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Complete dentures in digital vs. conventional workflow: efficiency, precision, aesthetics, and patient satisfaction: a literature review

Complete dentures in digital vs. Conventional workflow: efficiency, precision, aesthetics, and patient satisfaction: a literature review

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ABSTRACT:

An integrative literature review was conducted to compare digital complete dentures (CAD/CAM and 3D printing) with conventional methods, analyzing their efficiency, accuracy, mechanical properties, wettability, costs, and patient satisfaction. The methodology was based on an integrative review, searching the SCIELO and PUBMED databases (July-August 2025). Thirteen original articles from the last decade, in English, Portuguese, or Spanish, were selected, critically read, and analyzed to compile distinct information. The results indicate that CAD/CAM milling offers high manufacturing precision, fit accuracy, and lower surface roughness, outperforming 3D printing and conventional methods.

Extraoral digital scanners have also demonstrated high accuracy. Digital methods reduce costs and the number of clinical visits. However, the flexural strength of 3D-printed resins is lower, and digital prostheses may be more difficult to repair or experience aesthetic decline due to resin discoloration. Milled surfaces have superior wettability.
Patient satisfaction is generally positive, although conventional prostheses may be superior in phonetics and comfort. It is concluded that both methods are effective. Digital flow is a more modern and efficient alternative, promoting greater aesthetic and functional predictability. The choice of method should consider individual needs, costs, and available technology. Current research, however, presents contradictory results, requiring further investigation into reparability and accuracy consistency.
Keywords: Complete denture. Digital. CAD/CAM. Dentistry.

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An integrative literature review was conducted to compare digital complete dentures (CAD/CAM and 3D printing) with conventional methods, analyzing their efficiency, accuracy, mechanical properties, wettability, costs, and patient satisfaction. The methodology was based on an integrative review, searching the SCIELO and PUBMED databases (July-August 2025). Thirteen original articles from the last decade, in English, Portuguese, or Spanish, were selected and critically read and analyzed to compile distinct information. The results indicate that CAD/CAM milling offers high manufacturing precision, fit accuracy, and reduced surface roughness, outperforming 3D printing and conventional methods. Extraoral digital scanners have also demonstrated high accuracy. Digital methods reduce costs and the number of clinical visits. However, the flexural strength of 3D-printed resins is lower, and digital dentures may be

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more difficult to repair or experience aesthetic decline due to resin discoloration. The wettability of milled surfaces is superior. Patient satisfaction is generally positive, although conventional prostheses may be superior in phonetics and comfort. It is concluded that both methods are effective. Digital flow is **a** more modern and efficient alternative, promoting greater aesthetic and functional predictability. The choice of method should consider individual needs, costs, and available technology. Current research, however, presents contradictory results, requiring further investigation into reparability and accuracy consistency.
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1. INTRODUCTION

Oral diseases, including carious lesions, periodontal pathologies, dental trauma when it is already in an advanced stage, it results in tooth loss or even total edentulism impairing masticatory function with the risk of developing nutritional and other problems health disorders (Zupancic Cepic et al., 2023).

In this premise, complete dentures play a fundamental role in dentistry, offering an effective solution for edentulism, significantly improving the quality of life of patients, in order to acquire all masticatory functions, the preservation of health of oral tissues and patient self-esteem. Thus, the manufacturing process of these prosthetics can be carried out using two main methods in dentistry: the method conventional/traditional or the digital method (De Souza Almeida, Da Silva Machado & De Souza, 2023).

According to Dib Zakkour et al. (2023), the traditional method for making a prosthesis supported by mucosa involves an extensive sequence of clinical and laboratory procedures, which may result in a relatively long period of time for completion.

This same author also mentions that, in the area of complete dentures, the use of digital methods has increased considerably in recent decades, as advances in science and new technologies have technologies have made rapid progress in the field of dentistry.

In this same perspective, the rehabilitation of edentulous patients with removable complete dentures (PTR) is a pillar of oral rehabilitation. With the increase in average life expectancy, the number absolute number of patients requiring prosthetic rehabilitation continues to grow, making imperative to seek more efficient and high-quality workflows (Eva Anadioti et al., 2020).

However, for Can Wang et al. (2020) digital technology, in particular design and computer-aided manufacturing (CAD/CAM), revolutionized prosthetic practice, with the CAD/CAM systems for PTRs are generating considerable interest by offering a

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viable and modernized alternative to conventional methods. The primary digital flow involves essentially subtractive (milling) and additive (3D printing/3DP) methods.

In terms of technical performance, Rohit Kunnath et al. (2025) and Can Wang et al. (2020) state in their studies that the precision and adaptation of the prosthetic base are crucial factors for retention and stability. In vitro studies and reviews have shown that the bases Milled prosthetics (MIL) have a precision of fit (trueness) and a roughness of significantly higher surface areas than conventional molded bases. compression (CCM) and 3D printed bases (TDP). Therefore, the objective of this review literary study aims to compare the performance of complete dentures manufactured in the digital flow versus conventional, critically examining the available literature on the efficiency of the flow of work, manufacturing precision, aesthetic results and patient satisfaction.

2 THEORETICAL FRAMEWORK

2.1 CONVENTIONAL COMPLETE DENTURES X CAD/CAM

According to the author Murabaki et al. (2022), in their theoretical basis, they mention that prostheses Traditional are the most common manufacturing methods used in edentulous patients and their disadvantages are due to several consultations and high costs for materials.

On the other hand, in his literature review, the author Dib Zakkour et al. (2023), argued that the use of CAD/CAM is more advanced compared to conventional techniques resulting in simplified clinical protocols, in addition to the use of materials with superior properties, and also, in the significant improvement in the fit and retention of the prostheses, consequently, reduced office and laboratory work time and overall cost reduction. However, the adoption of this technology requires a learning curve and the digitalization of procedures clinical.

In this way, this software allows the creation of prostheses digitally and can be adjusted according to the specific needs of patients and produce through computers such as milling machines and printers, complete dentures with high precision and efficiency (Freitas, 2023).

However, according to the clinical report by Zavolski et al. (2021), technological innovations are challenging for dental professionals, as learning is required continuous to operate new devices, software and machines, as well as integrate them into practice daily. From this perspective, even though digital tools provide a guide for preparation

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minimal dental, it is essential that the operator has knowledge of the physical characteristics and the mechanical properties of dental materials and substrates to ensure the success of the case.

In the systematic review by Tew, Soo & Pow (2023) it is also addressed that proficiency in CAD/CAM system is essential for the production of digital prosthetics with clinical consultations reduced. Consequently, it is imperative to emphasize that professionals receive training adequate in the CAD/CAM system before implementing this technology in customer service patient.

2.2 CLINICAL TIME AND PATIENT SATISFACTION

In terms of time savings and cost-effectiveness, digital prosthetics have demonstrated more efficiency compared to conventional techniques. Thus, based on the report of clinical case by Zavolski et al. (2021), it was analyzed that the two work methods and revealed that dental professionals spend less time on the independent digital flow of the CAD/CAM system to be used.

Tew, Soo & Pow (2023) observed, in their meta-analysis, that prostheses made by CAD/CAM required fewer visits, consequently, less adjustment, such that, in principle, a ideally adjusted denture base.

However, in the review by Murabaki et al. (2022) some authors did not agree, since claim a longer working time in the digital flow, since, for the development of the prosthesis digital, the technician needs to build a precise and well-organized prosthesis demanding more time.

Zupancic Cepic et al. (2023) corroborate this thought, stating, in their study design and randomized, that both conventional and digital prostheses required an average of five visits for the installation of prostheses, in this case, the author reaffirms that there are strategies to improve the manufacturing flow of digital prosthetics to reduce the number of consultations.

Furthermore, regarding patient opinion, Ohara et al. (2022) found that patient satisfaction patients is higher with conventional prostheses compared to digital prostheses.

Dib Zakkour et al. (2023) also agree, stating that patients prefer prosthetics conventional due to their superior stability, which is achieved through articulation individual dental implant. The stability of conventional dentures can be attributed to the sealing peripheral and stable occlusal contacts, characteristics that are not as effective in prosthetics digital.

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In the same sense, in the retrospective and cross-sectional study by Clark et al. (2021), they report that a frequently cited factor that contributes to satisfaction is the reduction in duration treatment. In a traditional workflow, it typically takes about 5 visits to create a complete denture, while in a digital workflow, this number is reduced for 2-3 visits. The fewer appointments required not only saves time for the dentist, but also minimizes travel-related expenses. Consequently, both the both the healthcare provider and the patient can benefit from reduced costs.

2.3 RETENTION, FIT AND AESTHETICS

Dib Zakkour et al. (2023), in their theoretical basis, understand that prostheses conventional methods presented challenges such as complicated procedures, longer processing times, production and deformation caused by the polymerization of PMMA, which compromised the level of adaptation at the base of the prosthesis.

In the systematic review by Srinivasan et al. (2021), it was demonstrated that the results on the retention result in milled or 3D printed digital complete dentures being more retentive, in a clinical context, than conventional prostheses.

According to Tew, Soo & Pow (2023) many patients prefer milled complete dentures digitally due to its better retention capacity, thus improving chewing.

Improved retention has been reported because milled prostheses can overcome the contraction of polymerization associated with conventionally manufactured CDs, thus improving the fit prosthetic and patient comfort.

Similarly, a good explanation is observed in the randomized crossover study of Zupancic Cepic et al. (2023), since the author addresses that when using a disk PMMA for the production of prosthetics, the milling process effectively eliminates shrinkage polymerization that is normally associated with processed PMMA prostheses conventionally. This eradication of polymerization shrinkage eliminates the need for an accommodation phase in which conventional dentures are adjusted, resulting in greater stability for milled denture bases.

Srinivasan et al. (2021) show, in their meta-analysis, that in the comparison between the CD group conventional and the group that uses 3D printed CDs, in relation to aesthetics, it was observed a distinct preference for the conventional group. The aesthetics of CAD-CAM CDs still presents a limitation, as patients express apprehension about the appearance of prosthetics, especially the pink and white aspects.

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3. MATERIAL AND METHOD

The aforementioned research is an integrative review of the literature, which is presented in detail. identification and understanding of a specific topic, in addition to allowing the answers to questions relevant to understanding the topic discussed (De Lima Dantas et al., 2022).

The process of searching for scientific materials was carried out between July and August 2025, in the following databases: Scientific Electronic Library Online (SCIELO) and PUBMED.

To search for eligible studies, controlled vocabulary descriptors were used.

Health Sciences Descriptors (DeCS) and Medical Subject Heading (MeSH): “digital”, “Complete dentures”, “CAD/CAM” and “dentistry”.

The selected articles met the criteria for inclusion as English language, Portuguese or Spanish, published between 2020 and 2025 that made comparisons of production of the complete denture digitally and conventionally, within the theme. Excluded were opinions, news from editors or information and articles dealing with other aspects of the resins outside the objectives of this research. Data collection was designed in such a way that consider all the important points of the research question. Therefore, it was constructed descriptive topics in order to compile distinct information. The selected studies were carefully read and analyzed from a critical point of view. Subsequently, the results were tabulated allowing the identification of results, interpretation and integration through of thematic categories. In addition, specialized literature was used to construct dialogues and inferences on the topic, with the aim of strengthening discussions.

After the search was carried out, the materials that met the inclusion and exclusion criteria 22 articles were analyzed, of which 13 articles were summarized in a table where the predominant language was English.

The summary was organized to present the structure of the work in topics, composed of: author's name, year of publication, materials and methods, objectives and main results obtained. The data found were analyzed and presented in tables.

3. RESULTS AND DISCUSSION

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AUTHOR NODE	TYPE OF SEARCH	MATERIALS AND METHODS OBJECTIVE		RESULT
Prpiÿ et al. (2020)	In vitro study	A total of 160 rectangular specimens were manufactured. Eight different denture base materials were used: Three conventional heat-cured acrylics and three CAD/CAM-produced materials. A 3D printed material. A polyamide material. Hot-cured acrylic blocks were prepared by compression molding.	Evaluated and compared the mechanical properties (flexural strength and surface hardness) of different materials and technologies for the manufacture of denture bases, with emphasis on technologies digital computer-aided design/computer-aided manufacturing (CAD/CAM) and 3D printing.	The mechanical properties of Most CAD/CAM and heat-cured acrylics are superior to 3D printed materials. Despite this, the type of polymerization of a material does not guarantee its optimal mechanical properties, and the properties depend more on the material itself than on the manufacturing method.
Anadiot et al. (2020)	laboratory study experiments	Available literature on 3D-printed complete dental prostheses was searched in databases. The review focused on new biomaterials, manufacturing techniques and workflow, clinical performance, and patient satisfaction.	It compared removable complete dentures manufactured conventionally and digitally (using subtractive and additive methods) in terms of manufacturing accuracy (trueness and precision), fracture resistance under torsional load and repair capacity after fracture.	Currently, 3D printing is recommended for custom trays, registration bases, trial, temporary or immediate prostheses, but not for permanent prostheses. Limitations include poor aesthetics and retention, difficulty balancing occlusion, and low printer resolution. In terms of accuracy, CAD/CAM milled prostheses have been shown to be superior to 3D printed ones, especially at the intaglio surface and over time. However, another study suggested that the rapid prototyping (RP) method had the lowest fit discrepancies. The flexural strength of 3D printed resins is lower than that of milled or conventional ones, but generally within acceptable limits.
Wang et al. (2020)	Systematic review (in vitro)	An electronic search of the English-language literature was conducted in the PubMed/MEDLINE database from January 2009 to October 2019. This research was complemented by manual searches and citation mining.	Evaluated the accuracy of digital complete dentures (CDs) and summarized the factors that influence it.	Most studies reported clinically acceptable values for occlusal accuracy (<1 mm) and denture base fit (<0.3 mm) of digital CDs. Digital CDs showed similar or better fit than conventionally manufactured CDs. Factors that influence the accuracy of digital CDs include manufacturing technique, CAD-CAM system type, and long-term service life. study evaluated 4 systems CAD-CAM (AvaDent, Baltic, Whole You, Wieland/Ivoclar), concluding that AvaDent Digital Dentures showed the greatest congruence. It was not possible to draw clear conclusions about the superiority of CAD-CAM milling and 3D printing in terms of prosthetic accuracy, as different studies presented contradictory results. The adaptation of

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				prosthesis improved after incubation in artificial saliva for 21 days in all techniques, including compression molding, injection molding, 3D printing and milling.
Arakawa et al. (2022)	Retrospective clinical research study	Thirty-two edentulous participants (16 women, 16 men; ages 35–85 years) who received upper and lower CRPs, 16 with CAD-CAM prostheses and 16 with conventional prostheses, were evaluated. The total treatment time (in days), post-delivery adjustments (removal of excessive pressure areas, relining, or repairs), and costs (dental treatment, laboratory fees, and total costs) were recorded. The number of clinical visits was also compared.	Compared the duration of treatment, the financial costs and post-delivery adjustments of CAD-manufactured complete removable dentures (CDRs). CAM versus conventional ones.	No statistically significant difference was found in relation to the duration of treatment between digital and conventional prostheses. There was no significant difference in the number of adjustments (areas of excessive pressure, relining, or repairs). The study concluded that CAD-CAM PRCs can be considered a viable alternative to conventional removable PRCs regarding treatment duration, clinical and follow-up visits, adjustments, and maintenance requirements. Digital treatment was less expensive in terms of total costs and laboratory costs, suggesting that digital PRCs can replace conventional PRCs, reducing clinical treatment time and costs.
Ohara et al. (2022)	randomized clinical trial	This was a randomized, crossover clinical trial conducted between November 2017 and May 2020. For each patient, a set of conventional dentures (CDs) and a set of digital dentures (DDs) were fabricated using 3D printing by three qualified prosthodontists. Participants were randomly assigned to two groups: CD-DD (CDs fabricated first, followed by DDs) and DD-CD (reverse order).	It evaluated patient satisfaction with conventional prostheses (CDs) and digital prostheses (DDs) manufactured using 3D printing. The study also compared quality of life (QOL), number of visits, time required for fabrication of the final prosthesis, number of fitting appointments, and time required for prosthesis stabilization.	Patient satisfaction with CDs was superior in terms of phonetics, ease of cleaning, stability, comfort, and overall satisfaction. DDs resulted in a significantly fewer clinic visits for the fabrication of the final prosthesis. However, there were no significant differences in the number of fitting sessions, time required for prosthesis fabrication, and time required for fitting between CDs and DDs. Regarding quality of life (QOL), DDs had significantly higher scores in social disability (indicating a greater negative impact), but there were no significant differences in other areas. The authors suggested that the difference in satisfaction may be due to fabrication methods (milled vs. 3D printed prostheses), palatal thickness of DDs (2.5 mm vs. 1.4 mm for CDs/milled prostheses), and the type of artificial teeth used. Lower satisfaction with the stability and comfort of DDs can be attributed to an inferior marginal seal due to the design

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Namono et al. (2023)	In vitro study	A complete maxillary denture base construction file was used. as a reference. Eighty denture bases were 3D printed under four conditions (20 per condition): no reduction of the supporting structure (Control), palatal reduction (Condition P), rim reduction (Condition B), and palatal and rim reduction (Condition PB).	To investigate the effects of different support structure conditions on the fidelity (trueness) and accuracy of denture bases 3D printed using stereolithography additive manufacturing (SLA-AM) technology, considering various volume and area distributions.	The study concluded that reducing the support structure across different volumes and area distributions influences the results of stereolithography additive manufacturing (SLA-AM). This influence can be beneficial for optimizing accuracy, printing time, and resin consumption. In summary, the study suggests that by optimizing the design of support structures, it is possible to manufacture 3D printed denture bases with high precision while simultaneously reducing material consumption and production time, which has positive clinical and economic implications.
Cepic et al. (2023)	A prospective, randomized, crossover study	Patients were randomly assigned to receive digital dentures (prepared with the Vita Vionic system) and conventional dentures (made from heat-cured polymethylmethacrylate resin). There was a one-week washout period, during which patients wore their old dentures before receiving the second type of denture. Patients were blinded to the type of denture fabrication.	Reported the clinical and patient-related outcomes of digital versus conventional dentures in edentulous patients. Specifically, the study aimed to evaluate clinical effectiveness (using the Sato score) and patient satisfaction.	Patient satisfaction, assessed by VAS, was also higher with the new prostheses compared to the old ones, but regardless of the manufacturing method (digital or conventional). In summary, the results suggest a trend towards better clinical efficiency of digital prostheses compared to conventional ones, mainly in stability, while patient satisfaction and oral health-related quality of life were not significantly affected by the manufacturing method.
Zahel et al. (2024)	Narrative review	A total of 90 mandibular prostheses were fabricated, based on a digitized model of an edentulous mandible. Nine test groups were created, each with 10 samples, varying the base and tooth materials, as well as the manufacturing method. Ten bases were produced using the conventional process, 40 bases were subtractively milled, and 40 bases were additively (3D) printed.	Reviewed the available literature on complete dentures three-dimensionally printed, addressing new biomaterials, techniques manufacturing and workflow, clinical performance and patient satisfaction.	This study demonstrated that, in the event of a fracture, digital processes for manufacturing removable complete dentures present a significant disadvantage: greater difficulty in repair due to their greater fragility and irreparability. However, it became clear that the digital workflow allows for the production of prostheses with consistent quality, high precision, and good stability, in addition to offering cost reduction and fewer clinical sessions. Conventional prostheses, in contrast, presented imperfections due to manual manipulation and material characteristics.
Hann et al. (2024)	In vitro study	Thirty disc-shaped specimens (10x2 mm) were used, divided into 3 groups of 10 each: Hot-polymerized polymethylmethacrylate (PMMA) (conventional method). Milled (digital CAD/CAM method) from pre-polymerized resin blocks. 3D printed (method)	The main objective of this study was to evaluate the effect of conventional and digital techniques for constructing complete dentures on the wettability of the denture surface with distilled water and saliva substitute, before and after thermocycling	For water, the contact angle reduction was significant only in the heat-cured PMMA group. Saliva Substitute vs. Water: Saliva substitute allowed greater wettability for CAD/CAM-fabricated denture base materials.

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		digital CAD/CAM) with biocompatible resin.		(milled and 3D printed) compared to water, suggesting an improvement in the wetting and retention capacity of the denture. In the conventional group, there was no significant difference between water and saliva.
Kunnath et al. (2025)	systematic review with meta-analysis	A systematic search was carried out in Scopus, PubMed and the Cochrane Central Register of Controlled Studies, from its creation until December 2023. The interventions compared were digital denture bases manufactured by milling (MIL) or 3D printing (TDP), and compared with conventional techniques such as compression molding (CCM), injection molding (CCI) or autopolymerization (CCA).	Analyzed current evidence from in vitro studies comparing trueness of fit, surface roughness, color stability, surface wettability, water absorption, water solubility, and microbial adhesion between conventional and digital denture bases.	Milled digital denture bases (MIL) demonstrated significantly higher accuracy of fit compared to conventional compression molding (CCM) and 3D printing (TDP). MIL was ranked best for accuracy of fit. Milled digital denture bases (MIL) demonstrated significantly lower surface roughness compared to conventional compression molding (CCM) and 3D printing (TDP). MIL was ranked best for lowest surface roughness. No significant results were found for color stability, surface wettability, water absorption, or water solubility through NMA.
Al-Dulajjan et al. (2025)	In vitro study	A modified edentulous maxillary model with three spheres was used to ensure accurate measurements. This model was scanned with an E3 3Shape flatbed scanner to create a reference STL file.	compared the accuracy and reliability of digital impressions of an edentulous arch, taken with different scanners, with conventional physical impressions. They determined the ideal method for recording sulcus length and peripheral seal to achieve sufficient retention in complete dentures.	Extraoral desktop scanners have demonstrated the highest accuracy in edentulous cases. TRIOS intraoral scanner is a A clinically viable alternative to conventional impression methods (VPS) for complete dentures due to their comparable reliability. The Medit scanner, while adequate, showed the greatest deviations in reliability. The findings reinforce the potential of digital impression systems to improve efficiency and patient comfort and are encouraging for the adoption of digital workflows in prosthodontics.
El Osta et al. (2025)	Systematic review	Articles published between January 2010 and June 2024, written in English, that compared cost and time efficiency were included. of conventional, digital, and hybrid workflows for the manufacturing of RCDs. A total of 1,188 articles were initially identified and evaluated, and 10 additional articles were found through a bottom-up search.	Evaluated the time and cost efficiency of conventional, hybrid, and fully digital workflows throughout the entire Removable Complete Dentures manufacturing process. (RCDs)	Digital and hybrid workflows generally reduced clinical and laboratory time compared to conventional workflows. The hybrid protocol required significantly less clinical time, with reductions ranging from approximately 1 to 4 hours. Workflows Hybrid and fully digital processes have reduced laboratory manufacturing time by approximately 6 to 7 hours compared to conventional conventional workstations (reductions of 5.90 to 7.35 hours have been reported). One study reported that the hybrid protocol

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				required significantly fewer visits (3.8 ± 1.3 visits) than the protocol conventional.
Sawangsri et al. (2025)	in vitro study	Ten maxillary and ten mandibular complete dentures were fabricated and used, each with four fiduciary markers. Reference scans were obtained using a laboratory scanner (E4; 3Shape A/S). Test scans were performed using an intraoral scanner (IOS) (TRIOS 3; 3Shape A/S) with three different protocols: Manufacturer's scan pattern (MA). Rolling scan pattern (RO). Combined IOS-polyvinylsiloxane (IOS-PVS) technique. This technique involved three separate scans for the cameo, intaglio, and bite alignment, with inversion of the intaglio surface using 3D software. Scanning time and number of images were recorded for analysis. Fidelity was assessed by superimposing the test scans onto the reference scans using software. 3D inspection (Geomagic Control X) and calculating the Root Mean Square (RMS) value. Qualitative fidelity analysis was performed using 3D color mapping.	Compared the fidelity (trueness), time and number of images between different dental prosthesis scanning protocols.	Fidelity (RMS value): The lowest RMS value was observed in the mandibular scans with the RO protocol (0.10 ± 0.01 mm). The highest RMS value was recorded in the mandibular scans with the IOS-PVS protocol (1.46 ± 0.09 mm). There was no statistically significant difference in fidelity between the MA and RO scanning patterns. The RMS values were significantly higher in scans with the IOS-PVS technique ($p < 0.001$). The tested dental prosthesis scanning protocols significantly affected fidelity, total scanning time, and the number of images. Scanning dentures using the RO protocol improved fidelity and reduced scanning time and the number of images.

Source: Own authorship

The articles address various facets of complete denture manufacturing using technologies digital (CAD/CAM and 3D printing) compared to conventional methods, offering a comprehensive overview of its advantages and disadvantages.

According to the articles analyzed and studied in this research, it was observed that, as per the study by Adrian Zahel et al. (2024) that compared digital and conventional prostheses in terms of to manufacturing accuracy (trueness and precision), concluded that digital flow allows production prostheses with consistent quality, high precision and good stability, while prostheses conventional ones presented imperfections due to manual handling.

Thus, Rohit Kunnath Meno et al. (2025) aimed, in their study, comparing subtractive, additive and conventional digital prostheses, revealed that the bases of milled digital dentures (MIL) demonstrated significantly greater accuracy of fit in comparison with conventional compression molding (CCM) and 3D printing (TDP). MIL was rated the best for accuracy of fit. In agreement, Eva Anadiot et

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al. (2020) also indicated in their study that CAD/CAM milled prostheses demonstrated be superior to 3D printed ones in terms of accuracy. Rohit Kunnath Meno (2025) also pointed out that the milled digital denture bases (MIL) presented surface roughness significantly lower compared to conventional compression molding (CCM) and 3D printing (TDP), with MIL being the highest ranked.

In contrast, Can Wang et al. (2020), in their study evaluating the accuracy of prostheses complete digital and summarized the factors that influence them, noted that most of their research, indicated clinically acceptable values for occlusal accuracy (<1 mm) and adaptation of the prosthesis base (<0.3 mm) of digital CDs. Digital CDs showed adaptation similar to or better than conventionally manufactured CDs. However, it was not possible draw clear conclusions about the superiority of CAD-CAM milling and 3D printing in regarding accuracy, due to contradictory results. The adaptation of the prosthesis improved after the incubation in artificial saliva.

However, in the research of Sahaprom Namono et al. (2023), which studied determining the optimal parameters based on accuracy, ideal printing time and resin consumption, found that optimizing the design of supporting structures in denture bases 3D printed parts can lead to high accuracy along with reduced energy consumption material and production time.

Furthermore, digitization protocols significantly affect fidelity. Thus, according to the study by Yousif A, et al. (2023), which investigated comparing the accuracy and reliability of digital impressions of an edentulous arch, taken with different scanners, concluded that extraoral desktop scanners demonstrated the highest accuracy in cases edentulous patients. The TRIOS intraoral scanner is a clinically viable alternative to conventional methods. conventional scanners due to their comparable fidelity, while the Medit scanner showed higher deviations. These findings are encouraging for the adoption of digital workflows in oral rehabilitation.

In the same perspective, Edith Sawangsri, et al. (2025), who demonstrated comparing the fidelity (trueness), time and number of images between different protocols scanning of dental prostheses, showed that prosthesis scanning protocols dental procedures significantly affect the fidelity, time and number of images. Scanning of prostheses using the "rolling" (RO) protocol improved fidelity and reduced the time scanning and the number of images. The IOS-PVS protocol, on the other hand, demonstrated deviations pronounced in the area of the edge of the prosthesis.

Another important factor is demonstrated in the study by Vladimir Prpiÿ et al. (2020) who studied

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compare the mechanical properties (flexural strength and surface hardness) of different materials and technologies for the manufacture of denture bases, with emphasis on technologies computer-aided design/computer-aided manufacturing (CAD/CAM) digital and 3D printing, evaluated the flexural strength and surface hardness of different materials. The materials produced by CAD/CAM presented similar or better values than the conventional materials, while the 3D-printed material and polyamide were inferior in flexural strength. It is important to note that the properties depend more on the material itself. than the manufacturing method.

For Eva Anadiot et al. (2020) the flexural strength of 3D printed resins is lower than than milled or conventional ones, but generally within acceptable limits. The guidance impression material can affect mechanical properties. In addition, denture base resins heat-cured still produce the greatest bond strength to prosthetic teeth.

Regarding retention of complete dentures, Kenda I. Hann et al. (2024) investigated surface wettability. The milled denture base material showed the best wettability, the conventional intermediate, and the 3D printed one with the lowest wettability with water, but the best results were obtained with saliva substitute. Saliva substitute allowed increased wettability for CAD/CAM materials, suggesting an improvement in the ability to wetting and retention of the prosthesis. Accordingly, Adrian Zahel et al. (2024) also included fracture resistance under torsional loading as an objective of their study.

Efficiency is one of the pillars most often associated with the transition to workflow. digital work in oral rehabilitation. Adrian Zahel et al. (2024) indicates that the digital flow allows for cost reduction and fewer clinical sessions. Eva Anadiot et al. (2020), in turn, reinforces that the digital workflow promises faster response times rapid and a reduction in the number of clinical visits, potentially from more than five to three. However, she warns that initial reports show that further adjustments may be necessary than indicated by the manufacturers.

For Katsura Ohara et al. (2022) digital prostheses (DDs) resulted in a number significantly fewer visits to the clinic for the fabrication of the definitive prosthesis. However, there were no significant differences in the number of adjustment sessions, time required for the fabrication of the prosthesis or time for adjustment between conventional prostheses (CDs) and digital. Itsuka Arakawa et al. (2022) reported that they found no difference statistically significant in the duration of treatment or in the number of adjustments between prostheses CAD-CAM and conventional.

Eva Anadiot et al. (2020) suggests that higher initial costs for digital materials may

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be offset by reduced clinical time and laboratory costs. In addition, printers Desktop 3Ds are more affordable than milling centers.

Itsuka Arakawa et al. (2022) concluded that digital treatment was less expensive in terms of total costs and laboratory costs, suggesting that digital prosthetics can replace conventional ones, reducing the time and costs of clinical treatment. Adrian Zahel et al. (2024) also points to cost reduction as a benefit of digital flow. Nothing El Osta et al. (2025) focuses on evaluating the time and cost efficiency of different workflows work in the manufacture of complete removable dentures.

Adrian Zahel et al. (2024) highlights a significant disadvantage: in case of fracture, the digitally manufactured prostheses are more difficult to repair due to their greater fragility and irreparability.

Eva Anadiot (2020) noted that although patient satisfaction with digital prosthetics is generally positive, aesthetics decreased after 18 months due to color change of the resin in a study with 3D printed prosthetics. This same author indicates that patient satisfaction patient with digital prostheses is generally positive due to the fewer consultations and good initial results. A study with 3D-printed prosthetics showed improvements significant in retention, stability and quality of life (OHIP-EDENT).

Rohit Kunnath Meno (2025) found no significant results for the stability of color through network meta-analysis (NMA). Lana Zupancic Cepic (2023) found that oral health-related quality of life improved after receiving new dentures, regardless of the type of manufacture. Patient satisfaction, assessed by VAS, was also greater with the new prostheses compared to the old ones, but regardless of the manufacturing method. It suggests a trend towards better clinical efficiency of prostheses digital, mainly in stability, while patient satisfaction and quality of life were not significantly affected by the manufacturing method.

Katsura Ohara (2022) presented more nuanced results. Patient satisfaction with the conventional dentures (CDs) was superior in terms of phonetics, ease of cleaning, stability, comfort, and overall satisfaction. Digital prostheses (DDs) presented scores significantly higher in social disability (indicating a greater negative impact) in QOL. Although 20% of patients prefer and use DDs, the lowest satisfaction with stability and comfort of DDs can be attributed to an inferior marginal seal due to the palatal design or thickness.

It can be seen, therefore, that both digital and conventional flows are effective. in the manufacture of complete dentures, ensuring satisfactory results in functional terms and

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aesthetics. The findings indicate that both methods can be used in isolation or combined, depending on clinical demands, reinforcing its relevance for rehabilitation contemporary oral. However, the use of CAD/CAM technologies provides greater precision in adapting prosthetic bases, reducing clinical and laboratory steps, in addition to optimize execution time. Furthermore, the digital workflow favors greater aesthetic predictability. and functional, contributing to the standardization of results and patient satisfaction.

Thus, although the conventional method is still widely used and presents good outcomes, the digital prosthesis is a more modern, efficient and aligned with the current demands of oral rehabilitation. Despite notable advances in rehabilitation oral digital, it is clear that the topic of removable complete dentures, whether manufactured by conventional or digital methods, needs further research, as current research does not are shown to be sufficient. The sources reveal a series of nuances and results sometimes contradictory, which prevent definitive and universal conclusions about the superiority of one method in all aspects.

FINAL CONSIDERATIONS

When comparing these articles, it is clear that the digital workflow for complete dentures offers significant advances, but also presents challenges. In view of this, it was possible to raise the following questions:

Regarding efficiency, there is a consensus on reducing the number of clinical visits and, in many cases, of the total and laboratory costs.

In terms of precision, digital methods, especially CAD/CAM milling, demonstrate superiority in fit accuracy and surface roughness compared to printing 3D and conventional methods. Optimizing designs and scanning protocols (such as RO protocol) can also improve fidelity.

Although there are varied results, many studies point to a generally high level of satisfaction. positive and improvements in quality of life, retention and stability with digital prosthetics, driven by reduced treatment time.

Limitations and areas require further investigation to optimize the use of digital flow in complete dentures, as there are still some challenges, since repairability, aesthetics, accuracy consistency and post-delivery adjustments characterize some of the main limitations about the present study.

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