Special Focus, Retina, Original Article

Perspectives on the provision of diabetic retinopathy screening: Survey of eye health care professionals in Haryana

Sumit Grover, Prabhath N Piyasena, Marcia Zondervan, Covadonga Bascaran

Purpose: To examine the current provision and practice patterns of diabetic retinopathy screening (DRS) in Haryana. **Methods:** This was a descriptive cross-sectional survey in Haryana. All ophthalmologists registered with Haryana Ophthalmological Society in Haryana state were invited to participate on an online survey comprised of twenty questions exploring diabetic retinopathy screening provision, and barriers to screening services in Haryana. **Results:** The response rate was 82% (153/186). The majority (84%) of the eye care providers practiced in urban areas. Most ophthalmologists (89%, 136/153), considered diabetic retinopathy screening by non-ophthalmic human resource inappropriate because of technical feasibility issues (62%) followed by non-availability of trained staff (33%). Only half (54%) of the respondents had access to written protocols for the diagnosis and management of diabetic retinopathy in their practice. Barriers to optimize diabetic retinopathy screening were lack of knowledge or awareness among patients (95.5%), perception that eye complications were unlikely (76%) and cost of care (30%). **Conclusion:** Diabetic retinopathy screening practices are mainly opportunistic and urban-centric, likely delivering inequitable services for the rural populations in the state. The inclusion of other personnel in screening will require stakeholder engagement from all health professions and changing the perceptions of ophthalmologists about task shifting.

Access this article online

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_2642_21

Quick Response Code:

Key words: Diabetes mellitus, diabetic retinopathy, diabetic retinopathy screening, Haryana, ophthalmologists

Diabetes mellitus (DM) has become a well-recognized health priority globally.[1] It is predicted that the number of People living with Diabetes Mellitus' (PLWD) will increase to more than 700 million by the year 2045.[2] Diabetic retinopathy is one of the most common ocular complications of DM. It is the result of vascular changes in the retinal micro circulation. Diabetic retinopathy screening (DRS) is cost-effective when compared with disability loss for people losing their vision in the absence of a screening program.[3] Haryana is a large state in north India with a population of around 25 million. Haryana has six administrative divisions and 22 districts, with the majority of the population residing in rural areas.[4] There are three government medical colleges in Haryana and one district level civil hospital in each of the 22 districts. Retinal services are available in two of the government medical colleges, one of which is the Regional Institute of Ophthalmology (RIO, Rohtak).[5] The prevalence of DM in the population above 18 years has been reported to be 13.3% in rural Haryana.[6]

Broadly, there are two screening models currently practiced in the country: ophthalmologist-based and ophthalmologist-led models. In both the models, the ophthalmologist is the primary grader though in ophthalmologist-led model, the non-ophthalmologist human resource is involved in taking fundus pictures. The National Programme for Control of Blindness and Visual Impairment (NPCB&VI) in India recommends opportunistic screening for identification of DR. Guidelines state that every opportunity of contact with high-risk cases for DM and/or DR should be utilized for screening, diagnosis, and referral. This is currently the most followed practice of DRS in India including Haryana.[7]

The shortage of skilled human resources, including ophthalmologists, has been reported as a major challenge for the implementation of DRS in India.[8] Many studies have shown promising results for non-ophthalmologists conducting successful DRS in various settings globally.[9–14] This may be particularly suitable for low- and middle-income countries (LMIC) where it is difficult to implement full population-based DRS due to human resource constraints.[15] However, there is insufficient evidence from India to make informed decisions regarding task shifting of DRS to non-ophthalmologists. This study aims to explore the current provision of DRS and practice patterns among eye care professionals in Haryana using an online questionnaire.

Methods

This was a descriptive cross-sectional study conducted from 15 June 2020 to 31 August 2020. The study participants were all ophthalmologists registered with Haryana Ophthalmological

International Centre for Eye Health, London School of Hygiene and Tropical Medicine, London, United Kingdom

Correspondence to: Dr. Sumit Grover, House No-1134, Sec-21, Gurugram - 122 016, Haryana, India. E-mail: dr.sumitgrover@gmail.com

Received: 13-Oct-2021 Revision: 12-Jan-2022
Accepted: 31-Jan-2022 Published: 31-May-2022

Cite this article as: Grover S, Piyasena PN, Zondervan M, Bascaran C. Perspectives on the provision of diabetic retinopathy screening: Survey of eye health care professionals in Haryana. Indian J Ophthalmol 2022;70:2057-60.

Society (HOS) in Haryana state. A total of 186 ophthalmologists practicing in Haryana were requested to participate in the survey. Ethical approval was obtained from the London School of Hygiene and Tropical Medicine, and the executive council of HOS.

An electronic survey was developed and disseminated to all participants via email. The invitation to participate included a participant information sheet, consent sheet, and a link to the online survey.

The survey form comprised of 20 questions divided into two parts: Part one covered the provider's demographic information, practice characteristics, information on DRS practices and provisions; and part two covered barriers perceived by eye care professionals to improve DRS services. The survey questionnaire was pilot tested by sending the link to all the scientific committee members of HOS and was iteratively modified after receiving their feedback.

The survey link was open and available for completion for a period of one month. Seven days after sending the questionnaire, a reminder was sent in the form of a personalized email to all study participants. Two such reminders were sent two weeks apart.

Data was retrieved electronically in encrypted form and was stored in a password protected data cloud accessible only to the principal investigator. All responses were anonymous without any identifying information of the survey participants. Data was subsequently retrieved to Microsoft Excel spreadsheets for analysis. The data was analyzed as frequencies and percentages.

Results

A total of 186 ophthalmologists practicing in Haryana were invited to participate. The response rate was 82.2% (153/186), 54% of responders were men, and 77% were 30–50 years old. Most of the participants (84%) had their main practice in an urban setting while only 16% practiced in rural regions.

There was a mix of practice patterns with 46% of participants working in government hospitals or private/government medical colleges, 23% having private solo practices, and 31% having private group practices. The survey found that 75% of participants considered DRS a specific part of their routine clinical work.

DRS Modalities

Over half (51%) of the study participants performing DRS conduct opportunistic screening and 49% performed systematic

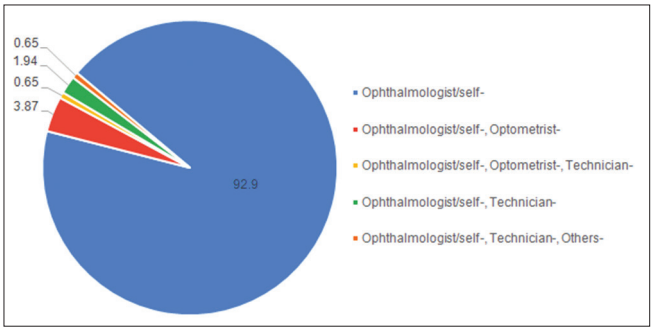

Figure 1: Human resource performing DRS

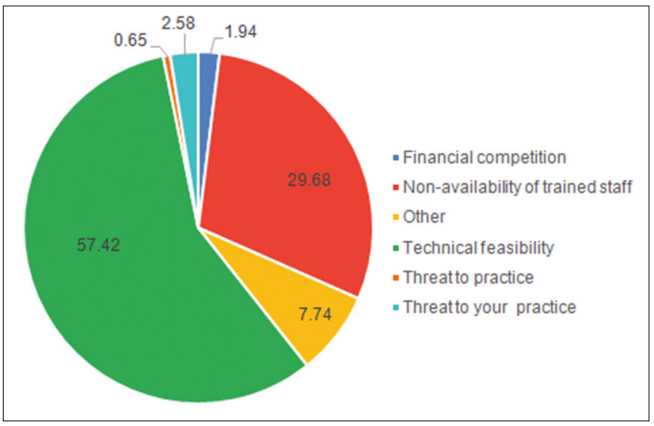

Figure 2: Barriers to non-ophthalmic personnel performing DRS

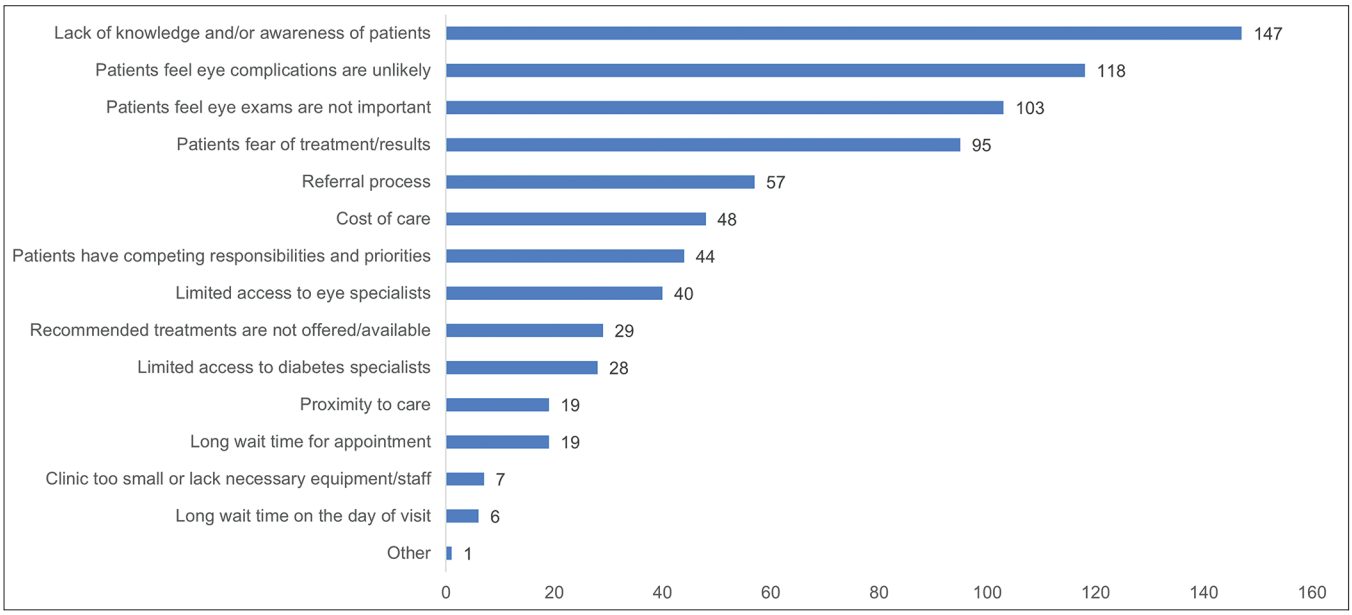

Figure 3: Barriers to improvement of DRS provisions and practices

screening consisting of established protocols for the area population as community outreach. All the participants doing DRS screened patients in a hospital setting, but 18% also screened at fixed facility outreach camps, and 6% used mobile vans with installed fundus camera in addition to the hospital setting.

Human resource performing DRS

All the ophthalmologists participating reported conducting screening through fundus examination using indirect ophthalmoscopy. The majority (92.9%) conducted the screening exclusively themselves in this way. The remaining 7.1% reported also involving optometrists and technicians in taking fundus camera images and grading DR. There were no reports of nurses being involved in DRS [Fig. 1].

The majority of the respondents (89%, 136/153) thought that it was not appropriate for non-ophthalmic personnel to conduct DRS. The main barriers cited were technical feasibility (accuracy as compared to gold standard ophthalmologist) (57.4%) followed by non- availability of trained staff (29.6%) [Fig. 2].

Practice patterns for diagnosing retinopathy

All respondents reported using fundoscopy while 63% additionally used fundus cameras and 24% optical coherence tomography (OCT). Fluorescein angiogram was used by 7% for diagnosing diabetic macular edema (DME). About 54% of respondents had access to written protocols for the diagnosis and management of diabetic eye disease in their practice. Around 56% of respondents displayed patient education material in the clinic. Only 14% reported always discussing on-ocular complications with their patients. The rest only did so occasionally (80%) or never (6%).

One in five participants (20%) reported to have received some specific training on DRS. Of those who had received training, 15% had received the training within the past year, 48% between one and five years, and 37% five years ago or longer. Most ophthalmologists (88%) were interested in further education and certification courses on DR.

Barriers to improvement of DRS provision and practices in Haryana

When asked about the most significant barriers to optimizing DRS in the state, the participants responses were largely focused on patient factors [Fig. 3]. From the provider perspective, the major barrier was the patients' general lack of knowledge or awareness about DM causing DR (95.5%), the believe that eye complications were unlikely (76%), patients feeling that eye exams were not important (67%), patients having a general fear of treatment or the test results (62%), and patients competing responsibilities and priorities (30%). Other challenges related to the services and largely outside the control of patients included the high cost of care (30%) and the complicated or delayed referral process (37%).

Discussion

This online survey captured the views and experiences of ophthalmologists on the provision and practices of DRS in Haryana. Most of the participating ophthalmologists (85%) worked in urban areas while the majority of Haryana's population resided in rural areas, highlighting major urban–rural disparity.[4] The issue of unequal distribution of eye care services in many settings has long been a topic of discussion. A recently published expert consensus prioritizing the main challenges in global eye health pointed out the need to provide services to people living in rural communities in order to improve access and equity.[16,17]

Three quarters of the providers mentioned DRS as a specific part of their clinical work and more than half of them reported performing opportunistic screening which can be attributed to current NPCB&VI protocols and guidelines.[7] The main facility to screen for DR was in clinics, followed by screening in community setting using outreach camps and mobile vans. However, in order to maximize impact, DRS programs should be patient-centric, and community based.[18]

Most ophthalmologists in the state performed the screening themselves, with a small minority also working with optometrists and technicians. There have been several reports of allied ophthalmic personnel delivering DRS services in India and other countries.[10–12] There was a strong opinion against utilizing non-ophthalmic personnel for DRS. In contrast with this perception from the ophthalmologists in Haryana, some studies have shown promising results for non-ophthalmologists conducting successful DRS at various settings globally.[11–13,19] Effective implementation of task sharing depends on many factors like perceptions of the health care professionals and perceived barriers[20,21] which are also evident from the current study. The fundus photography model for screening for DR has been a game changer in this regard. It has scope for building cost effective and efficient DRS models with wide reach, based on principles of task sharing, tele-ophthalmology, and artificial intelligence. But, even for the remote grading by an ophthalmologist, good quality image acquisition is vital, and thus training and involvement of non-ophthalmologist human resource becomes imperative.

This is the first study in India which formally investigated the perceptions of ophthalmologists towards task sharing of DRS to non-ophthalmologists. A limitation of the study is that other ophthalmic cadres were not surveyed. The results are not so encouraging, and more qualitative studies are needed to understand the reasons for these opinions in more detail. Policy makers, ministry officials, health care administrators, nurses, and optometrists should also be interviewed to have a broader view on task sharing of DRS.

Ophthalmologists reported that patient barriers where the reason for inadequate DRS in the state. However, the survey revealed some missed opportunities to help increase knowledge and awareness in patients. Only a few of the ophthalmologists reported discussing non-ocular complications of DM with their patients routinely, even when it was known that hyperglycemia and high blood pressure directly impact the progression of DR.[22–25] Equally only around half of the ophthalmologists reported distributing patient information materials in the clinic which have been used effectively to increase awareness and uptake of DRS in other settings.[26]

Addressing barriers to effective DRS program is a critical policy issue that was examined through the view of eye-care professionals. The most significant barriers to optimizing DRS services reported by almost all providers was "patient's lack of knowledge and awareness" and "fear of treatment". Effective management of DM often mandates PLWD to visit several providers. Efficient referral practices and a clear patient care pathway are essential to ensure effective DR management. However, survey findings suggest that suboptimal referral practices are an important barrier to effective DRS in Haryana. The unique insights into the barriers perceived by eye-care providers would be helpful in making recommendations about

the ways to improve DR screening practices in Haryana and similar settings in India.

Limitations

Although the online survey had a very good response rate, it may not be a representative of all the ophthalmologists in Haryana. The ophthalmologists who participated in the study might be more likely to be engaged and interested in the DRS than those who did not participate. Different results might have been found with a larger number of participants from different states especially southern India where there are many optometry institutions integrated with ophthalmology hospitals and task sharing is common. The survey provided a list of possible answers, and it is possible that a qualitative study design could provide more detail and broader insights into the perceptions of the participants.

Conclusion

The survey indicates that in Haryana, DRS practices are mainly opportunistic and urban centric. This poses questions of inequitable services for the rural populations in the state. There is evidence in other states of the efficient use of other well-trained ophthalmic and non-ophthalmic cadres including optometrists and NCD nurses which could minimize the urban-rural disparity. The inclusion of other personnel in DRS will require stakeholder engagement from all health professions, education, and changing the perceptions of the ophthalmologists to succeed.

Acknowledgements

We would like to acknowledge Prof. GVS Murthy and Dr Allen Foster ICEH, LSHTM (UK) for their wise suggestions and feedbacks during the study. A special thanks to the scientific committee (Haryana ophthalmological society) for their valuable feedback during the pilot testing of the survey questionnaire. Also, we acknowledge Dr Souvik Manna, R.P. Centre, AIIMS for reviewing and proofreading the manuscript.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: Prevalence, numerical estimates, and projections. Diabetes Care 1998;21:1414-31.
2. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, *et al*. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract 2019;157:107843. doi: 10.1016/j.diabres. 2019.107843.
3. Ferris FL. Results of 20 years or research on the treatment of diabetic retinopathy. Prev Med 1994;23:740-42.
4. Population of Haryana. Available from: https://haryana.gov.in/demography/index.html. [Last accessed on 2020 Apr 21].
5. Health care system in Haryana. Available from: http://haryanahealth.nic.in/about. [Last accessed on 2020 Apr 21].
6. Rajput R, Rajput M, Singh J, Bairwa M. Prevalence of diabetes mellitus among the adult population in rural blocks of Haryana, India: A community-based study. Metab Syndr Relat Disord 2012;10:443-6.
7. Vashist P, Singh S, Gupta N, Saxena R. Role of early screening for diabetic retinopathy in patients with diabetes mellitus: An overview. Indian J Community Med 2011;36:247-52.
8. Gudlavalleti VS, Shukla R, Batchu T, Malladi BVS, Gilbert C. Public health system integration of avoidable blindness screening and management, India. Bull World Health Organ 2018;96:705-15.
9. Henricsson M, Karlsson C, Ekholm L, Kaikkonen P, Sellman A, Steffert E, *et al*. Colour slides or digital photography in diabetes screening--a comparison. Acta Ophthalmol Scand 2000;78:164-8.
10. Sundling V, Gulbrandsen P, Straand J. Sensitivity, and specificity of Norwegian optometrists? Evaluation of diabetic retinopathy in single-field retinal images-a cross-sectional experimental study. BMC Health Serv Res 2013;13. doi: 10.1186/1472-6963-13-17.
11. Kuo H, Hsieh H, Liu R. Screening for diabetic retinopathy by one-field, non-mydriatic, 45 degrees digital photography is inadequate. Ophthalmologica 2005;219:292-6.
12. Bhargava M, Cheung CY, Sabanayagam C, Kawasaki R, Harper CA, Lamoureux EL, *et al*. Accuracy of diabetic retinopathy screening by trained non-physician graders using non-mydriatic fundus camera. Singapore Med J 2012;53:715-9.
13. Owens DR, Gibbins RL, Lewis PA, Wall S, Allen JC, Morton R. Screening for diabetic retinopathy by general practitioners: Ophthalmoscopy or retinal photography as 35 mm colour transparencies? Diabet Med 1998;15:170-5.
14. Ruamviboonsuk P, Wongcumchang N, Surawongsin P, Panyawatananukul E, Tiensuwan M. Screening for diabetic retinopathy in rural area using single-field, digital fundus images. J Med Assoc Thai 2005;88:176-80.
15. Piyasena M, Murthy G, Yip J, Gilbert C, Zuurmond M, Peto T, *et al*. Systematic review on barriers and enablers for access to diabetic retinopathy screening services in different income settings. PloS One 2019;14:e0198979.
16. Vela C, Samson E, Zunzunegui MV, Haddad S, Aubin MJ, Freeman EE. Eye care utilization by older adults in low-, middle-, and high-income countries. BMC Ophthalmol 2012;12:5. doi: 10.1186/1471-2415-12-5.
17. Burton MJ, Ramke J, Marques AP, Bourne RRA, Congdon N, Jones I, *et al.* The lancet global health commission on global eye health: Vision beyond 2020. Lancet Glob Health 2021;9:e518. doi: 10.1016/S2214-109X (20) 30488-5.
18. Torgerson DJ, Donaldson E. An economic view of high compliance as a screening objective. BMJ 1994;308:117-9.
19. Scanlon PH. The English national screening programme for diabetic retinopathy 2003-2016. Acta Diabetol 2017;54:515-25.
20. Lewallen S, Etya'ale D, Kello AB, Courtright P. Non-physician cataract surgeons in Sub-Saharan Africa: Situation analysis. Trop Med Int Health 2012;17:1405-8.
21. Dambisya YM, Matinhure S. Policy and programmatic implications of task shifting in Uganda: A case study. BMC Health Serv Res 2012;12:1-10.
22. Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 1993;329:977-86.
23. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). UK Prospective Diabetes Study (UKPDS) Group. Lancet 1998;352:837-53.
24. Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin epidemiologic study of diabetic retinopathy. II. Prevalence and risk of diabetic retinopathy when age at diagnosis is less than 30 years. Arch Ophthalmol 1984;102:520-6.
25. Klein R, Klein BE, Moss SE, Davis MD, DeMets DL. The Wisconsin epidemiologic study of diabetic retinopathy. III. Prevalence and risk of diabetic retinopathy when age at diagnosis is 30 or more years. Arch Ophthalmol 1984;102:527-32.
26. Piyasena MMPN, Zuurmond M, Yip JLY, Murthy GVS. Process of adaptation, development, and assessment of acceptability of a health educational intervention to improve referral uptake by people with diabetes in Sri Lanka. BMC Public Health 2019;19:614.