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1130 – Artificial intelligence in the early detection of breast cancer

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Introduction: Breast cancer remains the leading malignancy among women, and early detection is crucial to reduce mortality. Although mammography is the standard screening tool, its diagnostic accuracy is limited by interobserver variability and false results. In this context, artificial intelligence (AI) emerges as a promising adjunct method to improve diagnostic performance. This study aimed to systematically evaluate the effectiveness of AI in mammographic analysis compared to conventional interpretation.

Methods: A systematic review without meta-analysis was conducted in accordance with PRISMA guidelines and registered in PROSPERO (ID: CRD420261348272). Searches were performed in the PubMed and LILACS databases using descriptors related to breast neoplasms, mammography, and artificial intelligence. The studies were filtered from the last ten years and involved women ≥ 40 years undergoing screening or diagnostic mammography. AI-based image analysis was compared to radiologist interpretation. Outcomes included sensitivity, specificity, AUC, predictive values, and false-positive/negative rates. Methodological quality of the studies was assessed using QUADAS-2.

Results: AI systems demonstrated high diagnostic performance, with AUC ranging from 0.80 to 0.97. Sensitivity was comparable to standard radiologist assessment, while specificity was frequently higher, reducing false positives and recall rates. AI also improved lesion prioritization and enabled partial exclusion of low-risk results. When combined with standard radiologist interpretation, there was consistent improvement in diagnostic accuracy and workflow efficiency. Additionally, AI showed increased sensitivity for early-stage tumors and potential in identifying interval cancers.

Conclusion: AI shows high diagnostic accuracy in mammography, enhancing performance when integrated with human interpretation. Despite promising results, it should be considered a complementary tool. Further prospective and multi-center studies are needed to validate its clinical applicability and cost-effectiveness.

Ethics: Public data – Literature review.

Registry: PROSPERO CRD420261348272.

Keywords: breast cancer; mammography; artificial intelligence.