

Peer Review File

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**REVIEWER A**

*Comment 1:* The title of this review paper must be revised because the literatures from implantology and dental practice were also contained.

*Reply 1:* Title has been modified with the addition of Implantology (see page 1, line 2).

*Changes in the text:* Artificial Intelligence in Periodontology and Implantology – A Narrative Review.

*Comment 2:* PRISMA checklist should be used as the review paper.

*Reply 2:* This article is presented in accordance with the narrative review reporting checklist (see page 5, line 126) as it is a narrative review and not a systematic review. This has been recommended in previous literature, an example of which is given below:

Gregory AT, Denniss AR. An Introduction to Writing Narrative and Systematic Reviews - Tasks, Tips and Traps for Aspiring Authors. Heart Lung Circ. 2018 Jul;27(7):893-898. doi: 10.1016/j.hlc.2018.03.027.

*Comment 3:* English proof service must be used to improve readability.

*Reply 3:* Grammarly proofreading services have been used. Please let us know if further English proof service is required.

*Comment 4:* Subsections are not required for the Introduction section.

*Reply 4:* Subsections have been removed from the introduction section (see page 4, line 68-126).

*Comment 5:* PRISMA flow diagram should be used.

*Reply 5:* PRISMA flow diagram has been added (see page 17, line 505-530).

*Changes in the text:* The study selection process is outlined in Figure 1 (see page 6, line 144).

*Comment 6:* Section 5.1 CBCT should be spelled out at the first use

*Reply 6:* CBCT has been spelled out in section 3.4 (see page 7, line 181) and 4.1 (see page 8, line 210).

*Changes in the text:* Cone beam computed tomography (CBCT) scans.

*Comment 7:* Section 5.3 "Implant Designs" should be "implant designs".

*Reply 7:* "Implant Designs" has been modified to "implant designs" (see page 9, line 233).

*Changes in the text:* Section 4.3 Optimization of implant designs.

*Comment 8:* Section 5.4 "Treatment Outcomes" should be "treatment outcomes".

*Reply 8:* "Treatment Outcomes" has been modified to "treatment outcomes" (see page 9, line 242).

*Changes in the text:* Section 4.4 Prediction of treatment outcomes

*Comment 9:* Section 6 "CHATGPT IN PERIODONTOLOGY" should be "ChatGPT in periodontology".

*Reply 9:* "CHATGPT IN PERIODONTOLOGY" has been modified to "ChatGPT in periodontology" (see page 9, line 252).

*Changes in the text:* Section 5 ChatGPT in periodontology.

*Comment 10:* Section 7 "ARTIFICIAL INTELLIGENCE IN DENTAL PRACTICE" should be "AI in dental practice".

*Reply 10:* "ARTIFICIAL INTELLIGENCE IN DENTAL PRACTICE" has been modified to "AI in dental practice" (see page 10, line 264).

*Changes in the text:* : Section 6 AI in dental practice".

*Comment 11:* Section 8 "Artificial Intelligence" should be "AI".

*Reply 11:* "Artificial Intelligence" has been modified to "AI" (see page 11, line 305).

*Changes in the text:* Section 6.1 Advantages of AI.

*Comment 12:* The Conclusion section is too long. It should be summarized according to main outcome of this review.

*Reply 12:* We have reduced the length of the conclusion and summarized it (see page 11-12, line 324-331).

*Changes in the text:* AI can improve the effectiveness of periodontists as decision aids and decision-making tools. To gain widespread implementation, AI systems must receive regulatory approval, incorporation with public healthcare systems, standardization for reliable operation, clinical advice and training, and appropriate financing for continuous operation. However, it must be highlighted that AI cannot replace clinicians; instead, they can support periodontists as they provide patient care, with clinicians adopting roles that best utilize special human skills like compassion, motivation, and comprehensive assimilation as part of a holistic patient-centric healthcare system.

## **REVIEWER B**

*Comment 1:* The article is well-structured but would benefit from a revision in English. In light of the advancements in AI in dentistry, the introduction currently does not adequately address the topic. It is recommended to enhance the introduction by including the latest applications of AI across various dental specialties. Additionally, consider citing these articles for reference.

*Reply 1:* The latest applications of AI across various dental specialties have been included in the introduction (see page 4-5, line 86-120). The following references have been cited in the introduction as suggested (see page 4, line 90-95; page 5, line 100-101, line 110-112):

- Schwendicke F, Samek W, Krois J. Artificial Intelligence in Dentistry: Chances and Challenges. *J Dent Res.* 2020 Jul;99(7):769-774. doi: 10.1177/0022034520915714. Epub 2020 Apr 21. PMID: 32315260; PMCID: PMC7309354.
- Liu J, Zhang C, Shan Z. Application of Artificial Intelligence in Orthodontics: Current State and Future Perspectives. *Healthcare (Basel).* 2023 Oct 18;11(20):2760. doi: 10.3390/healthcare11202760. PMID: 37893833; PMCID: PMC10606213.
- Issa J, Jaber M, Rifai I, Mozdziak P, Kempisty B, Dyszkiewicz-Konwińska M. Diagnostic Test Accuracy of Artificial Intelligence in Detecting Periapical Periodontitis on Two-Dimensional Radiographs: A Retrospective Study and Literature Review. *Medicina (Kaunas).* 2023 Apr 15;59(4):768. doi: 10.3390/medicina59040768.

*Changes in the text:* Section 2 (AI in dentistry) incorporated into section 1 (Introduction).

Citation of references 7 (Schwendicke et al.), 8 (Liu et al.) and 9 (Issa et al.) in the introduction.

*Comment 2:* Consider adding the aim of the study at the end of the introduction.

*Reply 2:* The aim of the study has been added at the end of the introduction (see page 5, line 124-125).

*Changes in the text:* This article aims to review the applications of AI across various facets of periodontal diagnosis and treatment planning, along with its advantages and drawbacks.

*Comment 3:* To streamline the content and avoid repetition, it would be beneficial to incorporate the details from Section 3 (AI in Dentistry) into the introduction. Furthermore, the manuscript could be enriched by adding illustrations. Lastly, consider merging Section 8 (Advantages of Artificial Intelligence) with another relevant section.

*Reply 3:* Section 3 (AI in Dentistry) has been incorporated into section 1 (Introduction) (see page 4-5). Section 8 (Advantages of Artificial Intelligence) has been merged with section 6 along with the disadvantages of AI (see page 11, line 305-321).

*Changes in the text:* Section 2 (AI in dentistry) incorporated into section 1 (Introduction). Section 8 merged into section 6 (Section 6.1 Advantages of AI, Section 6.2 Disadvantages of AI).

## **REVIEWER C**

*Comment 1:* The literature search was not appropriately designed. The chosen key word search could potentially miss some important studies. The inclusion and exclusion criteria were not clearly defined in table 1, and it contradicts to the criteria in the method section. The study did not mention how many studies were extracted, screened and included/excluded.

*Reply 1:* Section 2 on methods has been modified. Keywords have been added. Inclusion and exclusion criteria have been clearly defined in text as well as table 1. Number of studies that were extracted, screened and included/excluded has been mentioned (see page 6, line 129-146).

*Changes in text:* A comprehensive search was carried out utilizing the databases such as Google Scholar, PubMed, MEDLINE, and Embase, using the keywords "Periodontics AND AI", "Periodontology AND Artificial Intelligence", "Periodontology AND neural networks" "AI IN periodontal disease and periodontal therapy" (Table 1). The publication period was set to 20 years. Original articles, clinical trials and systematic reviews utilizing AI for periodontal diagnosis and treatment, and study designs in which AI was used as the independent variable

were included in this review. Studies that were not published in English language, studies which used other software rather than AI-based tools, and studies which used AI for purposes other than periodontology and implantology were excluded. A single reviewer screened titles and abstracts. After a detailed review of the abstracts, the most relevant papers related to our topic were included, and any irrelevant articles were excluded. Full texts were reviewed by all the authors to determine their eligibility for studies which met the inclusion criteria, or where there was uncertainty to obtain consensus. Data was extracted from the studies and recorded in a tabulated form. The standardized data collation included the author names, year of publication, and the applications of AI. The study selection process is outlined in Figure 1. A total of 410 articles were identified for screening. In total, 295 texts were excluded after screening for factors not meeting inclusion criteria. Full-text review identified 56 studies for inclusion in the review.

*Comment 2:* The main aim of the study is to review AI in periodontology; however, the study used a large section 3 to review AI in dentistry and section 5 to review AI in implantology, which is completely unnecessary.

*Reply 2:* Section 3 (AI in dentistry) has been merged with section 1 (Introduction). Implantology has been included since it is very closely associated with Periodontology, and hence can be useful to periodontists who also practice Implantology.

*Comment 3:* The main body of the study including section 4 about AI in periodontology, only a sentence to describe the AI application in each aspect of periodontal disease. There is lack of critical insight and review of the literature in this area.

*Reply 3:* The review of literature has been presented in the tables for each application (see page 18-24).

## **REVIEWER D**

*Comment 1:* Thank you for your contribution. The importance of this article is greatly needed in the wider community. However, there is limited information noted in the method section for a review. Additionally, the keywords are very limiting with a high likelihood for bias due to limited information about exclusion criteria for a review article. Given the large amount of research in AI and periodontics section 3 is not needed. A more focused approach on the

periodontal field and AI would provide more understanding for the reader based on the title. For a review article the online citations lack high evidence. I would recommend using a more evidence-based methodology similar to PRISMA and restructuring the body of the article to focus on periodontics and AI.

*Reply 1:* The methods section has been updated. Keywords have been added in the methods. Section 3 has been merged with section 1. PRISMA flowchart has been added (see page 17, line 505-530).

*Changes in text:* A comprehensive search was carried out utilizing the databases such as Google Scholar, PubMed, MEDLINE, and Embase, using the keywords "Periodontics AND AI", "Periodontology AND Artificial Intelligence", "Periodontology AND neural networks", "AI IN periodontal disease and periodontal therapy" (Table 1). The publication period was set to 20 years. Original articles, clinical trials and systematic reviews utilizing AI for periodontal diagnosis and treatment, and study designs in which AI was used as the independent variable were included in this review. Studies that were not published in English language, studies which used other software rather than AI-based tools, and studies which used AI for purposes other than periodontology and implantology were excluded. A single reviewer screened titles and abstracts. After a detailed review of the abstracts, the most relevant papers related to our topic were included, and any irrelevant articles were excluded. Full texts were reviewed by all the authors to determine their eligibility for studies which met the inclusion criteria, or where there was uncertainty to obtain consensus. Data was extracted from the studies and recorded in a tabulated form. The standardized data collation included the author names, year of publication, and the applications of AI. The study selection process is outlined in Figure 1. A total of 410 articles were identified for screening. In total, 295 texts were excluded after screening for factors not meeting inclusion criteria. Full-text review identified 56 studies for inclusion in the review.