

INPLASY PROTOCOL

To cite: Saini et al.
Investigation on the
application of artificial
intelligence in prosthodontics.
Inplasy protocol 2022120096.
doi:
10.37766/inplasy2022.12.0096

Received: 23 December 2022

Published: 23 December 2022

Corresponding author:
Ravinder Saini

dr_ravi_saini@yahoo.com

Author Affiliation:
King Khalid University

Support: None.

Review Stage at time of this submission: Completed but not published.

Conflicts of interest:
None declared.

Investigation on the application of artificial intelligence in prosthodontics

Saini R¹; Alshadid, A²; Aldosari, L³.

Review question / Objective: 1. Which artificial intelligence techniques are practiced in dentistry? 2. How AI is improving the diagnosis, clinical decision making, and outcome of dental treatment? 3. What are the current clinical applications and diagnostic performance of AI in the field of prosthodontics?

Condition being studied: Procedures for desktop designing and fabrication Computer-aided design (CAD/CAM) in particular have made their way into routine healthcare and laboratory practice. Based on flat imagery, artificial intelligence may also be utilized to forecast the debonding of dental repairs. Dental arches in detachable prosthodontics may be categorized using Convolutional neural networks (CNN). By properly positioning the teeth, machine learning in CAD/CAM software can reestablish healthy inter-maxillary connections. AI may assist with accurate color matching in challenging cosmetic scenarios that include a single central incisor or many front teeth. Intraoral detectors can identify implant placements in implant prosthodontics and instantly input them into CAD software. The design and execution of dental implants could potentially be improved by utilizing AI.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 December 2022 and was last updated on 23 December 2022 (registration number INPLASY2022120096).

INTRODUCTION

Review question / Objective: 1. Which artificial intelligence techniques are practiced in dentistry? 2. How AI is improving the diagnosis, clinical decision making, and outcome of dental treatment?

3. What are the current clinical applications and diagnostic performance of AI in the field of prosthodontics?

Rationale: As artificial intelligence has made a significant advancement in the area of in-telligence technology, it is attracting

interest on a global scale. It is employed in every industry, including dentistry and automation. Thus, this study demonstrated the many fields in which AI models can be employed and their application in prosthodontics.

Condition being studied: Procedures for desktop designing and fabrication Computer-aided design (CAD/CAM) in particular have made their way into routine healthcare and laboratory practice. Based on flat imagery, artificial intelligence may also be utilized to forecast the debonding of dental repairs. Dental arches in detachable prosthodontics may be categorized using Convolutional neural networks (CNN). By properly positioning the teeth, machine learning in CAD/CAM software can reestablish healthy inter-maxillary connections. AI may assist with accurate color matching in challenging cosmetic scenarios that include a single central incisor or many front teeth. Intraoral detectors can identify implant placements in implant prosthodontics and instantly input them into CAD software. The design and execution of dental implants could potentially be improved by utilizing AI.

METHODS

Search strategy: web search: <https://www.webofscience.com/wos/woscc/advanced-search> software: Publish or Perish for batch export, IP based access with login/password Query: “artificial intelligence” AND (dental OR dentistry OR tooth OR teeth OR dentofacial OR maxillofacial OR prosthodontic) Limited to subject area: Dentistry Prosthodontics Type: Articles or review articles in English Google Scholar, web advanced search: https://scholar.google.com/#d=gs_asd&t=1650796298842 software: Harzing’s Publish or Perish for batch export Query: “artificial intelligence” AND (dental OR dentistry OR tooth OR teeth OR dentofacial OR maxillofacial OR orofacial OR orthodontics OR endodontics OR periodontics OR prosthodontics).

Participant or population: Age Range 16 Years to 65 Years.

Intervention: Artificial intelligence (AI) methods (deep learning, natural language processing, and robots) are used in dentistry treatment diagnosis, management, and prognosis prediction.

Comparator: Automatic algorithm, testing models, image analysis, and rater opinions.

Study designs to be included: We took into account both descriptive (case control and cohort) and interventional (trials) based research that was written in English for this review.

Eligibility criteria: Radiographs (periapical, bitewing, orthopantomography, and cone-beam computed tomography), CAD/CAM, and patient/simulator faciodental pictures in two- and three-dimensions (computer-aided design and computer-aided manufacturing). electronic dental models

Information sources: Scientific studies that specifically addressed the use of AI in prosthodontics were taken from several reliable sources, including Google Scholar, Pub-Med via MEDLINE, Springer, and Scopus, EBSCO host (Dentistry & Oral Sciences Source database), Science Direct, and Web of Science (All databases: WOS, KJD, MEDLINE, RSCI, SCIELO). The extensive collection of publications was analyzed to only include prosthodontics-related articles. These publications were evaluated attentively before being included in the research process.

Main outcome(s): The effectiveness of the CNN models was examined. Based on the findings of this re-search, it is possible to conclude that the AI-CNN system can categorize implant technologies with almost equal or higher efficiency than humans. Positional mistakes, cementation errors, and occlusion or interproximal correction with an under mount are just a few of the causes of errors that might occur.

Additional outcome(s): AI models may one day help physicians identify arches and so facilitate the high-quality patient-specific design.

Data management: Data was processed in Microsoft Excel (Excel 365; Microsoft Corp., Redmond, WA, USA). For export and data manipulation, Google Sheets (Alphabet Inc., Mountain View, CA, USA) were also used. This is an online spreadsheet program included as part of the free, web-based Google Docs Editors suite offered by Google.

Quality assessment / Risk of bias analysis: Two researchers independently assessed the risk of bias of the included articles using —JBI critical appraisal tools. The potential risk of bias was categorized as low if a study provided detailed information pertaining to 70% or more of the applicable parameters. Moderate risk was considered if a study provided information corresponding to less than 70% to 50% of the applicable parameters, whereas if a study showed missing information regarding more than 50% of the applicable parameters, the study was categorized as exhibiting a high risk of bias.

Strategy of data synthesis: Two review authors (RS and AK) used the studies to help select studies and document their decisions. This was done in two stages, with the first stage consisting of a title and abstract screening of all studies against the inclusion criteria, and the second stage being a full text assessment of papers that were deemed potentially relevant based on the initial screening [1]. RS and AK, the review's authors, discussed and settled their differences by consensus after consulting the procedure.

Subgroup analysis: The data was compiled from a variety of articles:

- Author(s), year of publication, country, study design.
- Total number of patients/datasets.
- Training/validation datasets
- Test datasets
- Aim of the study
- AI application; and

- Outcome.

Sensitivity analysis: NA.

Language restriction: Articles only in English were Selected.

Country(ies) involved: India, Saudi Arabia.

Keywords: Artificial Intelligence ; Prosthodontics; ANOVA.

Dissemination plans: All the data and the article will be share after the publication.

Contributions of each author:

Author 1 - RAVINDER SAINI - Conceptualization and drafting of Manuscript.

Email: dr_ravi_saini@yahoo.com

Author 2 - AbdulKhaliq Alshadid - Methodology, Formal Analysis.

Email: aalshadidi@kku.edu.sa

Author 3 - Lujain Aldosari - Selection Criteria : Risk of Bias.

Email: lualdossari@kku.edu.sa