



Raghad Saleh Alajlan

AAI-Imam-Muhammad Ibn
Saud University (IMSIU),
Saudi Arabia

Biography

Raghad Saleh Alajlan, was a final-year medical student at Al-Imam Muhammad Ibn Saud University in Riyadh, maintaining a GPA of 4.89. Her academic journey has been marked by a strong focus on ophthalmology, with multiple first-author research projects presented at both national and international conferences. She has been recognized with several awards for academic excellence, innovation, and leadership, and has contributed actively to student committees, health initiatives, and community outreach. My interests extend to medical innovation, entrepreneurship, and academic mentorship, with a commitment to advancing healthcare through evidence-based research and collaborative efforts.

Diagnostic Accuracy and Clinical Reliability of Portable Visual Field-Testing Devices for Glaucoma Monitoring: A Systematic Review and Meta-Analysis

Abstract:

Objectives: Portable visual-field (VF) testing devices have been introduced as accessible alternatives to standard automated perimetry (SAP) for glaucoma screening and monitoring. Their diagnostic accuracy and clinical reliability, however, remain uncertain due to heterogeneous methodologies and variable performance metrics. This systematic review and meta-analysis aimed to evaluate the diagnostic accuracy, test duration, and agreement of portable VF devices across multiple technological formats compared with SAP.

Methods: A comprehensive search of PubMed, Scopus, Web of Science, Cochrane Central, ClinicalTrials.gov, WHO ICTRP, and Google Scholar was conducted from inception through December 2024. Eligible studies included diagnostic-accuracy or cohort designs comparing portable VF devices—virtual-reality, tablet-based, web-based, or paper-based—with SAP as the reference standard. Two reviewers independently extracted data and assessed methodological quality using QUADAS-2. Pooled sensitivity, specificity, and diagnostic odds ratios (DOR) were calculated with bivariate random-effects models. Heterogeneity was assessed using I^2 and τ^2 statistics, and publication bias evaluated through Deeks' funnel asymmetry test. Secondary outcomes included test duration and correlation coefficients for mean deviation (MD), pattern standard deviation (PSD), and visual field index (VFI).

Results: Twenty-one studies including 2,254 participants (1,362 with glaucoma and 892 controls) were analyzed. Pooled sensitivity and specificity were both 86% (95% CI, 80–90 and 80–93, respectively), with an overall DOR of 28.6 (95% CI, 14.3–57.2). Virtual-reality and tablet-based devices demonstrated the highest diagnostic performance, while paper-based tools showed greater variability. Test durations were significantly shorter than SAP (SMD -3.86 ; 95% CI, -4.72 to -2.99). Agreement with SAP for global indices was strong ($r = 0.82$; 95% CI, 0.75 – 0.88).

Conclusions: Portable VF devices provide diagnostic accuracy comparable to SAP with markedly reduced testing time. Their validated performance supports integration into tele-ophthalmology, community screening, and home-monitoring pathways, offering scalable solutions for improving global glaucoma detection and management.