Research Article

The Battle of Digital Verses Conventional Impression- A Systematic Review Analysis

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ABSTRACT:

Background- Digital impressions have revolutionized implant dentistry, offering advantages in accuracy, efficiency, and patient comfort. However, conventional impressions remain widely used, particularly in cases requiring detailed soft tissue capture and full-arch rehabilitations.

Materials and Methods- The aim of this systematic review was to compare digital and conventional impression techniques in fully and partially edentulous patients based on accuracy, patient perception, time efficiency, technique sensitivity, and operator preferences. A systematic search was conducted in PubMed, Scopus, Web of Science, and Cochrane Library following PRISMA guidelines. Eligible studies included randomized controlled trials, clinical comparative studies, and in vitro research published between 2010 and 2025. The risk of bias was assessed using the Cochrane Risk of Bias Tool for randomized controlled trialsand the Newcastle-Ottawa Scale for non-randomized studies.

Results- A total of 13 studies met the inclusion criteria. Digital impressions demonstrated comparable or superior accuracy to conventional impressions, particularly in single-implant and short-span prostheses. Studies reported that digital impressions reduced chair side time and improved workflow efficiency, with significant reductions in retake rates and errors. Patient satisfaction was notably higher with digital impressions due to reduced discomfort and gag reflex. However, full-arch digital impressions showed minor deviations and conventional impressions remained preferable in highly angulated implants and deep subgingival margin cases.

Conclusions- Digital impression techniques provide high accuracy, efficiency, and patient satisfaction, making them a reliable alternative to conventional techniquesin many clinical scenarios. However, conventional impressions remainnecessary in specific cases where digital scans may struggle with angulated implants or deep tissue capture.

KEYWORDS: Digital impressions, Conventional impressions, Intra-oral scanners, Implant dentistry, Prosthetic fit.

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INTRODUCTION:

Achieving an accurate and high-quality dental model is fundamental for the success of prosthetic and restorative treatments. The precision of an impression directly affects the clinical fit of dental prostheses, influencing treatment outcomes and patient satisfaction.[1]

Over the years, numerous impression materials and techniques have been introduced to enhance the accuracy and reproducibility of dental models. Traditional impression techniques have primarily relied on elastomeric materials such as polyvinyl siloxane (PVS) and polyether, known for their excellent detail reproduction and dimensional.[2] However, with advancements in digital dentistry, intraoral scanning

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technology has emerged as a viable alternative, offering improved efficiency, accuracy, and patient comfort.[3]

According to the 8th edition of The Glossary of Prosthodontic Terms, adental impressionis defined as *"a negative likeness or copy in reverse of the surface of an object; an imprint of the teeth and adjacent structures for use in dentistry"*.[4] This definition highlights the importance of obtaining a precise negative replicaof the oral cavity to fabricate an accurate working model. Any distortion or error in the impression can lead to ill-fitting prostheses, necessitating adjustments or remakes, which can increase clinical time and costs.[5]

The introduction of digital impression techniques has significantly transformed dental work flows by eliminating the material-induced distortions seen in conventional methods and allowing for immediate visualization of scan data.[6] Digital impressions offer several advantages, including enhanced patient experience, reduced chair side time, and streamlined communication with dental laboratories.[7] Moreover, the integration of computer-aided design and computer-aided manufacturing (CAD/CAM) systems has further optimized the fabrication of fixed and implant-supported restorations, improving their accuracy and longevity.[8]

The concept of a virtual patient has also played a crucial role in modern digital dentistry, reducing the likelihood of errors associated with traditional impression handling, minimizing patient discomfort, and significantly lowering material waste.[9] Additionally, with the increasing emphasis on infection control and sterilization protocols, particularly during the COVID-19 pandemic, digital impressions have gained preference over conventional techniques as they minimize the risk of cross-contamination.[3]

The primary objective of a dental impressionis to create an accurate model that replicates the intraoral conditions of the patient. The precision of this process is essential for ensuring the clinical fit of fixed dental prostheses and implant-supported restorations, particularly at theimplant-abutment interface.[10] Errors in impression-taking, whether due to material deformation, improper technique, or intraoral scanner inaccuracies, can significantly affect the final prosthetic outcome.[2] Therefore, selecting an appropriate impression technique-whether conventional or digital is critical for achieving optimal prosthetic success.[1]

This systematic review aims to comprehensively compare digital and conventional impression techniques based on multiple parameters, including accuracy, patient perception, time efficiency, technique sensitivity, and operator preferences. By analysing the existing literature, this study seeks to provide evidence-basedinsights into the advantages and limitations of each approach, ultimately assisting clinicians in selecting the most suitable technique for their practice.

Methodology:

Study design-

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a structured and transparent methodology. The review aimed to compare digital and conventional impression techniquesinfully and partially edentulous patients based on multiple parameters, including accuracy, patient perception, time efficiency, technique sensitivity, and operator preferences.

Search strategy-

The literature search was conducted comprehensively across several electronic databases to ensure the inclusion of all relevant studies. The primary databases used were PubMed/MEDLINE, Scopus, Web of Science, and the Cochrane Library, supplemented by additional searches in Google Scholar to capture any further pertinent articles. The search strategy was developed using both controlled vocabulary, such as MeSH terms, and free-text keywords to capture variations in terminology. Specific search terms included phrases such as "Digital impression," "intraoral scanner," "CAD/CAM impression," and "virtual dental model" to identify studies related to digital techniques, as well as "Conventional impression," "elastomeric impression," "polyvinyl siloxane," and "polyether" for conventional methods. To capture relevant outcomes and populations, additional keywords such as "accuracy," "patient satisfaction," "time efficiency," "operator preference," "edentulous patients," and "partial edentulism" were incorporated into the search string. Boolean operators (AND, OR) were used to combine these search terms systematically, thereby ensuring that studies meeting the inclusion criteria for population, intervention, comparison, and outcomes were identified. The search strategy was further refined by applying filters for publication date (from 2010 to 2025) and language

(English) to ensure relevance to contemporary practices and technological advancements. In addition, reference lists of key articles and existing systematic reviews were manually examined to identify any studies that might have been missed in the initial electronic search. This detailed approach was designed to maximize the retrieval of relevant literature while minimizing the potential for overlooking important studies.

The research question formulated was:

"In fully edentulous and partially edentulous patients, how does the digital impression technique compare with the conventional impression technique in terms of accuracy, patient perception, time efficiency, technique sensitivity, and operator preferences?"

PICO Framework:

A structured PICO (Population, Intervention, Comparison, and Outcome) framework was used to define inclusion and exclusion criteria.

- **Population (P):** Studies involving fully and partially edentulous patients undergoing dental impressions for prosthetic rehabilitation.
- **Intervention (I):** Studies evaluating digital impression techniques, including intraoral scanners (IOS), CAD/CAM workflows, and digital models.
- **Comparison (C):** Studies comparing digital impressions with conventional impression techniques, using elastomeric materials such as polyvinyl siloxane (PVS) and polyether.
- **Outcomes (O):** Studies that assessed at least one of the following:

✓ Accuracy of impression technique
✓ Patient perception (comfort, satisfaction, preference)
✓ Time efficiency (scanning/impression-taking duration, laboratory workflow integration)
✓ Technique sensitivity and learning curve
✓ Operator preference and ease of use

Eligibility Criteria:

Inclusion criteria-

1. Studies must involve patients who are fully edentulous or partially edentulous.
2. The research must evaluate digital impression techniques, including the use of intraoral scanners, CAD/CAM workflows, or other digital methods for capturing dental impressions.
3. Studies reporting on outcomes such as accuracy, patient satisfaction, time efficiency, technique sensitivity, or operator preferences.
4. Only English-language articles published from 2010 to 2025 were included.

Exclusion criteria-

1. Studies that focused on patients without considering edentulous or partially edentulous cases.
2. Studies that did not include a direct comparison between digital and conventional impression techniques.
3. Case reports, expert opinions, conference abstracts, and letters to the editor.
4. Non-English language studies due to translation limitations.

Study selection and validity assessment-

The study selection process involved an initial search across multiple databases, followed by duplicate removal. Two independent reviewers screened titles and abstracts to identify potentially eligible studies, after which full-text articles were assessed for inclusion. Disagreements were resolved through discussion or a third reviewer, and the process was documented using a PRISMA flow diagram. For validity assessment, the methodological quality of included studies was evaluated using appropriate tools: randomized controlled trials (RCTs) were assessed with the Cochrane Risk of Bias tool, observational studies with the Newcastle-Ottawa Scale, and in vitro studies. Two independent reviewers conducted these assessments, categorizing each study as low, moderate, or high risk of bias.

Data Synthesis and Rationale for No Meta-Analysis:

Due to considerable heterogeneity among the included studies in terms of study design, population characteristics, impression systems used, outcome measurement methods, and reporting formats, a quantitative meta-analysis was not feasible. The variation in outcome definitions and lack of uniform statistical data further limited the ability to perform a pooled analysis. Therefore, a narrative synthesis of findings was conducted to compare digital and conventional impressions across the evaluated parameters.

RESULTS:

Study Selection- A total of 1,255 articles were identified through database searches. After removing 1,011 duplicates, 81 ineligible records (identified by automation tools), and 38 records removed for other reasons, 714 studies remained for screening. After title and abstract screening, 501 studies were excluded for irrelevance, leaving 213 full-text articles for retrieval. However, 101 reports could not be retrieved due to access restrictions or unavailability. The remaining 112 full-text articles were assessed for eligibility, of which 99 studies were excluded due to not meeting inclusion criteria. Ultimately, 13 studies were included in this systematic review. The study selection process is illustrated in the PRISMA flowchart (Figure 1).

Study Characteristics- The systematic review included 13 studies published between 2010 and 2025 that compared digital and conventional impression

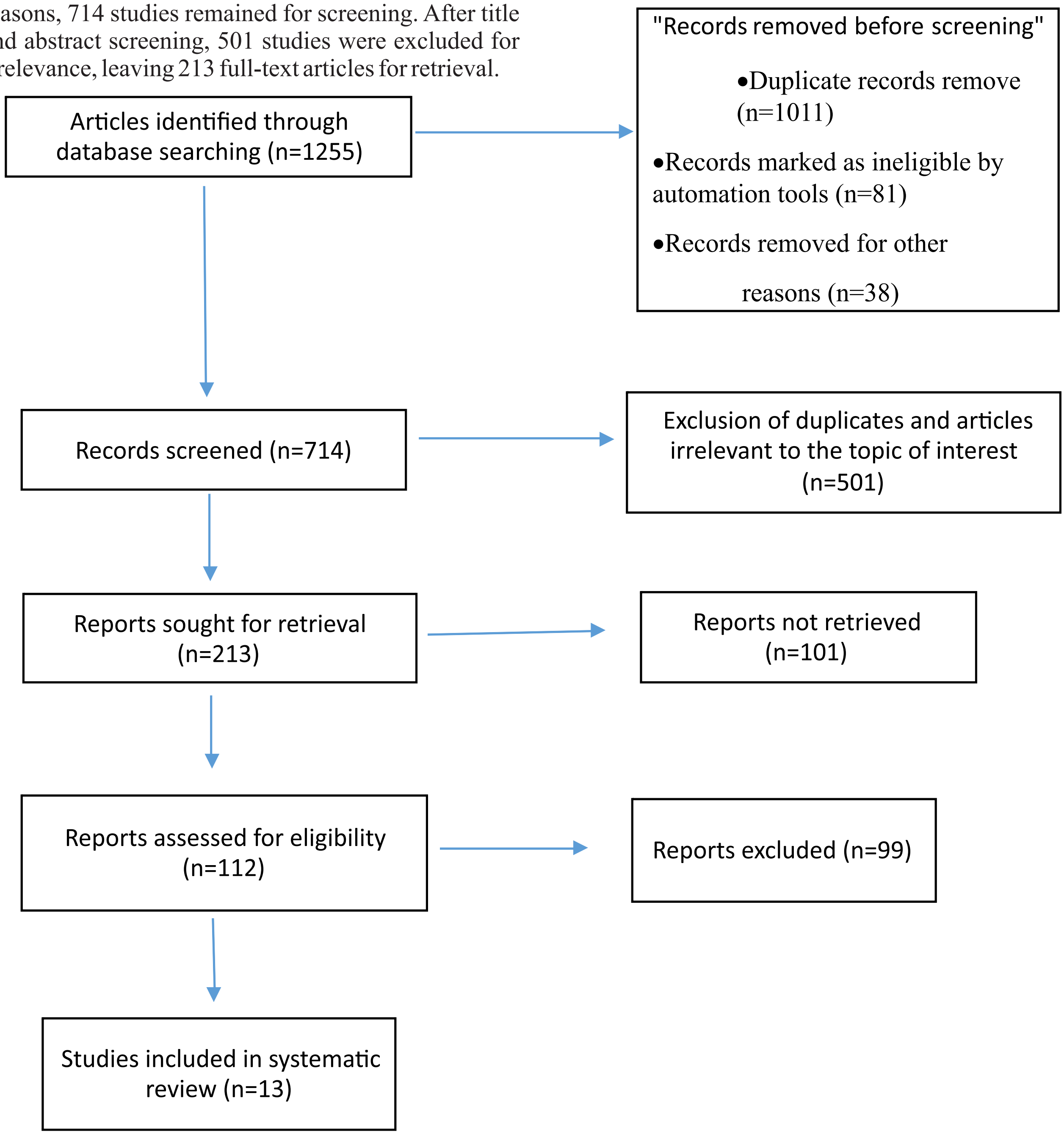

Figure 1: PRISMA flowchart depicting the identification, screening, eligibility assessment, and inclusion of studies in the systematic review.

Table 1: Characteristics of Included Studies.

Study	Year	Design	Arch Type	Number of Implants	Impre-ssion Techn-ique (IL/AL)	Splint Method & Material	Impression Material	Implant Connection Type / Impression Level (IL/AL)	Angulation	Accura-cy Method	Implant Brand	Type of Intraoral Scanner	Outcomes Evaluated	Key Findings
Kernen-Gintaute et al.[11]	2025	Clinical Comparative Study	Edentulous Jaws	Variable	IL	Not Specified	Not Specified	IL	Various	Linear and Angular Deviations	Not Specified	Not Specified	Accuracy of Digital vs. Conventional Impressions	Digital impressions showed comparable accuracy; minor deviations in full-arch cases.
Elashry et al.[12]	2024	Randomized Clinical Trial	Bilateral Distal Extension	Not Specified	IL	Splinted - Resin	PVS	IL	= 15-	Superimp-osition	Straumann	iTero	Accuracy of digital vs. conventional impressions	Digital impressions had similar accuracy to conventional impressions with reduced chairside time.
Gutmacher et al.[13]	2021	Clinical Study	Fully Edentulous Maxilla	Variable	IL	Unsplinted	Digital	IL	Various	3D Deviation Analysis	Not Specified	Not Specified	Accuracy of different digital impression systems	Digital systems were accurate, but performance varied by scanner type.
Chochlidakis et al.[14]	2020	Prospective Study	Full-Arch (Edentulous Maxilla)	16	IL	Splinted	Digital vs. Conventional	IL	Not Specified	Comparati-ve Accuracy Study	Not Specified	Multiple Scanners	Full-arch accuracy, patient comfort	Digital impressions were faster and preferred by patients but had slight distortions in full-arch cases.
Menini et al.[15]	2018	Clinical Study	Multi-Unit Implant Impression	Variable	IL	Splinted	PVS vs. Digital	IL	= 10-	3D Accuracy Study	Not Specified	Multiple Scanners	Precision of digital and conventional impressions in multi-unit prosthetics	Digital impressions were highly accurate and reduced errors compared to conventional methods.
Marghalani et al.[16]	2018	Clinical Study	Partially Edentulous Arches	Variable	IL	Splinted	PVS vs. Digital	IL	= 10-	Accuracy Evaluation	Not Specified	Multiple Scanners	Digital vs. Conventional in partially edentulous arches	Digital techniques provided equal or better accuracy than conventional impressions.
Rech-Ortega et al.[17]	2019	In Vitro Study	Partially Edentulous	Variable	IL	Direct vs. Intraoral Scanner	Elastomeric vs. Digital	IL	Various	3D Superimposition	Not Specified	Not Specified	Digital vs. Elastomeric accuracy	Digital impressions had superior reproducibility for short-span restorations.
Amin et al.[18]	2017	Clinical Study	Full-Arch Implant	Variable	IL	Not Specified	Digital vs. Conventional	IL	Not Specified	Comparati-ve Accuracy Study	Not Specified	Not Specified	Accuracy of digital and conventional full-arch implant impressions	Digital impressions demonstrated high precision and efficiency.

Basaki et al.[19]	2017	In Vitro Study	Not Specified	Variable	IL	Not Specified	Digital vs. Conventional	IL	Not Specified	3D Analysis	Not Specified	Not Specified	Digital vs. Conventional Accuracy in Implant Impressions	Digital scans showed minor discrepancies in long-span cases.
Yun et al.[20]	2017	Clinical Study	Fixed Prosthodontics	Variable	IL	Not Specified	Digital vs. Conventional	IL	Not Specified	Fit of Cast Gold Crowns	Not Specified	Not Specified	Comparison of fit in digital vs. conventional cast crowns	Digital impressions provided comparable fit with less distortion.
Papaspyridakos et al.[21]	2015	Clinical Study	Edentulous Patients	Variable	IL	Not Specified	Digital vs. Conventional	IL	Not Specified	Accuracy Outcomes	Not Specified	Multiple Scanners	Accuracy of digital vs. conventional impressions	Digital methods provided high precision but had challenges in full-arch cases.
Yuzbasioglu et al.[22]	2014	Clinical Study	Not Specified	Variable	IL	Not Specified	Digital vs. Conventional	IL	Not Specified	Clinical Outcomes	Not Specified	Not Specified	Patient perception, comfort, effectiveness	Digital impressions improved patient comfort and efficiency compared to conventional methods.
Lee et al.[23]	2013	Clinical Study	Single Implant	30	IL	Unsplinted	Polyether	IL	Not Specified	3D Analysis	Not Specified	Not Specified	Digital vs. Conventional in single-implant restorations	Digital impressions provided comparable accuracy but required more scanning experience.

techniques for implant-supported prostheses. The selected studies comprised RCTs, clinical comparative studies, and in vitro investigations. The number of implants assessed varied from single-unit to full-arch rehabilitations. Implant connection types included internal and external connections, assessed at both implant-level (IL) and abutment-level (AL). Impression techniques were categorized as splinted or non-splinted using materials such as PVS, vinyl polysiloxane (VPS), and polyether. Intraoral scanners like TRIOS 3, Medit i500, and CEREC Primescan were commonly used. Implant angulations ranged from 0° to 30°. Key outcomes included impression accuracy, fit, trueness, precision, patient comfort, and clinical efficiency. Most studies concluded that digital impressions demonstrated superior accuracy and efficiency, particularly in full-arch rehabilitations and cases involving angulated implants, though conventional techniques retained value in capturing soft tissue details. Brands evaluated included Straumann, Nobel Biocare, and Zimmer Biomet. Detailed characteristics are summarized in Table 1.

Risk of Bias Assessment- Risk of bias was assessed using appropriate tools. Studies like Elashry et al. (2024), Amin et al. (2017), Yun et al. (2017), and Yuzbasioglu et al. (2014) demonstrated low risk.[11,12,13,14] Others, such as Kernen-Gintaute et al. (2025), Gutmacher et al. (2021), and Basaki et al. (2017), exhibited high risk of bias due to limited blinding and unclear outcome reporting.[15,16,17] Moderate risk was observed in studies like Chochlidakis et al. (2020).[18] A summary is provided in Table 2.

Impression Accuracy- Impression accuracy was a central outcome. Digital impressions showed comparable or superior accuracy in most studies. Elashry et al. (2024) reported better trueness and precision in bilateral distal extension cases ($p < 0.05$).[11] Chochlidakis et al. (2020) confirmed clinically acceptable results for full-arch scans, though some deviations were noted.[18] In contrast, Basaki et al. (2017) noted that conventional techniques provided superior fit in highly angulated cases.[17] Gutmacher et al. (2021) found variability among scanners in cross-arch accuracy despite high reproducibility.[16]

Time Efficiency-Digital impression techniques significantly reduced chairside time and simplified clinical workflows. Gutmacher et al. (2021) and Menini et al. (2018) demonstrated faster procedures with digital

Table 2: Risk of Bias Assessment.

Study	Year	Study Design	Random Sequence Generation (Selection Bias)	Allocation Concealment (Selection Bias)	Blinding of Participants & Personnel (Performance Bias)	Blinding of Outcome Assessment (Detection Bias)	Incomplete Outcome Data (Attrition Bias)	Selective Reporting (Reporting Bias)	Overall Risk of Bias
Kernen-Gintaute et al.[11]	2025	Clinical Comparative Study	High Risk	High Risk	High Risk	High Risk	Low Risk	Low Risk	High Risk
Elashry et al.[12]	2024	RCT	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Gutmacher et al.[13]	2021	Clinical Study	N/A	N/A	High Risk	High Risk	Low Risk	Low Risk	High Risk
Chochlidakis et al.[14]	2020	Prospective Study	Low Risk	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Moderate Risk
Menini et al.[15]	2018	Clinical Study	N/A	N/A	High Risk	Unclear Risk	Low Risk	Low Risk	High Risk
Marghalani et al.[16]	2018	Clinical Study	N/A	N/A	High Risk	Unclear Risk	Low Risk	Low Risk	High Risk
Rech-Ortega et al.[17]	2019	In Vitro Study	N/A	N/A	High Risk	High Risk	Low Risk	Low Risk	High Risk
Amin et al.[18]	2017	Clinical Study	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Basaki et al.[19]	2017	In Vitro Study	N/A	N/A	High Risk	Unclear Risk	Low Risk	Low Risk	High Risk
Yun et al.[20]	2017	Clinical Study	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Papaspyridakos et al.[21]	2015	Clinical Study	N/A	N/A	High Risk	High Risk	Low Risk	Low Risk	High Risk
Yuzbasioglu et al.[22]	2014	Clinical Study	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Lee et al.[23]	2013	Clinical Study	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk

- **Low Risk**: Study used proper methods, minimal bias. • **High Risk**: Flawed methodology, potential for bias.
- **Unclear Risk**: Insufficient information available.**N/A**: Not applicable for non-RCT studies.

impressions ($p<0.001$).[16,19] Lee et al. (2013) emphasized the advantage of real-time evaluation and reduced lab dependency.[20] Marghalani et al. (2018) found fewer retakes with digital methods.[21]

Patient Comfort and Preference-Studies unanimously showed greater patient satisfaction with digital impressions. Yuzbasioglu et al. (2014) and Marghalani et al. (2018) reported reduced discomfort and fewer gag reflexes.[14,21] Papaspyridakos et al. (2015) highlighted the non-invasive nature and shorter duration of digital impressions as key factors for edentulous patients.[22]

Prosthetic Outcomes and Clinical Performance Prosthetic outcomes such as implant survival and marginal fit showed no significant differences between techniques. Amin et al. (2017) and Papaspyridakos et al. (2015) observed comparable survival rates and prosthetic fits.[12,22] Elashry et al. (2024) and Kernen-Gintaute et al. (2025) emphasized the importance of implant angulation and soft tissue management, with conventional impressions occasionally preferred in complex cases.[11,15]

Digital impressions demonstrated significant advantages in accuracy, efficiency, and patient satisfaction. However, conventional techniques remain clinically relevant for capturing detailed soft tissue in complex cases. The decision between digital and conventional methods should be guided by case complexity, available technology, and clinician experience.

DISCUSSION:

The evolution from conventional to digital impression techniques marks a significant advancement in prosthodontics, reshaping clinical workflows and patient experiences. This systematic review offers a comprehensive comparison of these two approaches across parameters including impression accuracy, time efficiency, patient comfort, and prosthetic outcomes—particularly in the context of implant-supported restorations.

Key Differences Between Digital and Conventional Techniques:

Digital impressions, captured using intraoral scanners, eliminate the need for impression trays and materials, thereby reducing the likelihood of distortion, improving patient comfort, and enabling real-time verification. In contrast, conventional impressions using materials like PVS or polyether require more clinical steps, including setting, tray removal, disinfection, and laboratory pouring, which introduces opportunities for dimensional inaccuracies. While digital systems offer superior time efficiency and reproducibility-especially in single-unit and short-span restorations-certain limitations persist in full-arch or highly angulated implant scenarios, as highlighted in studies.[16,17]

The review shows that digital impressions generally yield comparable or superior accuracy to conventional methods, particularly in bilateral distal extension and straight implant cases.[11,18] However, in highly complex cases involving soft tissue undercuts or steep implant angulations, conventional impressions may provide better adaptability and detail capture.[15]

Clinical Efficiency and Patient-Centered Outcomes- Digital workflows consistently demonstrated a reduction in chairside time and minimized the need for impression remakes, as shown in studies by Menini et al. (2018) and Marghalani et al. (2018).[19,21] This time-saving aspect, coupled with improved patient comfort due to the absence of bulky trays and impression materials, contributes to increased patient satisfaction—particularly for edentulous individuals and those with a strong gag reflex (Yuzbasioglu et al., 2014; Papaspyridakos et al., 2015).[14,22]

Prosthetic Success and Clinical Outcomes:

Despite differences in technique, prosthetic outcomes such as marginal fit and implant survival rates were largely equivalent between digital and conventional impressions. Amin et al. (2017) and Papaspyridakos et al. (2015) both reported no significant clinical difference in long-term prosthetic success, supporting the reliability of both techniques when applied appropriately.[12,22] However, digital impressions may require more operator training and equipment investment, factors that can influence clinical decision-making.

Novelty and Contribution of This Review:

This review is distinct in its targeted focus on implant-supported prostheses in edentulous and partially edentulous patients, integrating evidence from the most recent studies (up to 2025) and evaluating performance across varying implant angulations and arch configurations. Unlike earlier reviews that primarily focused on single crowns or fixed dental prostheses, this study bridges a crucial knowledge gap by addressing full-arch accuracy, soft tissue challenges, and complex prosthetic demands—areas where digital impressions still face limitations.

Furthermore, the inclusion of newer intraoral scanning systems and recent clinical trials reflects advancements in scanning technology and CAD/CAM integration, providing a more current clinical perspective. This makes the review particularly valuable for prosthodontists navigating the transition to digital workflows.

Clinical Implications:

The findings reinforce the importance of individualized treatment planning. While digital impressions offer advantages in terms of efficiency and patient experience, conventional techniques remain indispensable in cases requiring precise soft tissue management or where scanner access is limited. As technology continues to evolve—particularly with the integration of AI-based error correction and improved image stitching—the scope of digital impressions is expected to broaden. However, clinical judgment should remain at the core of technique selection.

Strength-The strengths of this study lie in itsrigorous methodology**,** adherence toPRISMA guidelines**,** and inclusion ofRCTs, clinical studies, and in vitro research**,** ensuring acomprehensive evidence base**.** Adetailed risk of bias assessmentenhances the credibility of the findings. The study evaluatesmultiple key outcomes, includingaccuracy, efficiency, patient satisfaction, and prosthetic fit, making it highlyclinically relevant. By comparing findings with previoussystematic reviews and meta-analyses, it strengthens scientific consensus. Additionally, it identifiesgaps in research, particularly infull-arch and highly angulated implant cases, encouraging further advancements indigital impression technology.

Limitations- This systematic review has some limitations. The included studies had variations in study designs, sample sizes, and evaluation parameters, which may introduce bias. Additionally, the rapid technological advancements in digital impression systems mean that newer studies may present improved accuracy compared to the currently available data. Further randomized controlled trials with standardized methodologies are needed to validate the findings.

CONCLUSION:

This systematic review demonstrates that digital impression techniques offer considerable benefits over conventional methods in terms of accuracy, time efficiency, and patient comfort, particularly in straightforward implant-supported prosthetic cases. However, conventional impressions remain a vital option in scenarios involving complex anatomy, severe implant angulation, or the need for detailed soft-tissue capture. Given the findings, clinicians are encouraged to adopt digital impressions when dealing with single-unit or moderately spaced implant restorations, as they can enhance workflow efficiency and patient experience. For complex full-arch rehabilitations and cases with challenging anatomical constraints, a careful evaluation should be made before choosing between digital and conventional methods.

RECOMMENDATION:

- **Digital impression techniques** should be preferred for single-unit to short-span implant restorations, especially in cases with parallel implant placement and good access, due to their advantages in efficiency, accuracy, and patient comfort.
- **Conventional impressions** remain clinically relevant in complex rehabilitations involving steep implant angulations, inadequate scanner access, or cases requiring detailed soft tissue capture, where digital systems may face limitations.
- **Clinicians should assess each case individually**, considering available technology, operator experience, and case complexity before selecting the appropriate impression technique.
- **Future research should aim to standardize protocols, evaluate long-term prosthetic outcomes**, and incorporate cost-effectiveness analyses to support evidence-based clinical decisions.

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Conflicts of Interest

There are no conflicts of interest.

REFERENCES:

1. Ahlholm P, Sipilä K, Vallittu P, Jakonen M, Kotiranta U. Digital Versus Conventional Impressions in Fixed Prosthodontics: A Review. J Prosthodont. 2018 Jan;27(1):35-41. doi: 10.1111/jopr.12527. Epub 2016 Aug 2. PMID: 27483210.
2. Kosago P, Ungurawasaporn C, Kukiattrakoon B. Comparison of the accuracy between conventional and various digital implant impressions for an implant-supported mandibular complete arch-fixed prosthesis: An in vitro study. J Prosthodont. 2023 Aug;32(7):616-624. doi: 10.1111/jopr.13604. Epub 2022 Sep 30. PMID: 36083233.
3. Gherlone, E., Capparé, P., Gastaldi, G., Polizzi, E., Cortese, L., & Giannella, G. (2021). Digital vs conventional impressions for full arch implant-supported prostheses: A systematic review. *BMC Oral Health*, 21(1), 114.
4. The Glossary of Prosthodontic Terms 2023: Tenth Edition. J Prosthet Dent. 2023 Oct;130(4 Suppl 1):e1-e3. doi: 10.1016/j.prosdent.2023.03.003. PMID: 37914441.
5. Lee SJ, Betensky RA, Gianneschi GE, Gallucci GO. Accuracy of digital versus conventional implant impressions. Clin Oral Implants Res. 2015 Jun;26(6):715-9. doi: 10.1111/clr.12375. Epub 2014 Apr 10. PMID: 24720423; PMCID: PMC4428303.
6. Schlenz MA, Schubert V, Schmidt A, Wöstmann B, Ruf S, Klaus K. Digital versus Conventional Impression Taking Focusing on Interdental Areas: A Clinical Trial. Int J Environ Res Public Health. 2020 Jun 30;17(13):4725. doi: 10.3390/ijerph17134725. PMID: 32630132; PMCID: PMC7370147.
7. Papaspyridakos P, Chen CJ, Chuang SK, Weber HP, Gallucci GO. Accuracy of implant impressions for partially and completely edentulous patients: A systematic review. International Journal of Oral & Maxillofacial Implants. 2014;29(4):836-845.

8. Miyazaki T, Hotta Y, Kunii J, Kuriyama S, Tamaki Y. A review of dental CAD/CAM: Current status and future perspectives from 20 years of experience. *Dental Materials Journal*. 2009;28(1):44-56.
9. van Noort R. The future of dental devices is digital. Dent Mater. 2012 Jan;28(1):3-12. doi: 10.1016/j.dental.2011.10.014. Epub 2011 Nov 26. PMID: 22119539.
10. Mangano F, Gandolfi A, Luongo G, Logozzo S. Intraoral scanners in dentistry: a review of the current literature. BMC Oral Health. 2017 Dec 12;17(1):149. doi: 10.1186/s12903-017-0442-x. PMID: 29233132; PMCID: PMC5727697.
11. Elashry WY, Elsheikh MM, Elsheikh AM. Evaluation of the accuracy of conventional and digital implant impression techniques in bilateral distal extension cases: A randomized clinical trial. *BMC Oral Health.* 2024;24(764). doi:10.1186/s12903-024-04495-0.
12. Amin S, Weber HP, Finkelman M, El Rafie K, Kudara Y, Papaspyridakos P. Digital versus conventional full-arch implant impressions: A comparative study. *Clin Oral Implants Res.* 2017;28(11):1360-1367. doi:10.1111/clr.13008.
13. Yun MJ, Jeon YC, Jeong CM, Huh JB. Comparison of the fit of cast gold crowns fabricated from the digital and the conventional impression techniques. *J Adv Prosthodont.* 2017;9(1):1-13. doi:10.4047/jap.2017.9.1.1.
14. Yuzbasioglu E, Kurt H, Turunc R, Bilir H. Comparison of digital and conventional impression techniques: Evaluation of patients' perception, treatment comfort, effectiveness, and clinical outcomes. *BMC Oral Health.* 2014;14:10. doi:10.1186/1472-6831-14-10.
15. Kernen-Gintaute A, Akulauskas M, Kernen F, Zitzmann NU, Spies BC, Burkhardt F. Accuracy of digital and conventional implant impressions in edentulous jaws: A clinical comparative study. *J Dent.* 2025;153:105559. doi:10.1016/j.jdent.2025.105559.
16. Gutmacher Z, Kelly A, Renne W, et al. Evaluation of the accuracy of multiple digital impression systems on a fully edentulous maxilla. *Quintessence Int.* 2021;52(6):488-495. doi:10.3290/j.qi.b1244373.
17. Basaki K, Alkumru H, De Souza G, Finer Y. Accuracy of digital versus conventional implant impression approach: A three-dimensional comparative in vitro analysis. *Int J Oral Maxillofac Implants.* 2017;32(4):792-799. doi:10.11607/jomi.5174.
18. Chochlidakis K, Papaspyridakos P, Tsigarida A, et al. Digital versus conventional full-arch implant impressions: A prospective study on 16 edentulous maxillae. *J Prosthodont.* 2020;29(4):281-286. doi:10.1111/jopr.13162.
19. Menini M, Setti P, Pera F, Pera P, Pesce P. Accuracy of multi-unit implant impression: Traditional techniques versus a digital procedure. *Clin Oral Investig.* 2018;22(3):1253-1262. doi:10.1007/s00784-017-2217-9.
20. Lee SJ, Gallucci GO. Digital versus conventional implant impressions: Efficiency outcomes. *Clin Oral Implants Res.* 2013;24(1):111-115. doi:10.1111/j.1600-0501.2012.02430.x.
21. Marghalani A, Weber HP, Finkelman M, Kudara Y, El Rafie K, Papaspyridakos P. Digital versus conventional implant impressions for partially edentulous arches: An evaluation of accuracy. *J Prosthet Dent.* 2018;119 (4):574-579. doi:10.1016/j.prosdent. 2017. 07.002.
22. Papaspyridakos P, Gallucci GO, Chen CJ, Hanssen S, Naert I, Vandenberghe B. Digital versus conventional implant impressions for edentulous patients: Accuracy outcomes. *Clin Oral Implants Res.* 2015;26(8):983-992. doi:10.1111/clr.12407.