IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 6 Ser.7 (June 2025), PP 53-56
www.iosrjournals.org

A Questionnaire Survey on Various Impression Techniques and Materials Used for Implant Prosthesis Among Practitioners in and Around Coimbatore District.

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Abstract:
Background:
Accurate impression techniques and appropriate material selection are essential for the clinical success of implant prostheses. This study aimed to evaluate the awareness, preferences, and practices regarding implant impression techniques among dental practitioners in Coimbatore
Materials and methodology:
A cross-sectional survey was conducted among 250 dental professionals, including general practitioners, postgraduate students, and specialists. A structured 15-question validated questionnaire was distributed. Data were analyzed using the Chi-square test, and a significance level of $p < 0.05$ was considered
Results:
Among the 250 participants, 41.2% were postgraduates, 38.8% general practitioners, and 20% specialists. Awareness of impression techniques was high (93.6%), with a preference for custom trays (41.2%) and vinyl polysiloxane material (65.2%). Implant-level impressions were favored by 51.2%, while 57.2% preferred square/pick-up copings. Pattern resin was the preferred splinting material (59.6%). Verification jigs were widely accepted (93.6%), and 73.2% opted to section and rejoin if the jig was not passive. A statistically significant association was observed between participant type and awareness of impression techniques ($p<0.05$).
Conclusion:
The study reveals that while practitioners possess a good theoretical understanding of impression techniques and materials, there remains variability in clinical execution. Continuous education is recommended to enhance clinical outcomes in implant prosthodontics.
Key words: *Impression techniques, impression materials, and implant prosthesis.*

Date of Submission: 08-06-2025 Date of Acceptance: 20-06-2025

I. Introduction:

Dental implants have revolutionized the rehabilitation of partially and completely edentulous patients, offering improved esthetics, function, and patient satisfaction. [(1)] However, the long-term success of implant-supported prostheses depends significantly on the accuracy of the implant impression, which ensures a passive fit and minimizes biomechanical complications. Accurate impression techniques and material selection are vital for the transfer of the three-dimensional spatial relationship of implants to the working cast. [(2)] Inaccurate impressions may lead to misfit prostheses, contributing to mechanical failures, screw loosening, peri-implant bone loss, and even implant failure. Various impression materials, such as vinyl polysiloxane, polyether, and techniques like open tray and closed tray methods, have been proposed to enhance precision. [(3,4)] However, the choice often depends on practitioner knowledge, experience, and clinical conditions. This study was designed to evaluate the current trends and awareness regarding impression techniques and materials among dental practitioners in and around the Coimbatore district.

II. Materials and Methods:

Study design and Participants:
It is a cross-sectional, questionnaire-based study conducted among dental practitioners, including general practitioners, postgraduate students, and specialists in the Coimbatore district. The sample size consisted of 250 participants.
Questionnaire Design:

A structured and validated questionnaire comprising 15 questions was developed. The questionnaire covered the areas including

- Awareness of impression techniques
- Preferred impression trays and materials
- Level of impression making (implant or abutment level)
- Use of splinting materials and verification jigs
- Handling of non-parallel implants
- Perceived causes of impression distortion

Data collection:
The questionnaire was distributed digitally via email and messaging platforms. Informed consent was obtained from all participants.

Statistical analysis:
Responses were analysed using the Chi-square test to assess associations between variables. A p-value <0.05 was considered statistically significant.

III. Results:

A total of 250 participants completed the survey, comprising 97 (38.8%) general practitioners, 103 (41.2%) postgraduate students, and 50 (20%) specialists. Regarding awareness of implant impression techniques, 234 (93.6%) participants reported familiarity with the various methods, showing a statistically significant association with practitioner category (p = 0.002). Among those aware, the majority preferred custom-made trays (41.2%) for impressions, while prefabricated trays and digital impressions were less commonly selected. This preference showed a statistically significant difference among practitioner groups (p = 0.000). When asked about the impression material commonly used for implant impressions, 65.2% of respondents selected vinyl polysiloxane, which also demonstrated a statistically significant association with the type of practitioner (p = 0.000). Implant-level impressions were preferred by 128 (51.2%) participants; however, there was no statistically significant difference between practitioner categories for this preference (p = 0.069). In the choice of components for open tray impressions, 143 (57.2%) of practitioners favored square or pick-up type impression copings, though the association between practitioner type and preference was not statistically significant (p = 0.485). For splinting during the open tray impression technique, pattern resin was the most commonly used material by 59.6% of respondents, with a statistically significant association observed (p = 0.009). For impression making in cases of multiple non-parallel implants, 53.2% preferred the implant-level open tray technique, although this preference did not reach statistical significance (p = 0.112). Regarding factors affecting implant impression accuracy, 87.6% of participants believed that factors such as impression technique, implant angulation, and coping modification collectively determined the overall accuracy. This association was statistically significant (p = 0.011). Verification jigs were favored by 93.6% of the respondents, and a statistically significant association was found between practitioner type and preference for verification jig usage (p = 0.002). When asked about their course of action if the verification jig was not passive, 73.2% indicated they would opt to section and rejoin the jig to correct inaccuracies, which was statistically significant (p = 0.037). When questioned about the impact of inaccurate transfer of the impression post, 20% of participants acknowledged that it would affect key parameters, including implant stability, prosthesis fit, and soft tissue contour. However, this finding was not statistically significant (p = 0.298). Finally, 35.2% of respondents identified the closed tray impression technique as most commonly associated with misfits during jig trials, which was statistically significant (p = 0.005).

	General Practitioners 97 (38.8%)	Postgraduates 103 (41.2%)	Specialist 50 (20%)	Total 250 (100%)	Statistical Inference
Are you aware of various impression techniques					X2 Value: 12.076[a] df: 2 p value: 0.002
Yes	86 (36.8%)	103 (44.0%)	45 (19.2%)	234 (93.6%)	
No	11 (68.8%)	0 (0%)	5 (31.2%)	16 (6.4%)	
If 'yes' what is the preferred type of tray	36 (35.0%)	32 (31.1%)	35 (34.0%)	103 (41.2%)	X2 Value: 22.152[a] df: 2 p value: 0.000*
Which impression material is commonly used for Implant impression	41 (25.2%)	82 (50.3%)	40 (24.5%)	163 (65.2%)	X2 Value: 36.737[a] df: 2 p value: 0.000*
At what level do you prefer the implant impression	41 (32.0%)	57 (44.5%)	30 (23.4%)	128 (51.2%)	X2 Value: 5.353a df: 2

					p value: 0.069
What type of component you prefer for making an open tray impression	56 (39.2%)	62 (43.4%)	25 (17.5%)	143 (57.2%)	X2 Value: 1.447[a] df: 2 p value: 0.485
Which material do you prefer for splinting during open tray impression technique in multiple Implant cases	51 (34.2%)	73 (49.0%)	25 (16.8%)	149 (59.6%)	X2 Value: 9.337[a] df: 2 p value: 0.009
For multiple nonparallel implants which impression technique is preferred	55 (41.4%)	58 (43.6%)	20 (15.0%)	133 (53.2%)	X2 Value: 4.377[a] df: 2 p value: 0.112
Implant impression accuracy depends on	81 (37.0%)	88 (40.2%)	50 (22.8%)	219 (87.6%)	X2 Value: 9.019[a] df: 2 p value: 0.011
Preference of verification Jig	86 (36.8%)	103 (44.0%)	45 (19.2%)	234 (93.6%)	X2 Value: 12.076[a] df: 2 p value: 0.002
In case if verification jig is not passive, what will be your next move	71 (38.8%)	82 (44.8%)	30 (16.4%)	183 (73.2%)	X2 Value: 6.599[a] df: 2 p value: 0.037
If the transfer of the Impression post is not accurate during impression making, it will affect	15 (30.0%)	25 (50.0%)	10 (20.0%)	50 (20.0%)	X2 Value: 2.422[a] df: 2 p value: 0.298
Based on your experience, misfit during jig trial is most common in which type of impression technique	31 (35.2%)	47 (53.4%)	10 (11.4%)	88 (35.2%)	X2 Value: 10.425[a] df: 2 p value: 0.005

Table 1 *Response of the participants*

IV. Discussion:

This study underlines the trends among practitioners regarding implant impression materials and techniques. The results showed that a significant majority of practitioners (93.6%) were aware of various impression techniques, which aligns with existing literature that underlines the importance of accurate impressions for prosthesis success**.** The results showed that a majority of practitioners prefer custom trays and vinyl polysiloxane materials, aligning with existing literature that underscores their superior dimensional stability and accuracy. Studies by **Shafa S et al (2008) and Kim HK et al. (2001)** have similarly emphasized the advantages of custom trays in minimizing polymerization shrinkage and providing better seating during impression making. [5,6] The preference for implant-level impressions indicates a good understanding among practitioners of the importance of capturing the precise implant position, particularly in cases involving multiple implants. Implant-level impressions have been shown to result in better passivity compared to abutment-level impressions, as per **Alikhasi et al (2011) and Lee H et al (2008).** The overwhelming support for verification jigs among participants is encouraging, as the use of jigs is crucial for minimizing distortion and verifying the master cast's accuracy. [7,8] In line with **Ercoli C et al (2012),** a verification jig significantly reduces prosthesis misfit, thereby enhancing clinical success. [9] However, the findings also indicate gaps, such as a portion of practitioners still opting for less ideal splinting techniques or misunderstanding the impact of impression post inaccuracy. Continuous professional education and workshops emphasizing newer digital workflows and clinical protocols are necessary to bridge these gaps. Digital impressions, although gaining popularity, were less frequently preferred. This may reflect limited access to intraoral scanners or a lack of confidence in digital workflows among some practitioners. Given the documented advantages of digital impressions, including patient comfort and reduced errors (**Chandran SK et al., 2019 and Ahlholm P et al, 2018)**, efforts should be made to increase their adoption. [10,11]

V. Conclusion:

Within the limitations of this questionnaire-based study, it can be concluded that practitioners in and around Coimbatore demonstrate good knowledge regarding implant impression techniques and materials. Preference for custom trays, vinyl polysiloxane material, implant-level impressions, and the use of verification jigs are promising findings.

However, discrepancies remain regarding the management of non-parallel implants and splinting methods. Greater emphasis on continuing dental education and practical workshops can help translate this knowledge into improved clinical outcomes for implant prosthodontics.

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