ABSTRACT

Title of Abstract : Effectiveness of Artificial Intelligence for Early Dental Caries Screening in Samarinda
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Background : Artificial Intelligence (AI) has rapidly advanced in dentistry, offering opportunities to enhance the early detection and diagnosis of dental caries. In Indonesia, caries remains a significant public health problem, and conventional screening methods are often subjective, time-consuming, and less accurate. Integrating AI into dental screening can improve diagnostic precision and efficiency, especially in primary healthcare settings such as clinics in Samarinda.

Objective : To evaluate the effectiveness of AI applications in early caries screening, explore healthcare professionals' perceptions toward AI adoption in primary care, and analyze policy implications related to digital health integration in dental services in Samarinda.

Research Methods/ Implementation Methods : A systematic review was conducted following PRISMA guidelines. Literature was sourced from PubMed, Scopus, and Google Scholar databases, covering publications between 2016 and 2025. Studies were selected based on inclusion criteria focusing on AI applications for caries detection, diagnostic accuracy, and relevance to primary healthcare. Data were synthesized descriptively to assess AI's performance and implementation challenges.

Results : The review revealed that AI models, particularly those based on deep learning and convolutional neural networks (CNN), demonstrated high diagnostic accuracy, with sensitivity and specificity exceeding 90%. AI applications improved diagnostic efficiency and decision-making in dental care. However, barriers such as limited digital infrastructure, low technological literacy among practitioners, and regulatory challenges persist in the implementation phase.

Conclusion/Lesson Learned : AI shows strong potential to improve early caries screening in primary care by enhancing diagnostic speed and accuracy. Successful implementation requires adequate infrastructure, practitioner training, and supportive digital health policies. Integrating AI can contribute significantly to the digital transformation of oral healthcare services in Samarinda.

Keyword : Artificial Intelligence; dental caries; primary care; healthcare professionals' perception; digital health