Commentary: Meibomian gland dysfunction: Taking a deep dive into the ocular surface parameters

Meibomian gland dysfunction (MGD), being a chronic abnormality of the meibomian glands, leads to qualitative and quantitative changes in the tear film.[1] The resulting ocular surface disease affects the quality of life of such patients. It may also lead to suboptimal patient satisfaction after a cataract surgery or a refractive procedure and may render contact lens use uncomfortable. The majority of patients suffering from dry eye disease are diagnosed with MGD. The global prevalence of MGD is reported as 3.5%–70%, with Asians showing comparatively higher prevalence rates of 46.2%–69.3%.[2] However, data from India is sparse, with prevalence reported to be 48.4%.[3]

Owing to the lack of homogeneous objective and subjective criteria, defining and measuring the effects of MGD and its treatment outcomes had become a medical challenge globally. This hampered standardizing of patient care and conduct of clinical trials. In search of more definitive diagnostic tests, various clinical approaches and tests have been tried. Biomarkers of inflammation based on impression cytology for HLA-DR expression or by tear sampling for cytokines and chemokines (TNF-a, IL-6, IL-17a, and IL-8, secretory phospholipase A2, prostaglandin E2, etc.) have been looked into.[4] Tests of tear osmolarity and matrix metalloproteinase-9 (MMP-9) are available as point-of-care objective metrics. Imaging of the ocular surface can be done to assess tear film stability, tear meniscometry, and tear meniscus height (TMH).[4] Meibomian gland morphology and meibomian gland loss (MGL) assessed using infrared illumination or adaptive transillumination can be correlated with clinical findings. In-vivo confocal microscopy (IVCM) for assessing meibum reflectivity, acinar diameter and density, and peri-glandular inflammation for diagnosis of MGD has been studied.[5] An interferometer can demonstrate the lipid layer of the tear film. However, due to the heterogeneous nature of MGD and the variability of signs, a more comprehensive diagnostic approach is needed. Also, for large-scale epidemiologic studies, simple, noninvasive investigation modalities that are repeatable and reproducible are sought.

The current study by Yadav *et al.*[6] reports a high hospital-based prevalence of MGD in the Indian population over 18 years of age. With the use of an ocular surface analyzer (OSA) complete with three-dimensional meibomian gland imaging to study the various parameters related to MGD, they found MGL to be the parameter with the highest diagnostic accuracy for MGD and was inversely related to both lipid layer thickness (LLT) and noninvasive tear breakup time (NIBUT). Cases with widespread MGL can thus be identified as unsuitable for therapies such as vectored thermal pulsation and mechanical expression of the liquified meibum.

In the recent era of the COVID-19 pandemic, "digital addiction" has become a norm not just in adults but also in children and adolescents. "Work from home" culture, "virtual schooling," and excessive smartphone usage have resulted in increased digital screen time and an increased risk of ocular surface disease, especially dry eye disease. Decreased or incomplete blinks are being held responsible for the increased incidence of symptomatic MGD in the pediatric population too. Hence, by virtue of extrapolation, in the future, minimally invasive and reproducible objective metrics will provide the key to appropriate diagnosis and epidemiological understanding of MGD in adults as well as in children.

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