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Assessment of knowledge, attitude, and practice of glaucoma among different cadres of optometrists

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Purpose: To assess the level of knowledge, attitude, and clinical practice of glaucoma among optometry students and optometry practitioners with different years of clinical experience and academic background. **Methods:** A survey with 20 questions on knowledge, attitude, and practice (KAP) of glaucoma was prepared and self-administered to optometry students and optometry practitioners practicing in an eye hospital/clinic/optical with varied years of clinical experience and education qualification. **Results:** Among the 558 participants, 57% were optometry practitioners and 43% were students. The knowledge scores among optometry practitioners increased significantly with an increase in the years of clinical experience ($P < 0.001$). Participants with master's degrees scored higher than participants with bachelor's degrees ($P = 0.12$). There was no statistically significant difference in knowledge scores based on the type of clinical practice - hospital, private practice, or optical ($P = 0.39$). Practicing optometrists who performed slit-lamp examination, gonioscopy, IOP measurements, and disc evaluation for the detection of glaucoma had significantly higher knowledge scores than those who did not perform these tests in their practice ($P < 0.05$). A positive attitude toward glaucoma learning through workshops and hands-on training was reported by optometrists and students. **Conclusion:** Knowledge about glaucoma was good among optometrists and optometry students and was better among those who handled the diagnostics. All the optometrists had a positive attitude toward enhancing their practice through proper training.

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The worldwide prevalence of glaucoma was estimated to increase to 111.8 million by 2040.[1] In India, various population studies stated about 90% of glaucoma remains undiagnosed.[2-4] The major component of any glaucoma management is early case detection and prompt treatment by eye care professionals.[5] Optometrists have a predominant role in primary eye care, and limited evidence is available on knowledge, attitude, and practice (KAP) of glaucoma among optometrists. Hence, this questionnaire-based survey was carried out to assess the KAP of glaucoma among optometrists.

Methods

This was a cross-sectional self-administered questionnaire-based survey on the current KAP of glaucoma detection among optometrists. The study was conducted in agreement with the ethical principles as laid down in the Helsinki Declaration after approval from the institute's research and ethics committee. The flowchart of the study methodology is presented in Fig. 1.

Designing the KAP of glaucoma detection survey questionnaire

The previous works of literature were searched using PubMed and Google Scholar on the available KAP questionnaires. Keywords used were "KAP," "Glaucoma," and "Optometrists." We found 15 articles using the search, and among them, six were found to be relevant. All the articles were reviewed by two experts in the field of glaucoma research, and the items for the questionnaire were developed. The experts had more than 14 years of experience (clinical, research, and teaching) in optometry and a Ph.D. in Optometry. A total of 41 knowledge questions, eight questions on practice, and five questions on attitude toward glaucoma were identified from previous literature.[6-9] The experts reviewed and finalized 20 questions for the current study.

Identifying the domains and items of the KAP questionnaire

Twenty questions on the domains of knowledge, attitude, and practice were finalized. The content was reviewed to ensure that there were no leading, confusing, or double-barreled questions. This structured questionnaire included the demographic details of the participants; the first ten questions assessed the knowledge about glaucoma, the next eight questions determined the clinical practice of glaucoma, and the last two questions ascertained the attitude toward glaucoma learning. Under the knowledge domain, basic questions about glaucoma were queried. The practice domain included the details of their clinical practice, and the attitude domain included their interest in attending workshops and hands-on sessions on glaucoma detection.

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Sampling method

The study included undergraduate (B.S. Opt.) optometry students involved in a clinical internship program in tertiary eye hospitals located in Chennai, postgraduate (M. Opt.) optometry students from standard optometry schools, and optometry practitioners practicing in an eye hospital/clinic or a private sector located in Chennai. Optometrists were approached by a single examiner in various hospitals, optical shops, and optometry schools to participate in this survey. The data were collected from January to June 2019. Undergraduate Optometry students of 1st, 2nd, and 3rd years were not included in the study. The sampling procedure involved in this study was convenient sampling, and the survey questionnaire was administered to the interested participants after getting written consent. A total of 930 optometrists were approached by the examiner from various hospitals, optical shops, and optometry schools to participate in this survey. Among them, 558 (60%) participants readily accepted to participate in the study and 372 (40%) did not consent to participate in the study. The common reasons for non-participation included lack of interest or time to be a part of the study.

Data analysis

During statistical analysis, participants were classified based on their educational or academic qualifications, practicing sector, and the number of years of clinical experience. The qualification was sub-classified as Bachelors and Masters in Optometry. The practicing sector was sub-classified as the hospital sector, optical sector, and private clinical sector. The number of years of clinical experience was sub-classified as less than 1 year, 2–5 years, and 6 or more years of clinical experience.

Scores were given for questions categorized under "knowledge about glaucoma." Each correct response was scored as "1," the wrong response as "0," and the total score out of 10 was given for all participants. A score of above 5 was set as a good level of knowledge and 5 or below as a poor level of knowledge.

Table 1: Knowledge of glaucoma scores among optometry students and practitioners

Category	Sample (*n*)	Median score (IQR)	*P*
Respondents			0.35*
Student	238	8 (6.5)	
Practitioners	320	8.5 (6)	
Qualification of Students			<0.001*
Bachelor of Optometry	185	7.5 (6.5)	
Master of Optometry	53	8 (4.5)	
Qualification of Practitioners			0.12*
Bachelor of Optometry	285	8.5 (6)	
Master of Optometry	35	9 (4)	
Clinical experience			<0.001†
Less than 1 year	23	6 (6)	
1-5 years	233	8.5 (6)	
6 or more years	64	9 (3.5)	
Type of working sector (*n*=291)			0.39 †
Hospital sector	246	9 (5)	
Optical sector	20	8 (4.5)	
Private sector	25	8 (4)	

*Mann-Whitney U test. †Kruskal-Wallis test

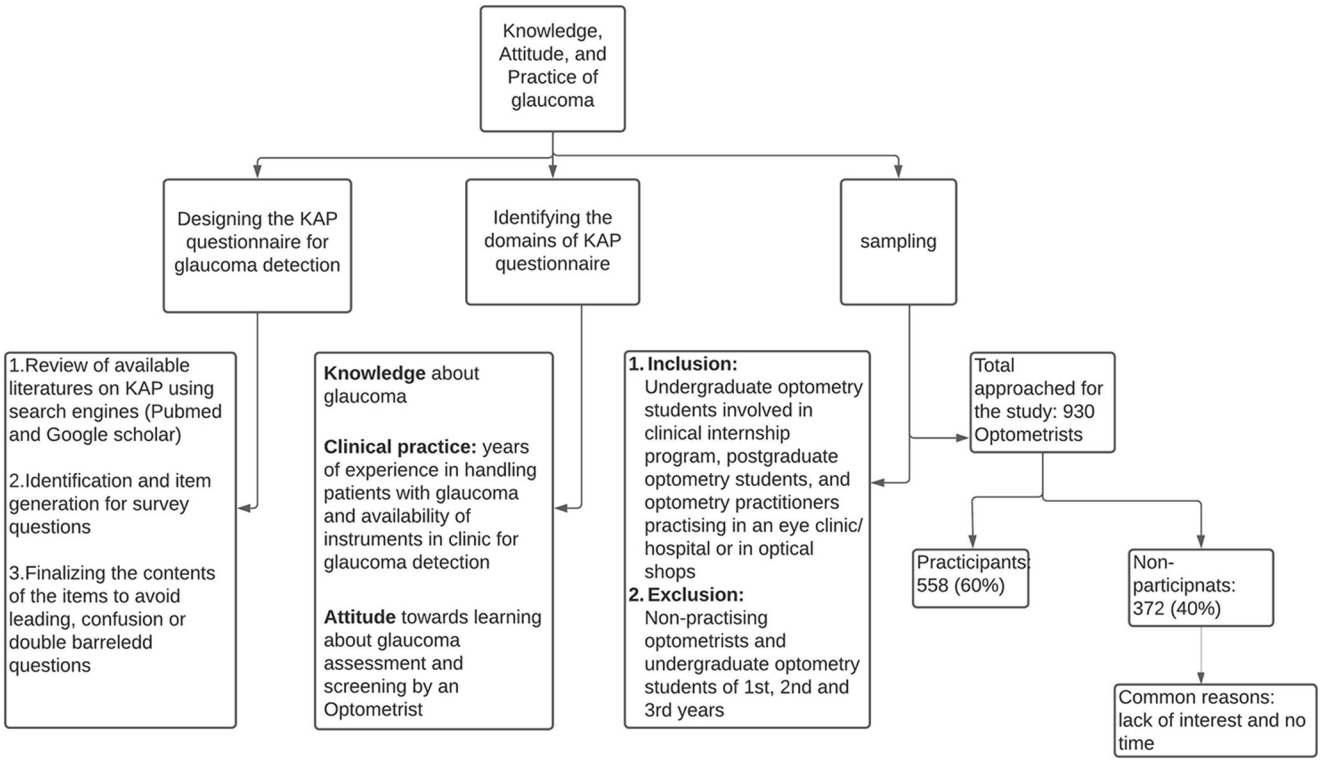

Figure 1: Flowchart of detailed methodology

Table 2: Distribution of practitioners' response to the clinical practice of glaucoma

	Years of Clinical Experience				*P**
	Total practitioners (*n*=320)*n* (%)	Less than 1 year (*n*=23) *n* (%)	1-5 years (*n*=233) *n* (%)	≥6 years (*n*=64) *n* (%)	
Can you treat glaucoma at your clinic?					
Yes	154 (48)	11 (48)	119 (51)	24 (38)	0.83
No	161 (50)	12 (52)	109 (47)	40 (63)	
According to you, which professional can best diagnose and treat glaucoma?					
Opticians	133 (41)	9 (39)	102 (44)	11 (17)	0.22
Optometrists	195 (61)	13 (57)	149 (64)	3 (5)	0.87
Ophthalmologists	305 (95)	23 (100)	223 (95)	51 (80)	0.81
Glaucoma Specialists	320 (100)	23 (100)	233 (100)	51 (80)	1.000
When do you refer a patient with glaucoma to Ophthalmologist?					
F/H/O glaucoma	245 (79)	20 (87)	179 (77)	46 (72)	0.142
Raised IOP	290 (91)	22 (96)	208 (90)	60 (94)	0.675
Occluded angles	256 (80)	18 (78)	187 (80)	51 (80)	0.80
Elsewhere diagnosed	238 (74)	14 (61)	173 (74)	51 (80)	0.186
Which professional assesses glaucoma at your clinic?					
Self	51 (16)	5 (22)	35 (15)	11 (17)	0.630
Trained Refractionists	13 (4)	2 (9)	8 (3)	3 (5)	0.404
Trained Optometrists	235 (73)	16 (70)	175 (75)	44 (69)	0.575
Ophthalmologist	275 (86)	17 (74)	207 (89)	51 (80)	0.353
What evaluations are performed at your clinic to detect glaucoma					
Slit-lamp examination	266 (83)	16 (70)	191 (82)	59 (92)	0.324
IOP measurements	304 (95)	20 (87)	224 (96)	60 (94)	0.253
Gonioscopy	277 (86)	17 (74)	211 (96)	49 (77)	0.017
Disc evaluation	253 (79)	14 (61)	184 (79)	55 (86)	0.311
Do you counsel on compliance with AGM usage?					
Yes	232 (73)	15 (65)	165 (74)	52 (81)	0.247
No	55 (17)	6 (26)	39 (17)	10 (16)	
Maybe	28 (9)	2 (9)	24 (10)	2 (3)	
Can you prescribe AGM?					
Yes	15 (5)	4 (17)	10 (4)	1 (2)	0.005
No	279 (87)	19 (83)	201 (86)	59 (92)	
Sometimes	27 (8)	1 (4)	22 (9)	4 (6)	
Do you follow any protocol to detect glaucoma at your clinic					
Yes	274 (85)	18 (91)	201 (86)	55 (86)	0.408
No	41 (13)	5 (22)	27 (9)	9 (14)	

*Kruskal-Wallis test

Statistical analysis was carried out using the statistical package for social sciences software, version 20 (SPSS Inc., Chicago IL), and graphs were built in Microsoft® Excel 2016. Discrete data were expressed as the number of subjects/participants (n) and proportion or percentages (%). Normality was tested, and appropriate parametric or non-parametric tests were performed.

Results

A total of 558 participants completed the survey; 238 (43%) of them were optometry students and 320 (57%) were optometry practitioners. Of the 238 Optometry students, 79 (33%) were male students and 159 (67%) were females. Similarly, the proportions of male and female practitioners were 129 (40%) and 191 (60%), respectively.

Knowledge of glaucoma

The median knowledge score increased with higher education among students ($P < 0.05$) and with the increase in years of clinical experience among practitioners ($P < 0.05$) [Table 1]. The median score of the optometrists practicing in a tertiary hospital sector was higher than that of those practicing in an optical

Table 3: Median knowledge score versus glaucoma evaluation

Clinical tests for glaucoma evaluation	Practitioners who perform the tests		Practitioners who do not perform the tests		*P**
	Sample (*n*)	Median score (IQR)†	Sample (*n*)	Median score (IQR) †	
Slit-lamp examination	269	9 (4.5)	48	8 (5)	0.001
IOP measurements	309	8.5 (5)	11	7.5 (3.5)	0.021
Gonioscopy examination	282	9 (5)	35	7.5 (4.5)	<0.001
Optic Disc evaluation	258	9 (4.5)	59	7.5 (5)	<0.001

*Mann-Whitney test. †Interquartile range

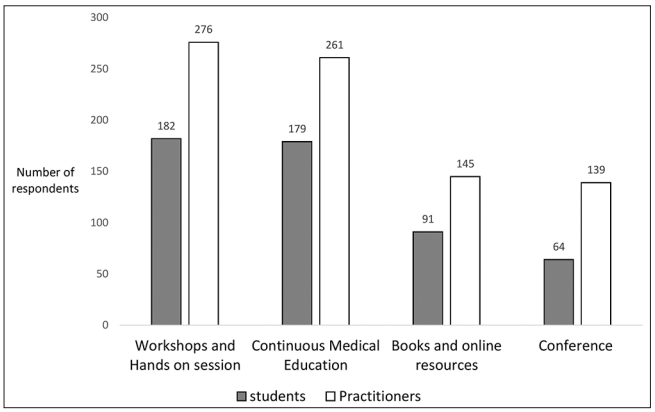

Figure 2: Attitude of participants toward the best method equipped for glaucoma learning

and private sector but did not show a statistically significant difference ($P = 0.39$).

Clinical practice of glaucoma among respondents

Clinical practice patterns among the practitioners are given in Table 2. This was grouped as practitioners with less than 1 year of clinical experience, 1–5 years, and 6 or more years of clinical experience. All the practitioners responded to glaucoma specialists as the best professionals to detect and diagnose patients with glaucoma. When questioned about the referral pattern of glaucoma, more than 90% of practitioners in all groups responded raised IOP as a foremost factor for glaucoma referral. Positive family history of glaucoma was second majorly selected by practitioners with less than 1 year (87%), whereas the other two groups of practitioners responded occluded angles of the anterior chamber (80%) for referring the patients to glaucoma clinic. Another multi-response question was designed to understand the clinical tests done by an optometrist in South India for evaluating glaucoma. IOP measurement was predominately selected by the practitioners in all groups followed by gonioscopy [Table 2].

The knowledge scores of the practitioners who perform and who do not perform the stated clinical test for evaluating glaucoma at their clinic were compared irrespective of their clinical experience [Table 3]. The median knowledge score of the practitioners who perform the mentioned clinical test to evaluate glaucoma was significantly higher than that of the practitioners who do not perform.

Attitude towards glaucoma learning

Among 238 students, 96% (229) had a positive attitude toward glaucoma learning and responded that they are interested to attend continuous education programs on glaucoma. Similarly, among 320 practitioners, 93% (298) were interested in attending workshops on glaucoma. Another multi-response question was designed to know about the best-equipped method for learning glaucoma techniques among students and practitioners. They preferred glaucoma workshops and hands-on sessions followed by continuous medical education [Fig. 2].

Discussion

Early detection and diagnosis by an optometrist are important to avoid irreversible vision loss in glaucoma. There were no studies in India to understand the current level of knowledge, attitude, and practice patterns of glaucoma among the optometry fraternity. In this study, we have reported that the knowledge of glaucoma was better with higher academic qualifications among students and a higher number of years of clinical experience among optometry practitioners. The study highlights the need for training the optometry students and practitioners for diagnosing glaucoma through continuous education programs.

Knowledge about glaucoma

In this study, the knowledge score was higher in practitioners with high clinical experience. When knowledge scores were compared based on the qualification of the participants, both students and practitioners with master's degrees had higher scores than participants with bachelor's degrees.

In this study, practitioners had a better understanding of glaucoma than students engaged in an internship program. Similarly, participants with a secondary level of education had better knowledge about glaucoma than participants with a primary level of education. The number of respondents with a good level of knowledge increased with an increase in the number of years of experience. Hence, the understanding of glaucoma is not adequate among students and less-experienced practitioners. The probable reason could be the regular practice and strategy they follow in their clinical setup. Hence, it is evident that when adequate training on glaucoma is given for optometry students and practitioners, the level of understating about the disease might improve.

These results were supported by a previous study in 2015 by Yoshioka,[10] where two groups of optometrists with and without a short diagnostic training on glaucoma were compared. Pre- and post-training results on glaucoma examination, evaluation of optic disc photography, and visual field testing for diagnosing the glaucoma patients were found to have a reduction in false-negative referrals, and the short teaching program on glaucoma improved optometrists' ability on glaucoma evaluation. A similar study on awareness,

knowledge, and self-care practices of glaucoma among health care students in Ghana revealed that students were aware of the term glaucoma but understanding about the disease was low.[8]

Clinical practice of glaucoma

As glaucoma is a silent thief and has a higher prevalence in India, optometry practitioners must be eligible to detect and diagnose the condition in its subclinical or asymptomatic stage to avoid visual impairment. In this study, the clinical practice of glaucoma was assessed by inquiring about the investigations that are necessary for glaucoma evaluation, the referral pattern of the practitioners, and the managing strategy. Most of the practitioners responded that glaucoma specialists are the best in diagnosing and treating glaucoma, followed by the optometrist. This result is similar to the study in Ghana where the majority of health care students responded to glaucoma specialists and approximately 20% of the respondents responded to optometrists as the best in diagnosing and treating glaucoma.[8]

When the referral pattern of glaucoma was assessed, where optometrists play a major role, most of the practitioners responded to high IOP as a mainstay in glaucoma referral. Previous studies exposed that the rate of false-positive referrals was higher by optometrists when only high IOP was considered.[11] In this study, a positive family history of glaucoma was the second majorly responded by practitioners with less than 1 year of experience. In contrast, experienced practitioners responded to occluded angles to be a sign for glaucoma referral. Though a positive family history of glaucoma is an important feature for screening, the occluded angles of the anterior chamber also remain essential for glaucoma referrals after IOP measurements. These results suggest that the accuracy of glaucoma referral increases with clinical experience and proper training, which was supported by several previous studies where the proportion of false-positive referrals by optometrists reduced significantly post glaucoma training and with clinical experience.[12]

A comprehensive eye examination is necessary for glaucoma evaluation, which includes primary testing, disc evaluation, gonioscopy, and visual fields testing. In our survey, 86% of respondents claimed that their glaucoma patients were assessed by an ophthalmologist, but only 79% said that disc evaluation was done in their clinic, which implies that a complete ocular examination was not performed routinely. Previous studies have also shown that glaucoma diagnosis was missed by optometrists and at times by ophthalmologists and lead to the late presentation as extensive eye examination was not conducted.[6,13]

Various studies were conducted to evaluate the diagnostic performance of glaucoma, including optic disc assessment, and the agreement between trained optometrists and ophthalmologists in glaucoma decision-making were compared. These investigations found a sensitivity and specificity of 95% and a high level of agreement between optometrists and ophthalmologists in glaucoma evaluation. Hence, it is evident that with sufficient training and experience, optometrists would be efficient in evaluating patients with glaucoma.[14-16] The ophthalmic community has to be sensitized regarding the need to perform gonioscopy to minimize the problem of misdiagnosis or under diagnoses of angle closure.[17]

Attitude toward glaucoma

Attitude toward glaucoma learning depends upon each optometrist. The response as yes to attending a health care program on glaucoma was considered a positive attitude while a response as no was considered a negative attitude. As predicted, the majority of the participants had a positive attitude and were interested in participating in health care programs on glaucoma to improve the skills of a glaucoma evaluation. Students and practitioners with different years of experience are more interested in attending workshops and hands-on learning glaucoma evaluations than books and conferences as a practical session is more significant for glaucoma examination in clinics. A positive attitude toward glaucoma is the mainstay to update the management protocol and skills in glaucoma investigations and evaluation. This positive attitude among participants helps to rule out incorrect diagnoses of glaucoma. Also, optometrists are capable of detecting and diagnosing the condition when proper training and health care programs.[15,18]

There are several guidelines recommended for the examination of eye structure and function for glaucomatous changes by the National Health and Medical Research Council (Australia, NHMRC), the National Institute for Health and Clinical Excellence (NICE, UK), American Optometric Association (AOA, USA), and the American Academy of Ophthalmology (AAO, USA). It is important for the optometrist to be aware of such guidelines that can be applied in their clinical practice.[19,20] In this study, most optometry students and practitioners were found to have a positive attitude toward glaucoma learning; thus, it is noteworthy to conduct various training programs or online lectures on glaucoma and frequent assessment might help the budding optometrist to have a better KAP on glaucoma.

Conclusion

From this study, we can understand that the clinical experience had an impact on the KAP of glaucoma. Hence, the proper training and practice on glaucoma can improve the KAP among optometry students and young optometrists. With more participants in each group with different years of clinical experience, we can better understand the importance and effect of glaucoma training on optometrists.

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Conflicts of interest

There are no conflicts of interest.

References

1. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. The global prevalence of glaucoma and projections of glaucoma burden through 2040: A systematic review and meta-analysis. Ophthalmology 2014;121:2081-90.
2. Dandona L, Dandona R, Srinivas M, Mandal P, John RK, McCarty CA, *et al*. Open-angle glaucoma in an urban population in southern India: The Andhra Pradesh eye disease study. Ophthalmology 2000;107:1702-9.
3. Vijaya L, George R, Baskaran M, Arvind H, Raju P, Ramesh SV, *et al*. Prevalence of primary open-angle glaucoma in an urban south Indian population and comparison with a rural population. The Chennai glaucoma study. Ophthalmology 2008;115:648-54.

4. Ramakrishnan R, Nirmalan PK, Krishnadas R, Thulasiraj RD, Tielsch JM, Katz J, *et al*. Glaucoma in a rural population of southern India: The Aravind comprehensive eye survey. Ophthalmology 2003;110:1484-90.
5. Senjam SS. Glaucoma blindness–A rapidly emerging non-communicable ocular disease in India: Addressing the issue with advocacy. J Fam Med Prim Care 2020;9:2200-6.
6. Ichhpujani P, Bhartiya S, Kataria M, Topiwala P. Knowledge, attitudes and self-care practices associated with glaucoma among hospital personnel in a tertiary Care Center in North India. J Curr Glaucoma Pract 2012;6:108-12.
7. Komolafe OO, Omolase CO, Bekibele CO, Ogunleye OA, Komolafe OA, Omotayo FO. Awareness and knowledge of glaucoma among workers in a Nigerian tertiary health care institution. Middle East Afr J Ophthalmol 2013;20:163-7.
8. Boadi-Kusi SB, Kyei S, Mashige KP, Hansraj R, Abraham CH, Ocansey S, *et al*. Awareness, knowledge and self-care practices toward glaucoma among final year health science university students in Ghana. Clin Exp Optom 2015;98:160-7.
9. Rewri P, Kakkar M. Awareness, knowledge, and practice: A survey of glaucoma in north Indian rural residents. Indian J Ophthalmol 2014;62:482-6.
10. Yoshioka N, Wong E, Kalloniatis M, Yapp M, Hennessy MP, Agar A, *et al*. Influence of education and diagnostic modes on glaucoma assessment by optometrists. Ophthalmic Physiol Opt 2015;35:682-98.
11. Nilsson AG, Peters D. Effectiveness of elevated intraocular pressure as a criterion for glaucoma referral after 6 years of follow-up. Clin Ophthalmol 2021;15:3041-9.
12. Davey CJ, Scally AJ, Green C. Factors influencing accuracy of referral and the likelihood of false-positive referral by optometrists in Bradford, United Kingdom. J Optom2016;9:158-65.
13. Hennis A, Wu SY, Nemesure B, Honkanen R, Leske MC; Barbados Eye Studies Group. Awareness of incident open-angle glaucoma in a population study: The Barbados Eye Studies. Ophthalmology 2007;114:1816-21.
14. Marks JR, Harding AK, Harper RA, Williams E, Haque S, Spencer AF, *et al*. Agreement between specially trained and accredited optometrists and glaucoma specialist consultant ophthalmologists in their management of glaucoma patients. Eye 2012;26:853-61.
15. Banes MJ, Culham LE, Bunce C, Xing W, Viswanathan A, Garway-Heath D. Agreement between optometrists and ophthalmologists on clinical management decisions for patients with glaucoma. Br J Ophthalmol 2006;90:579-85.
16. Kumar AU, Jonnadula GB, Garudadri C, Rao HL, Senthil S, Papas EB, *et al*. Agreement of glaucoma specialists and experienced optometrists in gonioscopy and optic disc evaluation. J Optom 2013;6:212-8.
17. Vijaya L, George R, Arvind H, Baskaran M, Ramesh SV, Raju P, *et al*. Prevalence of primary angle-closure disease in an urban south Indian population and comparison with a rural population: The Chennai glaucoma study. Ophthalmology 2008;115:655-60.
18. De Souza N, Cui Y, Looi S, Paudel P, Shinde L, Kumar K, *et al*. The role of optometrists in India: An integral part of an eye health team. Indian J Ophthalmol 2012;60:401-5.
19. Steinmetz JD, Bourne RR, Briant PS, Flaxman SR, Taylor HR, Jonas JB, *et al*. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: The Right to Sight: An analysis for the Global Burden of Disease Study. Lancet Glob Health 2021;9:e144-60.
20. Krishnakumar R, Anuradha N, Jameel Rizwana Hussaindeen M, Sailaja MV. Role of optometrist in eye hospitals. Sci J Med Vis Res Foun 2016;34:2-6.