Diabetic Retinopathy in People with Diabetes

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Opinion

Diabetic Retinopathy (DR) is the outcome of microvascular retinal alterations caused by diabetes and is the primary cause of preventable blindness in the world's working-age population. Diabetic Macular Edema (DME) is a consequence of diabetes that is characterised by fluid accumulation or retinal thickness and can occur at any stage of the disease. According to the International Council of Ophthalmology (ICO), one out of every three diabetics has some kind of DR, and one out of every ten has vision-threatening DR. It is the sixth leading cause of blindness in India.

Early detection and treatment of DR can help to prevent vision loss. As a result, diabetes individuals are advised to have a regular biannual or annual follow-up and frequent appointment for retina screening. The elimination of avoidable visual impairment is mostly based on a pool of trained doctors and the fundamental health care infrastructure required for eye treatment. In the Indian subcontinent, there is one eye care expert for every 608,000 people, compared to a national ratio of one eye care expert for every 107,000 people. In some regions, the ratio is one eye care expert for every 90,000 people, whereas in others, there is only one eye care expert for every 608,000 people. Because of the vast number of persons who require constant monitoring and the scarcity of ophthalmologists, the treatment of DR requires focus to build a computer-aided diagnosis tool. Recent technical breakthroughs in computing power, communication systems, and machine learning techniques enable biomedical engineers and computer scientists to meet clinical practise standards. The raw photos with ground truths serve the scientific community in the development, validation, and comparison of DR lesion detection algorithms used in clinical applications. Precise pixel level annotation of DR anomalies such as microaneurysms, soft exudates, hard exudates, and haemorrhages is a significant resource for evaluating the performance of individual lesion segmentation algorithms. In contrast, reliable information on the illness severity level of DR and DME is useful in the development and evaluation of image processing and retrieval algorithms for disease detection.

Diabetic retinopathy is the major cause of preventable blindness in persons aged 20–74 years around the world. With the goal of early detection, major organisations such as the American Diabetes Association, International Council of Ophthalmology, and American Academy of Ophthalmology recommend regular screening at intervals ranging from every 12 months to every 24 months for patients with no or mild diabetic retinopathy. Although regular screening is critical for preventing blindness, the estimated increase in the number of diabetic patients from 415 million in 2015 to 642 million in 2040 means that the burden of screening and follow-up will be significant. The efficacy of diabetic retinopathy screening programmes could be enhanced by personalising screening frequencies based on the chance of diabetic retinopathy development or progression. We developed a deep-learning system that predicts the risk of developing diabetic retinopathy using colour fundus pictures.

Colour fundus images, which are commonly used to assess the stage of diabetic retinopathy, show signs of retinal microvascular alterations induced by diabetes. Aside from disease stage, various risk factors influence the development and progression of diabetic retinopathy. Modifiable risk factors include hyperglycemia, hypertension, dyslipidaemia, and obesity, as well as smoking, anaemia, pregnancy, low health literacy, insufficient access to health care, and poor medication adherence. Ethnicity, family history or genetics, age at beginning of diabetes, type of diabetes, and length of diabetes are all non-modifiable risk factors.

The developing world bears the brunt of the diabetes burden, with almost 80% of all diabetics living in low- and middle-income nations, and the Asia Pacific area accounting for roughly two-thirds of all diabetes cases, primarily in China and India. Primary healthcare facilities for handling the diabetes epidemic are insufficient or non-existent in many of these developing countries, and public awareness is poor. Poor metabolic management of diabetes and, as a result, increased incidence of complications such as diabetic retinopathy are probable in the absence of competent care. As the global prevalence of diabetes rises, so will the number of diabetic retinopathy patients. Diabetic retinopathy affects almost one-third of people with diabetes, and it has become the major cause of vision loss and blindness in working-age adults. The personal and social costs of vision impairment and blindness to individuals and nations are enormous in terms of the burden of dependence, potential loss of earning power, and increased social support demands [1-5].

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