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Application of Artificial Intelligence in Dental Implantology: A Narrative Review

Armin Jamshidi¹, Aminollah Khormali¹, Negin Soghli², Patricia A. Miguez³

¹Adams School of Dentistry, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

²Department of Biomedical Sciences, Adams School of Dentistry, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

³Department of Periodontology, Endodontics and Dental Hygiene, Adams School of Dentistry, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA



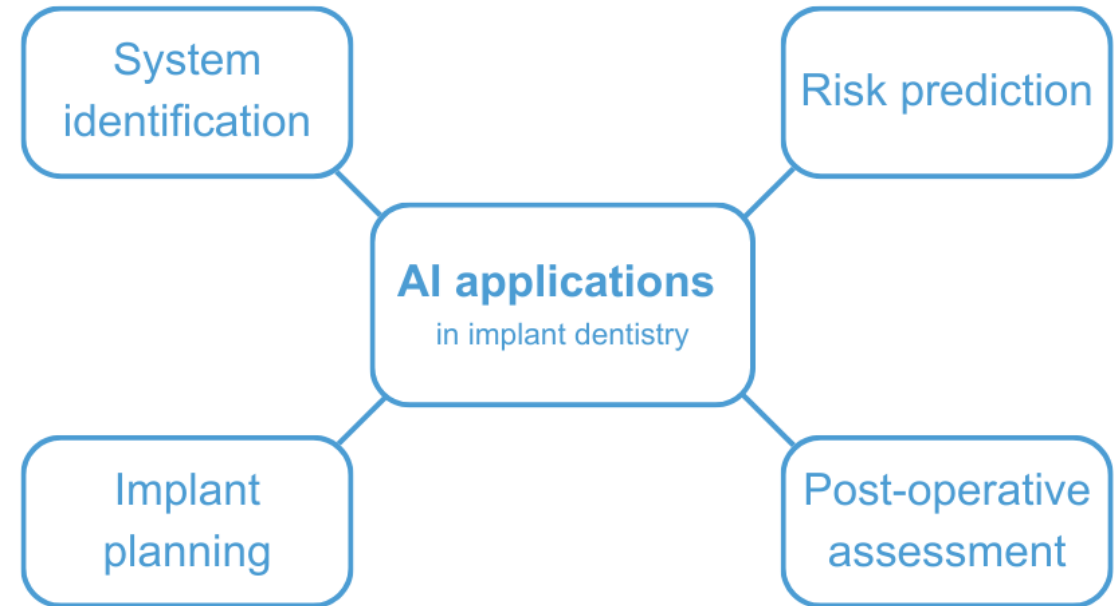
The University
of North Carolina
at Chapel Hill



Introduction



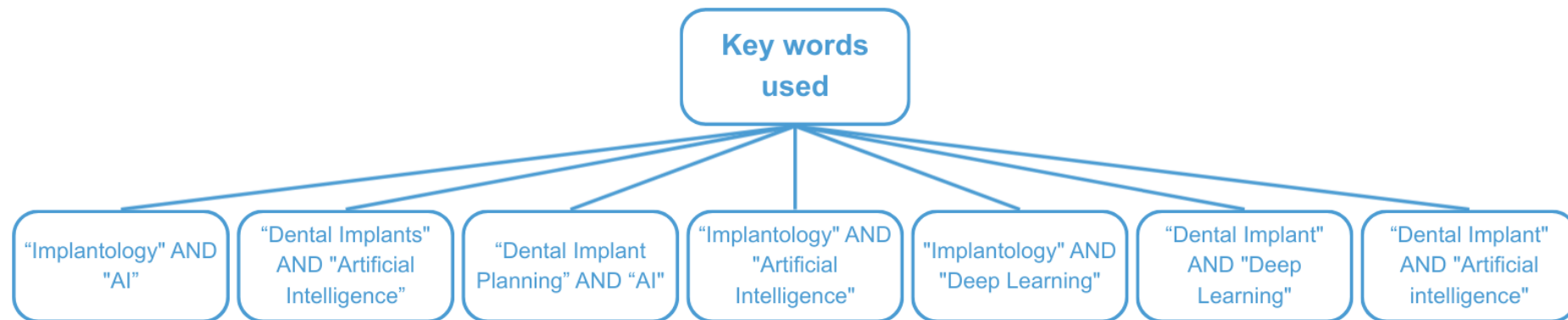
- How is **Artificial Intelligence (AI)** performing in treatment planning and evaluation of dental implant success?
- We conducted a narrative review of published papers to **synthesize** and **evaluate** AI applications in dental implantology, highlighting key **advantages**, **limitations**, and **future directions**.



Methods



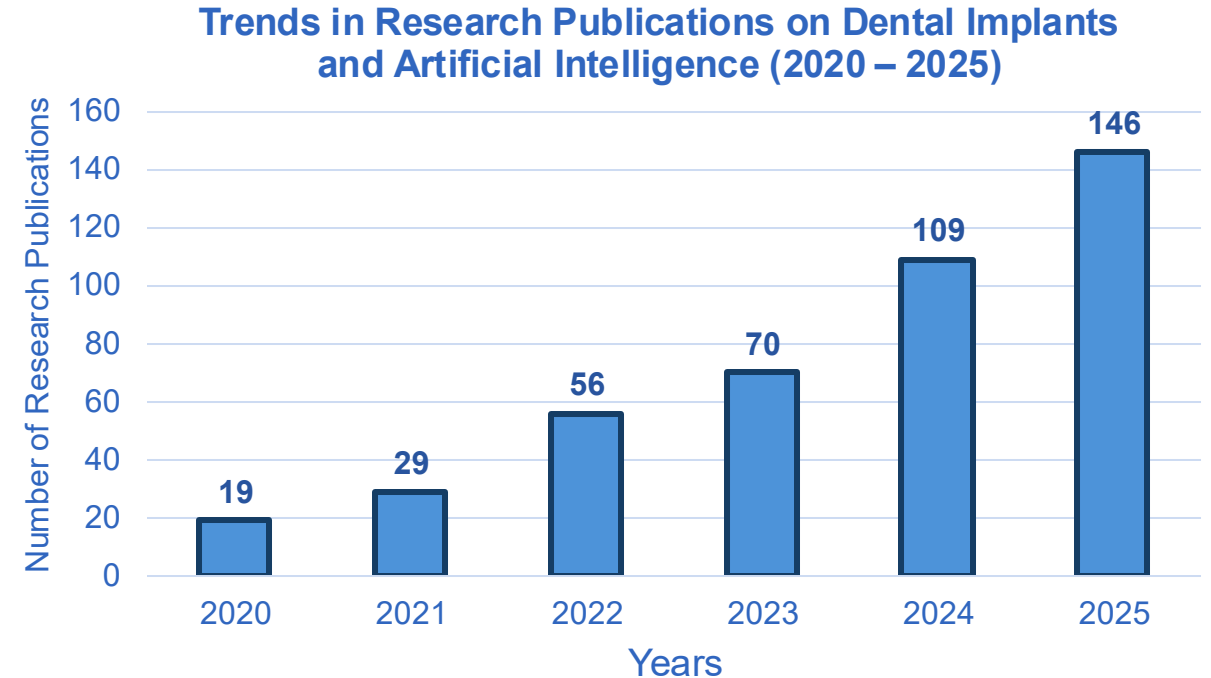
- Google Scholar and PubMed were used to search for published papers in English between the years 2020 and 2025.
- Only original articles were included for the screening.
- Three evaluators (AJ, AK, and NS) screened all studies.
- Studies closely aligning with the focus of the review were included.



Results



- Rapidly growing trend since 2020
- Main uses of AI and implants:
 - Automating image-based tasks
 - Predicting clinical outcomes
 - Helping with treatment planning
- Accuracy ~ 90%
- Area under curve: 0.9 - 0.99



These studies have shown that AI have commonly performed as well as or have out-performed conventional methods and expert clinicians.

Conclusion



- Current **promises** with AI:
 - Clinical tools
 - Recognizing treatment outcomes
 - Personalizing care
- Current **challenges** with AI:
 - Standardization across imaging modalities
 - External validation
 - Handling low quality radiographs
 - Integration of multi-modal data
 - Unrepresentative datasets for predictive accuracy
- Progress with AI can strengthen **clinical applicability** and **reliability**.