

## Diabetic retinopathy: A right time to intervene

Ironically, after a decade of social, economic, and health progress that had almost eliminated many of the dreadful communicable diseases from most parts of India, one of the greatest threats to health at present is type 2 diabetes.<sup>[1]</sup> The number of people with diabetes in India is growing rapidly. As per reports, in 2013, there were about 65 million people with diabetes in India and by 2035, it is likely to reach about 109 million.<sup>[2-5]</sup> According to International Diabetes Federation, nearly half of the people with diabetes in the world live in just three countries, namely, India, China, and the US.<sup>[6]</sup>

In India, there have been several population-based studies to estimate the prevalence of diabetic retinopathy (DR) at different timepoints. It being a universal problem whether rural or urban, rich or poor; a diabetic patient has a lifetime risk of developing it. In India, after 2000 there have been many efforts by governmental, non-governmental, and private ophthalmologists to screen different populations.<sup>[7]</sup> Broadly, there are two screening models currently practiced in the country, ophthalmologist-based and ophthalmologist-led models. Ophthalmologist-based model involves screening by an ophthalmologist using indirect ophthalmoscopy alone or coupled with retinal photographs while ophthalmologist-led, the telescreening model, involves the use of paramedical staff to take images and a remote grading by graders.<sup>[8]</sup>

There have been encouraging efforts by the All India Ophthalmological Society (AIOS) in fighting this important cause of blindness. Last year witnessed a series of continuing medical education (CME's) on DR across the country.<sup>[9]</sup> This year AIOS formed a "task force" with experts to create guidelines for screening, diagnosis and management of DR. November month witnessed a series of screening camps across the country done by AIOS members. Realizing the importance of DR in India, there are both national and international funding agencies, who are supporting many services and research initiatives.<sup>[9]</sup>

This issue highlights some of the work done by the Queen Elizabeth trust funded initiatives in India. Likewise, ORNATE-India study, a study sponsored by the Medical Research Council, UK has been making some good progress and trying to collect some India-centric evidence on DR in India. The service and research initiatives related to DR of some institutes, namely, Aditya Jyot Foundation for Twinkling Little Eyes (AJFTLE), Mumbai; Sankara Nethralaya, Chennai; LV Prasad Eye Institute, Hyderabad; Mohan Diabetes Research Foundation, Chennai; Aravind eye care, Madurai; RP Center, Delh; and PGI, Chandigarh needs an applaud.

India has pioneered the development and validation of artificial intelligence-based algorithms in DR. The artificial intelligence (AI) article by investigators from Sankara Nethralaya and Aravind eye care was reported to be among one of the ten most important contributions of the decade to clinical medicine and public health, published by views and citations and curated by JAMA editors.<sup>[10]</sup> Likewise, the study

done by AJFTLE has shown promise in the use of an offline AI system in community screening for referable DR with a smartphone-based fundus camera.<sup>[11]</sup> This article is also one of the top 10 articles in 2019, as reported by the JAMA network. In the coming years, we will witness more use of AI in DR screening globally.

## What can we do to Reduce the Incidence of Blindness Caused by DR?

### Primary prevention

The best way to avoid DR is to avoid diabetes. AIOS members can help to reinforce public health messages concerning healthy eating, exercise, and avoiding obesity. People who do develop type 2 diabetes can reduce their risk of retinopathy by good glycaemic control and control of blood pressure. However, it is important to note that good control of blood sugar does not eliminate the risk of retinopathy but merely reduces it. Although ophthalmologists are not responsible for managing their patients' diabetes and blood pressure, we can support the work of our fellow physician by emphasizing the visual benefits of good diabetic control.

### Secondary prevention

As early retinopathy is asymptomatic, this means that some form of the screening program is necessary. Screening guidelines have been very elegantly elaborated in this issue. In the upcoming issues, we will see the AIOS guidelines for screening. In a country like India, with fragmented healthcare systems involving government, insurance, and privately funded care, it is much harder to screen for retinopathy. The first requirement for any screening program is to know who has diabetes. In the absence of a national diabetes register, it may be difficult to find this out. Health insurers, pharmacies, hospitals, physicians, and endocrinologists will all know some of the diabetic patients but it is unlikely that anyone source will know all of them. Secondly, the screening program must be able to contact the patients and call them for screening. The photos must be read by trained staff, or we must use one of the established AI algorithms. To be sure that the screening program is accurate, quality control is essential, so some of the normal photos should be re-examined by another ophthalmologist to check that the grading is accurate. If people do not come for their screening appointment, the program needs a mechanism to follow-up. If significant retinopathy is detected at screening, the patient must be referred to a clinic that has the capacity to examine the retina and treat the retinopathy.

### Tertiary prevention

We now have very effective treatments for most forms of DR. Timely laser for proliferative DR and intravitreal injections for diabetic macular edema have improved our success rates. With newer vitrectomy machines and viewing systems, even the visual outcomes of proliferative diabetic retinopathies requiring surgeries have greatly improved. The major challenge today is poor compliance to treatment. We need to explore novel ways of ensuring good compliance for treatment.

## Conclusion

DR poses a major challenge to Vision 2020 in India. Unlike a cataract or glaucoma, which can be dealt by eye care

professionals alone, managing DR requires a multidisciplinary approach by building alliances with diabetologists, physicians, public health specialists, healthcare providers, and civil society. We need to leave our comfort zone and engage with our fellow professionals in these related disciplines. Thus, together, we can prevent the great majority of visual impairment caused by diabetes.


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### Prof. S. Natarajan

Padmashri Prof. Dr. S. Natarajan, is renowned for his skills as a vitreoretinal surgeon, keen academic mind and for his philanthropic initiatives in prevention of blindness. He is one of the only two Indians inducted in the Retina hall of fame. At present he serves on the ICO Board of Trustees, is President Asia-Pacific Ophthalmic Trauma Society, All India Ophthalmological Society and Sankara Nethralaya Alumni. Founder of Aditya Jyot Eye Hospital and Aditya Jyot Foundation for Twinkling Little Eyes, he has introduced offline artificial intelligence for diabetic retinopathy screening, for the first in the world. He has been the recipient of several national and International awards.