 2 (1%) |
| 3-5 years | 9 (12%) |
| 6-10 years | 90 (58%) |
| 11-15 years | 33 (21%) |
| >15years | 12 (8%) |
| Hospital | |
| Public | 44 (28%) |
| Private | 112 (72%) |

Further analysis was done to understand any associations of KAP with gender, years of experience, qualification, and type of practice (Table 3 and 4).

Across all 9 questions about the knowledge of the effect of supplements in the management of glaucoma as an adjuvant therapy, female participants showed higher knowledge than male counter parts and the difference was statistically significant. Practitioners with 6-10 years of experience and glaucoma specialists had significantly good knowledge on the role of supplements in the management of glaucoma.

## DISCUSSION

The present study analysis revealed that a higher number of male ophthalmologists participated in the survey compared to their female counterparts. Similarly, AL-Balawi HB and Alali NM, in their study on ophthalmologists' knowledge, attitudes, and practices concerning the COVID-19 pandemic, reported that 67% of respondents were male, while 32% were female.[17]In this study, 58% of respondents had 6–10 years of professional experience. Similarly, Karslıoğlu et al., in their research on the impact of COVID-19 on ophthalmologists' clinical practices in

**Table 2:** *KAP on prescription of supplements as adjuvant therapy for management of glaucoma*.

| | Level 1 | Level 2 | Level 3 |
|---|---|---|---|
| Knowledge | Good 27% | Fair 31% | Poor 43% |
| Attitude | Positive attitude 34% | Neutral 44% | Negative: 22% |
| Practices | 22% prescribed | 78% did not prescribe | |

**Table 3:** *Knowledge Associations with gender, qualifications, years of experience and type of practice.*

| All subjects | Level of knowledge<br>Good n (%)<br>41 (27%) | <br>Fair n (%)<br>48 (31%) | <br>Poor n (%)<br>67 (43%) | P value |
|---|---|---|---|---|
| **Gender** | | | | |
| Male | 23 (23%) | 36 (36%) | 40 (40%) | <0.001 |
| Female | 18 (32%) | 12 (12%) | 27 (21%) | |
| **Current job title** | | | | |
| Residents | 4 (11%) | 13 (37%) | 18 (51%) | <0.001 |
| Specialist | 29 (43%) | 19 (28%) | 20 (29%) | |
| Consultant | 8 (15%) | 16 (30%) | 29 (55%) | |
| **Years of experience** | | | | |
| 0-2 years | 1 (1%) | 1 (1%) | 0 (0%) | |
| 3-5 years | 7 (4%) | 2 (1%) | 1 (1%) | 0.26 |
| 6-10 years | 22 (14%) | 31 (20%) | 37 (24%) | |
| 11-15 years | 7 (4%) | 9 (6%) | 17 (11%) | |
| >15 years | 4 (3%) | 5 (3%) | 3 (2%) | |
| **Hospital** | | | | |
| Public | 16 (36%) | 11 (25%) | 17 (39%) | <0.001 |
| Private | 25 (22%) | 37 (33%) | 50 (45%) | |

**Table 4:** *Practice responses across gender, designation, years of experience and type of practice.*

| Characteristics | Nutritional supplements prescribing practice<br>Yes (n= 35) | <br>No (n= 121) | P. value |
|---|---|---|---|
| Gender | | | |
| Male | 32 (32%) | 67 (68%) | <0.001 |
| Female | 17 (30%) | 40 (70%) | |
| Current job title | | | |
| Resident | 6 (17%) | 29 (83%) | <0.001 |
| Specialist | 31 (46%) | 37 (54%) | |
| Consultant | 12 (23%) | 41 (77%) | |
| Years of experience | | | |
| 0-2 years | 1 (50%) | 1 (50%) | |
| 3-5 years | 5 (26%) | 14 (74%) | <0.001 |
| 6-10 years | 28 (31%) | 62 (69%) | |
| 11-15 years | 10 (30%) | 23 (70%) | |
| >15years | 5 (42%) | 7 (58%) | |
| Hospital | | | |
| Private | 34 (30%) | 78 (70%) | <0.001 |
| Public | 15 (34%) | 29 (66%) | |

Turkey, reported that 62% of participants also had 6–10 years of experience, making this range the most common among respondents.[18] Our results indicated that 57% of glaucoma specialists were aware of nutritional supplements and their importance in glaucoma care. This finding aligns with a study conducted in Canada by Bower TN et al., which revealed that ophthalmologists' opinions and practices regarding the use and recommendation of complementary and alternative medicine (CAM) for glaucoma patients were most prevalent among specialists. Notably, a significant number affirmed the role of CAM in response to the question, "Do you think CAM has a role in glaucoma management?"[19]

Our results showed that 45% of the ophthalmologists from private hospital had less knowledge about the role of supplements in glaucoma. These findings are consistent with a prior study by Zhang AC et al., which highlighted that cooperative practitioner demonstrated limited nutritional understanding.[20] Respondents of our study told that eating nutrients is better than taking them as medication. Giaconi et al, investigated the impact of vitamin A, vitamin C, and carotenoids from fruits and vegetables on glaucoma. Their findings revealed that consuming more fruits and fruit juices (p=0.023), fresh oranges (p=0.002), fresh peaches (p=0.002), and collard greens or kale (p=0.014) provided a protective effect against glaucoma. Additionally, the study suggested that healthy eating habits may lower the risk of glaucoma, particularly among older African American women.[21]

Flavonoids like Ginkgo Biloba extract, anthocyanins, and Erigeron *breviscapus* seemed to have the most convincing evidence for improving visual fields, with studies showing either improvement or slowing of visual field damage.[22-25] Despite this, 29% and 34% of respondents in our survey disagreed. Nutritional supplements were prescribed by 57% of responders with 6-10 years of experience for glaucoma. Bower TN, *et al,* examined the opinion and practice pattern of Canadian ophthalmologists regarding the use and recommendations for complementary and alternative medicine (CAM) for

their glaucoma patients. The ophthalmologists with multiple years of experience were more likely to recommend CAM (9%).[19]

## CONCLUSION

The study results indicate that only 1 in 3 ophthalmologists administer supplements as adjuvant therapy for glaucoma. Most ophthalmologists prefer to prescribe a nutritious diet with anti-glaucoma medications rather than as medication. A larger sample can corroborate study results. Randomized controlled trials of nutritional supplements as glaucoma adjuvant therapy can improve ophthalmologists' knowledge, attitude, and practice.

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**Patient's Consent:** Researchers followed the guidelines set forth in the Declaration of Helsinki.

**Conflict of Interest:** Authors declared no conflict of interest.

**Ethical Approval:** The study was approved by the Institutional review board/Ethical review board **(LCOO-ETH/PG/2021/8/7-01)**.

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## Authors Designation and Contribution

Prema Chande; *Principal, Concepts, Manuscript preparation, Manuscript editing, Manuscript review.*

Renu Thakur; *Head of Department: Design, Data analysis, Statistical analysis.*

Priyanka Udaybhan Gupta; *Optometrist: Literature search, Data acquisition.*