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Evaluation of Smartphone-Based Fundus Photography for Diabetic Retinopathy Screening in Rural Settings

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Diabetic retinopathy (DR) screening remains challenging in rural and underserved populations due to lack of access to specialized equipment. Smartphone-based fundus photography (SBFP) offers a low-cost, portable alternative potentially expanding screening reach. This study evaluated SBFP's diagnostic accuracy and feasibility in 200 diabetic patients attending rural clinics. Images were captured using commercially available adapters attached to smartphones and graded by ophthalmologists blind to patient history. SBFP sensitivity and specificity for detecting referable DR were 85% and 90%, respectively, compared to conventional fundus cameras. Interobserver agreement was high (κ = 0.82). Patients and healthcare workers reported high satisfaction with device usability.

Limitations included image quality variability due to media opacities and operator experience. Nonetheless, SBFP enables timely identification of patients requiring referral, reducing barriers to care. Integration of SBFP into teleophthalmology programs could improve DR detection rates, reduce blindness, and optimize resource allocation. Future developments in artificial intelligence-assisted image analysis may further enhance screening accuracy and workflow efficiency.

Biography

Dr. Priya Singh is an ophthalmologist and telemedicine specialist at the All India Institute of Medical Sciences, New Delhi. She is a leading expert in teleophthalmology, dedicated to expanding access to quality eye care in under-served and remote communities. Dr. Singh's work focuses on leveraging technology to bridge healthcare gaps and improve early detection and treatment of eye diseases.