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Editorial
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Corneal changes in patients with diabetes mellitus: clinical implications

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Abstract

Diabetes mellitus (DM) is a major chronic disease and currently a 'public health priority' in most countries in the world.[1] India is home to the second-largest population of diabetics in the world with 77 million people in 2019, which is expected to rise to 134.2 million by the year 2045. With continued improvement in health care delivery, the life expectancy is also set to increase in people with DM by about 33% by 2050.[2] The cost involved in the management of DM and its associated complications exerts a great stress on the health care system.[3] DM affects nearly all ocular tissues—the tear film, cornea, crystalline lens, optic nerve, and retina—and is currently the leading cause of legal blindness in adults globally. Although diabetic retinopathy (DR) is usually more prominent and highlighted compared to other ocular complications, corneal issues appear to be more frequent with approximately 70% of examined patients being affected.[4]

DM-induced corneal alterations include low tear secretion leading to dry eye, epithelial fragility, recurrent erosions, superficial punctate keratitis, epithelial defects, neuropathy manifested by reduced corneal sensitivity and delayed epithelial healing, oedema, increased corneal thickness, increased hysteresis, and endothelial changes.[5]

In patients with chronic DM, the cell adhesion mechanism is impaired, leading to recurrent epithelial erosion and delayed wound healing. The corneal neuropathic changes of the sub-basal nerve plexus include decreased density, length, and branch density with increased nerve tortuosity and thickness, leading to epitheliopathy and delayed wound healing. Corneal stroma has shown to have abnormal collagen bundles of variable thickness, advanced glycation end products, and upregulation

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of matrix metalloproteinases 3 and 10, leading to altered stromal remodelling. The alteration of corneal stroma, poor epithelial barrier function, and, rarely, decreased endothelial cells can lead to accumulation of fluid in the stroma causing corneal oedema.[6,7]

Alterations in corneal thickness, transparency, and hysteresis seen in diabetic patients have clinical and surgical implications. In chronic deranged glycaemic status (measured by glycated haemoglobin A1c [HbA1c] levels), there is alteration of corneal thickness, which is an important measure used in planning for cataract and keratorefractive procedures. In recent years, there has been a greater demand for improved precision in these surgeries; thus, understanding thickness changes and having DM under control prior to surgery would improve precision. Corneal thickness and hysteresis do have an impact on the measurements of intraocular pressure (IOP). Hence, understanding the magnitude of change in these parameters compared to age-matched controls would help in adjusting the measured IOP.[8,9]

The article titled "Effect of glycaemic control on cornea among type 2 diabetes mellitus" in the current issue analyses very important findings pertinent to the Indian subcontinent. There is a correlation between glycaemic control and corneal parameters, *i.e.*, corneal thickness and anterior corneal curvature. It is interesting to see a clear correlation between the magnitude of change in HbA1c with corneal thickness and anterior corneal curvature. The findings in this paper provide vital information that could impact clinical decision by anterior segment specialists. We look forward to future publications on this relevant topic from this part of the region, as diabetic ocular complications are becoming increasingly common.

References

1. Kumpatla S, Kothandan H, Tharkar S, Viswanathan V. The costs of treating long term diabetic complications in a developing country: a study from India. JAPI. 2013;61:1–17.
2. Boyle JP, Thompson TJ, Gregg EW, Barker LE, Williamson DF. Projection of the year 2050 burden of diabetes in the US adult population: dynamic modeling of incidence, mortality, and prediabetes prevalence. Popul Health Metr. 2010 Oct 22;8:29.
3. Akari S, Mateti UV, Kunduru BR. Health-care cost of diabetes in South India: a cost of illness study. J Res Pharm Pract. 2013;2:114–7.
4. Calvo-Maroto AM, Perez-Cambrodí RJ, Albarán-Diego C, Pons A, Cerviño A. Optical quality of the diabetic eye: A review. Eye (Lond) 2014;28:1271-80.
5. Ljubimov AV. Diabetic complications in the cornea. Vision Res. 2017;139:138-152.
6. Shih KC, Lam KS, Tong L. A systematic review on the impact of diabetes mellitus on the ocular surface. Nutr Diabetes. 2017;20;7:e251.
7. Zhao H, He Y, Ren YR, Chen BH. Corneal alteration and pathogenesis in diabetes mellitus. Int J Ophthalmol. 2019;18;12:1939-1950

8. Luo XY, Dai W, Chee ML, et al. Association of Diabetes with Central Corneal Thickness Among a Multi-ethnic Asian Population. JAMA Netw Open. 2019;2(1):e186647.
9. Kim YJ, Kim TG. The effects of type 2 diabetes mellitus on the corneal endothelium and central corneal thickness. Sci Rep. 2021;15;11:8324.