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Diagnostic accuracy of artificial intelligence for screening of oral potentially malignant disorders and oral cancer using clinical photographs: A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - KKU.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202650123

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 May 2026 and was last updated on 22 May 2026.

INTRODUCTION

Review question / Objective What is the diagnostic accuracy of artificial intelligence for screening oral potentially malignant disorders and oral cancer using clinical photographs? A systematic review and meta-analysis.

Condition being studied The diagnostic accuracy of artificial intelligence for screening oral potentially malignant disorders and oral cancer using clinical photographs.

METHODS

Participant or population Patients with oral potentially malignant lesions.

Intervention Arttificail imntelligence.

Comparator Human experts.

Study designs to be included We selected studies in which an AI algorithm was assessed as an “index test” for detecting or classifying oral mucosal lesions using clinical photographs (including smartphone photos) and where at least one other criterion was met.

Eligibility criteria We selected studies in which an AI algorithm was assessed as an “index test” for detecting or classifying oral mucosal lesions using clinical photographs (including smartphone photos) and where at least one other criterion was met. The eligible studies had to: (1) be tested on a separate data set (“test”, “validation”, “external”, “independent”, “temporally-separated” or “holdout”) to assess performance; (2) have reference standards based on histopathological diagnoses and/or medical expert opinions; and (3) provide enough detail to allow us to create a 2 × 2 contingency table, or reconstruct it from the authors’ reported sensitivities/specificities and class counts. Review articles, editorials, and studies whose objectives were not specifically related to diagnostic accuracy testing (DTA) for oral

mucosal lesions (e.g., caries, periodontal bone level assessment via cone-beam computed tomography) were excluded.

Information sources Databases including PubMed, Scopus, and web of science.

Main outcome(s) Diagnostic accuracy.

Quality assessment / Risk of bias analysis The risk of bias and applicability concerns for each study included in this review were evaluated using the QUADAS-2 tool, which assesses four domains: Patient Selection, Index Test, Reference Standard, and Flow/Timing. While completing the QUADAS-2 form, judgments were made based on one of three classifications (Low, High, or Unclear), taking into consideration factors specific to AI-based reviews (such as Spectrum Effects, selection of archival or web images, and selection of regions from lesions).

Strategy of data synthesis Data from the included studies were extracted using a pre-identified working table. The five authors divided the included articles for data extraction, and a consensus was reached through discussion when uncertainties arose.
The following information was extracted from each selected study: study design; imaging modality and acquisition context; AI architecture and training strategy (as reported in the original); reference standard; target condition and binary definition; unit of analysis; and test set sample sizes. Subsequently, 2 × 2 contingency tables (TP, FP, FN, TN) were extracted/reconstructed. If a study provided sensitivity and specificity along with explicit counts of the test-set classes for both positive and negative cases, we reconstructed TP/FN and TN/FP by dividing the counts by their respective denominators. As long as the denominator used to calculate the proportion is accurate and the original proportion is correctly rounded, the reconstructed integer counts should match the original numbers.

Subgroup analysis None.

Sensitivity analysis The Clopper-Pearson method was used to calculate sensitivity and specificity with 95% confidence intervals (CIs). The sensitivity and specificity for the screening/task (referral-worthy/suspicious vs. not referral-worthy/suspicious) were pooled using separate random-effects inverse-variance meta-analyses on the logit scale with DerSimonian–Laird estimation.10 The diagnostic odds ratio (DOR) was pooled using random-effects meta-analysis of log(DOR). Due to the limited number of studies available for pooling, we conducted a sensitivity analysis (i.e., a case-control data set for OSCC vs. normal data sets) and focused on clinical heterogeneity during interpretationwe conducted a meta-analysis of eleigible studies to indicate the sensitivity of the.

Language restriction Only sudyies inEnglish language.

Country(ies) involved Saudi Arabia.

Keywords oral cancer; oral potentially malignant disorders; diagnostic test accuracy; deep learning; clinical photographs; screening; systematic review; meta-analysis.

Contributions of each author

Author 1 - Abdullah Alqarni - Conceptualization.
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