Background: Breast cancer is a prevalent and potentially life-threatening disease. The advancements in artificial intelligence (AI) have led to the development of AI-powered imaging analysis systems, which show promise in improving breast cancer detection. This systematic review and meta-analysis aim to evaluate the diagnostic accuracy and clinical utility of AI-powered imaging analysis compared to traditional mammography and other imaging modalities for breast cancer detection.

Methods: A systematic search strategy was conducted from May 2003 to May 2023, focusing on MeSH terms related to breast cancer, artificial intelligence, machine learning, deep learning, imaging, mammography, diagnostic accuracy, and clinical utility. The search was limited to English-language studies. In addition, reference lists of included studies and pertinent reviews were hand-searched for additional relevant studies. The Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool was used to assess the quality and risk of bias of included studies.

Results: The systematic review identified 12 papers that met the inclusion criteria. These papers encompassed a range of AI-powered imaging analysis techniques, including machine learning and deep learning approaches. The quality assessment using the QUADAS-2 tool provided insights into the risk of bias and applicability of the primary diagnostic accuracy studies. Furthermore, a meta-analysis was conducted, and a forest plot was used to represent the data. The odds ratios of the included papers were calculated to be 128, 13, and 31, indicating the strength of association between AI-powered imaging analysis and breast cancer detection.

Conclusion: This systematic review and meta-analysis provide compelling evidence regarding the diagnostic accuracy and clinical utility of AI-powered imaging analysis for detecting breast cancer. The findings demonstrate significant odds ratios, suggesting a strong association between AI-powered imaging analysis and improved breast cancer detection. These results have important implications for clinical practice, highlighting the potential of AI technology to enhance breast cancer screening and diagnosis. Further research is warranted to validate these findings and explore the integration of AI-powered imaging analysis in routine clinical settings.