Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6690

EVALUATION OF CLINICIAN SATISFACTION AND CLINICAL OUTCOMES WITH OPTICAL IMPRESSION SYSTEMS IN PROSTHETIC DENTISTRY

Sajid Ali Khan[1], Sheeba Wahab[2], Kamran khan[3*], Muhammad Asif Nawaz[4], Yasir Ali Shah[5], Hijab Moeen[6]

[1]Demonstrator, Shaheed Zulfiqar Ali Bhutto Medical University, School of Dentistry, Islamabad
[2,3,4,5,6]Resident prosthodontist, Sardar Begum Dental College, Peshawar

***Corresponding Author**. Dr Kamran Khan,
*Resident prosthodontist, Sardar begum dental college Peshawar.
Email: kamranwazir21.kk@gmail.com

Abstract:

Objective:

This study aimed to evaluate clinician satisfaction and clinical outcomes associated with optical impression systems compared to traditional impression methods in prosthetic dentistry.

Methodology:

The study used a prospective observational design with 230 participants. Data collection included demographic information, types of impression systems used, clinician satisfaction surveys assessing ease of use, accuracy, comfort, and overall satisfaction. It also involved clinical outcomes assessments such as impression accuracy and procedure time. Statistical analysis involved descriptive statistics, comparative analysis using chi-sqaure and t-tests to identify influencing factors.

Results:

The mean of the years of experience was 0.12 0.05. Additionally, 85% of clinicians reported high accuracy with optical system versus 70% with traditional methods. Furthermore, impressions taken using optical systems exhibited greater accuracy ($p = 0.034$).

Conclusions:

This study highlights the benefits of using optical impression systems in prosthetic dentistry, including greater clinician satisfaction, improved clinical outcomes, and enhanced accuracy and efficiency, which could improve prosthetic dental practice.

Keywords: Optical Impression, Accuracy, Clinician, Prosthetic

Introduction

In the field of modern dentistry, the introduction of digital technologies has transformed traditional clinical operations, opening up new possibilities for better patient care and treatment outcomes. Among these advancements, optical impression systems have received substantial attention for their potential to improve accuracy, efficiency, and patient experience in prosthetic dentistry. Optical impression devices, often known as intraoral scanners, represent a significant change from traditional impression techniques, which involved heavy materials causing patient discomfort. These

systems use advanced imaging technologies like structured light or confocal microscopic imaging to produce comprehensive digital models of dental structures with high precision [1]. The resulting digital models may be readily linked into computer-aided design/computer-aided manufacturing (CAD/CAM) workflows, allowing for the creation of custom prosthetic restorations with unprecedented precision and efficiency [2]. The possibility of various potential advantages has pushed optical impression systems into widespread use in prosthetic dentistry. The most important goal is to improve patient satisfaction and ease. Compared to traditional impressions, which can include the use of impression trays and thick impression materials, optical impressions provide a non-invasive and less painful experience for patients, resulting in a more pleasant dental experience [3]. Furthermore, the removal of impression material setting times and accompanying gag reflexes might lead to a more calm more effective therapeutic workflow, eventually boosting overall patient satisfaction. [4] Apart from contributing to a better patient satisfaction, optical impression systems provide clinician with greater precision and accuracy in prosthesis treatment planning and manufacture. Digital impressions enable the acquisition of comprehensive anatomical information with sub-millimeter accuracy, reducing the mistakes and discrepancies often associated with conventional impressions [5]. This precision results in better-fitting prosthetic restorations, fewer remakes or revisions, and eventually, better clinical results for patients [6]. Furthermore, the digital format of optical impressions allows for continuous interaction and cooperation between clinician and dental laboratories, which streamlines the manufacturing process and reduces wait times [7].

Considering the potential benefits of optical impression systems, their implementation and incorporation into ordinary healthcare settings have not been without barriers. Clinicians may encounter early challenges due to the price of obtaining the appropriate gear and software, thereby and also to the amount of time and money needed for training and understanding with the latest innovations [8]. In addition, worries regarding the durability and accuracy of optical impression systems for different clinical circumstances, such as deep sub-gingival margins or difficult implant cases, may lead to reservations among certain clinicians [9]. As a result, assessing clinician experience and clinical outcomes with optical impression systems in prosthetic dentistry is essential to understanding how these technologies affect current dental practice. Examining physicians' circumstances, views, and issues with optical impression systems can provide helpful information into the factors which affect their uptake and utilization, as well as the consequences for the treatment of patients and their success.[10]

The present study seeks to explore the perspectives of clinicians utilizing optical impression systems in prosthetic dentistry, aiming to assess their satisfaction with these technologies and their perceived impact on clinical outcomes. Through a comprehensive evaluation of clinician experiences and feedback, this study aims to contribute to a deeper understanding of the opportunities and challenges associated with the integration of optical impression systems into routine prosthetic dental practice. By elucidating the factors influencing clinician satisfaction and clinical outcomes, this research endeavor strives to inform future advancements in digital dentistry and enhance the delivery of prosthetic care to patients. The study aimed to provide valuable insights into the effectiveness of optical impression systems in prosthetic dentistry, with implications for clinical practice and future research directions.

Methodology:

The study employed a prospective observational design to evaluate clinician satisfaction and clinical outcomes associated with optical impression systems compared to traditional impression methods in prosthetic dentistry. The research was conducted in dental clinics and academic institutions offering prosthetic dentistry services. Participants included clinicians with at least one year of experience in prosthetic dentistry, practising in clinics equipped with both optical impression systems and traditional impression materials. A sample size calculation, based on an expected effect size derived

from pilot data, determined a minimum of 230 participants necessary to achieve adequate statistical power. Data collection encompassed demographic information, types of impression systems used, clinician satisfaction surveys assessing ease of use, accuracy, comfort, and overall satisfaction, as well as clinical outcomes assessments such as impression accuracy and procedure time. Statistical analysis involved descriptive statistics, and comparative analysis using chi-sqaure and t- tests to identify influencing factors.

Results:

The research assessed clinician satisfaction and clinical outcomes of optical impression systems versus traditional methods in prosthetic dentistry. The average age of the clinicians was 38.8 ± 4.9, with a gender ratio of 2:1. The mean years of experience were 0.12 ± 0.05. The results showed that clinicians using optical impression systems reported higher satisfaction levels in all aspects, such as ease of use, accuracy, comfort, and overall satisfaction, compared to those using traditional methods. Specifically, 90% of clinicians in the optical impression group found the system easy to use, while only 75% in the traditional impression group found it easy. Similarly, 85% of clinicians using optical impression systems reported high accuracy, compared to 70% in the traditional group. Impressions taken with optical systems were more accurate, with a mean deviation of 0.12 mm compared to 0.18 mm in the traditional group. Additionally, procedures using optical impression systems were completed faster, with an average time of 22.5 minutes compared to 28.1 minutes using traditional methods. These findings indicate that optical impression systems provide advantages in terms of clinician satisfaction and clinical outcomes, including improved accuracy and efficiency, which could enhance prosthetic dentistry practice.

Table 1: Clinician Satisfaction with Impression Systems

Satisfaction Aspect	**Optical Impression Group**	**Traditional Impression Group**	**p-value***
Ease of Use	90%	75%	0.042
Accuracy	85%	70%	0.091
Comfort	95%	65%	0.012
Overall Satisfaction	88%	72%	0.031

*chi-square test

Table 2: Clinical outcomes

Outcome Measure	**Optical Impression Group**	**Traditional Impression Group**	**p-value***
Impression Accuracy (mm)	Mean: 0.12 ± 0.05	Mean: 0.18 ± 0.07	0.034
Procedure Time (minutes)	Mean: 22.5 ± 4.3	Mean: 28.1 ± 5.6	0.012

*Independent sample t-test

Discussion:

The results of this study show that optical impression systems have several significant advantages over traditional methods in prosthetic dentistry. Clinicians using optical impression systems reported higher satisfaction levels compared to those using traditional methods, particularly in terms of ease of use, accuracy, comfort, and overall satisfaction. Specifically, 90% of clinicians found optical impression systems easy to use, whereas only 75% reported the same for traditional methods ($p = 0.042$). These findings are consistent with existing literature, which emphasizes the

effectiveness and benefits of digital impression technologies in dental practice, and align with previous research showing that digital impression systems are preferred by clinicians for their ease of use and user-friendly interfaces.[11]

Our research revealed that 85% of clinicians reported high accuracy with optical impression systems compared to 70% with traditional methods. Although this difference was not statistically significant ($p = 0.091$), it aligns with previous studies showing that digital impressions yield highly accurate results. Patzelt et al. (2014) found that digital impressions provided comparable, if not superior, accuracy to conventional techniques.[12] Similarly, Reich and Yatzko (2015) found that the accuracy of digital impressions was within clinically acceptable limits for prosthetic restorations, supporting our findings.[13] Additionally, the increased comfort reported by clinicians (95% for optical versus 65% for traditional, $p = 0.012$) highlights the non-invasive nature of digital impressions. This is supported by Christensen (2009), who noted that patients and clinicians preferred digital impressions due to the reduced discomfort and absence of gag reflexes.[14] The improved clinical outcomes associated with optical impression systems were evident in our study, with impressions taken using digital systems exhibiting a mean deviation of 0.12 mm compared to 0.18 mm for traditional methods ($p = 0.034$). This enhanced precision aligns with the findings of Ender and Mehl (2013), who reported that digital impressions offered superior accuracy and consistency in capturing dental anatomy.[15] Similarly, Güth et al. found that the precision of digital impressions was consistently higher than that of traditional methods, particularly in complex cases.[8] Moreover, the reduction in procedure time (mean time of 22.5 minutes for optical versus 28.1 minutes for traditional methods, $p = 0.012$) is a significant advantage, reflecting the efficiency of digital workflows. Another researcher also observed similar reductions in time with digital impressions, attributing this to the elimination of setting times and immediate availability of digital data for CAD/CAM processes.[16,17] Additionally, Park et al. (2016) reported that digital impressions significantly reduced chair time and increased the efficiency of prosthetic procedures.[18]

Despite the benefits, the implementation of optical impression systems is not without challenges. The initial cost of acquiring digital impression equipment and the time required for training can be significant barriers for some practices. Mangano et al. (2017) highlighted the financial burden and the learning curve associated with adopting digital impression systems, which can deter some clinicians from transitioning from traditional methods.[19] Additionally, concerns regarding the reliability of digital impressions in complex cases, such as deep sub-gingival margins, persist. However, as technology advances and becomes more accessible, these barriers are likely to diminish. Mizumoto et al. (2014) noted that ongoing improvements in digital impression technology are addressing these challenges, making them more versatile and reliable for a wider range of clinical scenarios.[20]

Conclusion

The present study provides evidence regarding the benefits of optical impression systems in the field of prosthetic dentistry. It illustrates a higher level of clinician satisfaction and improved clinical outcomes in comparison to traditional impression methods. These results align with existing scholarly literature, underscoring the potential of digital impressions to enhance the accuracy, efficiency, and overall quality of prosthetic care. Future research endeavors should center on addressing the challenges associated with cost and training, in addition to exploring the capabilities of digital impressions in more intricate clinical scenarios.

References

1. Patzelt SBM, Emmanouilidi A, Stampf S, Strub JR, Att W. Accuracy of full-arch scans using intraoral scanners. Clin Oral Investig [Internet]. 2014;18(6):1687–94. Available from: http://dx.doi.org/10.1007/s00784-013-1132-y

2. Joda T, Brägger U, Gallucci G. Systematic literature review of digital three-dimensional superimposition techniques to create virtual dental patients. Int J Oral Maxillofac Implants [Internet]. 2015;30(2):330–7. Available from: http://dx.doi.org/10.11607/jomi.3852
3. Rodriguez R, Hartmann N, Figgener L, Kleinheinz J, Weingart D. Long term clinical outcome of dental implants placed in a patient with Singleton–Merten syndrome. J Prosthodont Res [Internet]. 2015;59(3):199–204. Available from: http://dx.doi.org/10.1016/j.jpor.2015.03.003
4. Lee SJ, Gallucci GO. Digital vs. conventional implant impressions: efficiency outcomes. Clin Oral Implants Res [Internet]. 2013;24(1):111–5. Available from: http://dx.doi.org/10.1111/j.1600-0501.2012.02430.x
5. Güth J-F, Runkel C, Beuer F, Stimmelmayr M, Edelhoff D, Keul C. Accuracy of five intraoral scanners compared to indirect digitalization. Clin Oral Investig [Internet]. 2017;21(5):1445–55. Available from: http://dx.doi.org/10.1007/s00784-016-1902-4
6. Sailer I, Mühlemann S, Fehmer V, Hämmerle CHF, Benic GI. Randomized controlled clinical trial of digital and conventional workflows for the fabrication of zirconia-ceramic fixed partial dentures. Part I: Time efficiency of complete-arch digital scans versus conventional impressions. J Prosthet Dent [Internet]. 2019;121(1):69–75. Available from: http://dx.doi.org/10.1016/j.prosdent.2018.04.021
7. Imburgia M, Logozzo S, Hauschild U, Veronesi G, Mangano C, Mangano FG. Accuracy of four intraoral scanners in oral implantology: a comparative in vitro study. BMC Oral Health [Internet]. 2017;17(1). Available from: http://dx.doi.org/10.1186/s12903-017-0383-4
8. Güth JF, Edelhoff D, Schweiger J, Keul C, Stumbaum J. Virtual evaluation for the production of ceramic implant-supported crowns based on digital impression data. International Journal of Computerized Dentistry. 2016;19(2):127–39.
9. Sannino G, Barlattani A. Straightforward In-office Procedure for Fabricating an All-ceramic Restoration Using CAD/CAM Technology. Journal of Visualized Experiments. 2015;(98).
10. Alshagroud RS, Alfadda SA. Clinical outcomes of implant-supported restorations fabricated from digital impressions: a systematic review and meta-analysis. Clinical Oral Implants Research. 2020;31(5):491–508.
11. 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 Jan 30;14:10–10.
12. Patzelt SBM, Lamprinos C, Stampf S, Att W. The time efficiency of intraoral scanners. The Journal of the American Dental Association. 2014 Jun;145(6):542–51.
13. Reich S, Yatzko M. Accuracy of single-tooth restorations based on intraoral digital and conventional impressions in a clinical study. J Prosthet Dent. 2015;113(4):304-309.
14. Christensen GJ. Will Digital Impressions Eliminate the Current Problems With Conventional Impressions? The Journal of the American Dental Association. 2008 Jun;139(6):761–3.
15. Ender A, Mehl A. Full arch scans: conventional versus digital impressions-an in-vitro study. Int J Comput Dent. 2013;16(1):11–21.
16. Abduo J, Palamara JEA. Accuracy of digital impressions versus conventional impressions for 2 implants: an in vitro study evaluating the effect of implant angulation. International journal of implant dentistry. 2021 Jul 30;7(1):75–75.
17. Schaefer O, Decker M, Wittstock F, Kuepper H, Guentsch A. Impact of digital impression techniques on the adaption of ceramic partial crowns in vitro. Journal of Dentistry. 2014 Jun;42(6):677–83.
18. Park JM, Kim HY, Kim JH, Kim WC, Kim JH. Comparison of prosthetic models produced by traditional and digital methods. J Adv Prosthodont. 2016;8(6):472–9.
19. Mangano FG, Veronesi G, Hauschild U, Mijiritsky E, Mangano C. Trueness and precision of four intraoral scanners in oral implantology: A comparative in vitro study. PLoS One. 2017;12(9)

20. Mizumoto RM, Yilmaz B, McGlumphy EA Jr, Seidt J, Johnston WM. Accuracy of different digital scanning techniques and scan bodies for complete-arch implant-supported prostheses. J Prosthet Dent [Internet]. 2020;123(1):96–104. Available from: http://dx.doi.org/10.1016/j.prosdent.2019.01.003