ORIGINAL ARTICLE

Revisiting Alginate Impressions: A Brief Analysis Integrating Patient Feedback in Dental Students Performance

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OBJECTIVE: The objective of the study is to assess patient satisfaction and discomfort level with the alginate impression procedure and analyze the patient communication and feedback, stratified by gender variable.

METHODOLOGY: This descriptive cross-sectional research was conducted at the Prosthodontic department of Baqai Dental College on a sample of 150 partially dentate patients who underwent the impression technique. Non-probability convenience sampling technique was used to collect sample. Study was conducted for 6-8 months. The study tool was a questionnaire designed to focus on demographic characteristics and asked 10 questions to assess satisfaction level, feedback, allergy, procedural anxiety, professionalism of the dental staff, and post-procedure recommendations. A pilot study was run to assess the questionnaire's reliability. The data was analyzed using SPSS software version 21 for descriptive and inferential statistics, with the Chi-Square test applied to assess gender differences.

RESULTS: A total of 150 participants (male n= 78, 52% and female n= 72, 48%) submitted their responses, with their median age reported as 38.5 years (range 25-68). Most patients were satisfied with the alginate impression procedure, reporting no discomfort or allergic reactions. Females were significantly more informed about the procedure, found more positive aspects and felt more comfortable than males (p-value: <0.001, 0.033 and 0.006) respectively. Regression analysis revealed that females were 2.5 times more satisfied, 6.5 times more informed and three times more comfortable with the procedure than males. Multivariate analysis confirmed that females were more likely to be informed and perceived greater involvement of dental staff in seeking feedback.

CONCLUSION: Women showed more positive feedback with a greater likelihood of level of satisfaction compared to men, suggesting women feel more comfortable or informed during the process and men may need further support.

KEYWORDS: alginate, dental impression materials, Irreversible hydrocolloid, patient feedback.

HOW TO CITE: Ammar Q, Tanveer T, Inayat A, Afaq H, Zeeshan M, Nazeer Z. Revisiting alginate impressions: a brief analysis integrating patient feedback in dental students performance. J Pak Dent Assoc 2025;34(3):93-98.

DOI: https://doi.org/10.25301/JPDA.343.93

Received: 02 January 2025, Accepted: 22 September 2025

INTRODUCTION

Impression, a negative replica of oral tissues, is crucial in assisting dental clinicians and technicians in fabricating prostheses that are provided with excellent retention and stability. This impression-taking technique serves as a foundational step in the treatment planning and prosthetic fabrication. These impressions are tailored to the oral cavity with extreme precision to avoid any error in esthetics and function in the denture.[1]

Among the different materials available for impression with advanced techniques, Alginate impression, an irreversible hydrocolloid are still remains as a cornerstone for dental practice. This material is reported as hypoallergenic, non-toxic and ability to capture intricate surface details. In particular terms of affordability, ease of use with short execution time and reliability, it ensures the safe use during working and diagnostic cases for dentate patients.[2,3]

In the outpatient department (OPD), dental students are

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the first ones who encounter the interaction with patients and face procedural challenges during impression technique.[4]

However, the experience of patients in the domain of comfort, procedural efficacy and communication is often overlooked, so integrating the feedback from the patients could enhance better procedural outcomes along with the development of patient-centered care in these clinical practitioners.[5,6] Patient feedback is essential for improvements in dental procedures, as it fosters a more compassionate and effective dental experience for both the dental practitioner and the patient. This facilitates the growth of the dental practice and better outcomes, and drives the dental students to address the patient concerns promptly and extract the meaningful feedback that can further motivate them to practice with better skills in the future.[7]

The rationale for this study stems from the need to assess this impression material through the lens of patient feedback, which will further allow the dental students to refine their procedural skills and patient communication and provide holistic dental care. The study further offered insight into bridging technical competency and patient-centered care in dental education. However majority of the research was conducted on dental students or dental practitioners. There is less emphasis on the opinions and experiences of the patients undergoing the impression technique seen in the literature; therefore, this research evaluated the perception and feedback of the patients, aiming to bridge the gap and evaluate the perception of the patients and respond to the dental care. This research hopes to gain a better understanding of perceptions of the patients undergoing the impression technique to attain a comprehensive picture of the impact of dental practices from the recipients' point of view.

METHODOLOGY

This descriptive cross-sectional study was conducted at the Prosthodontic OPD of Baqai Dental College, Karachi. The study was approved by the Ethical Review Board of Baqai Medical University with the reference no (BDC/ERB/2024/0023; date of approval: July, 31st 2024). The calculated sample was one hundred and fifty patients. The sample size was calculated using OpenEpi (online software for sample size calculation), considering a confidence interval of 95%, power of the study 80% and expected frequency outcome of 43.8.[8]

The selected sample was enrolled in the study via a non-probability sampling technique with the inclusion criteria of partially dentate male and female patients aged 25-70 years who were visiting the prosthodontic OPD and had undergone the impression technique recently. Complete edentulous and non-compliant patients were excluded from the study.

The administered questionnaire was constructed in the English and then translated into Urdu and back into English to check the content validity of the data collection instrument. The confidentiality of the participants was maintained. The questionnaire was designed to assess satisfaction, recommendation, and feedback regarding the clinical procedure done by the student, in two parts.

- Part 1 focused on the demographic characteristics of the participants, including the name of the patient, age and gender.
- Part II comprises 10 multiple-choice questions regarding satisfaction level, feedback and recommendations regarding the clinical procedure.

Initially, a pilot study was conducted to assess the context validity and reliability of the study questionnaire. The questionnaire was distributed to twenty participants. SPSS software version 21 was used to calculate reliability index Cronbach's alpha (α=0.76), which is acceptable for this pilot study. Written consent was sought from the study participants. The continuous variables were reported as mean and standard deviation and categorical variables were reported as frequencies and percentages. The Chi-Square test was applied to assess the difference in responses to the questionnaire about alginate impression by gender. The results were considered significant if the p-value was ≤ 0.05.

RESULTS

Data does not follow normal distribution (Shapiro-Wilk Test p-value <0.05), therefore median is calculated for the continuous variables. The median for age was 38.50 (Interquartile ranges: Q1-Q3: 34-49) years and it ranged from 25 to 68 years. Almost equal male to female 78:72 ratio was reported for this study. Approximately, 45% patients were satisfied with the alginate impression procedure (n= 30) and 62.6% reported no discomfort (n= 94) and 77.3% reported no allergic response (n= 116), given in Table 1. Table 2 presents the response of the alginate impression procedure among the genders. Females were more informed about the purpose and steps of the procedure as compared to males (p-value <0.001). Females found more positive aspects of alginate impression in comparison to males (p-value <0.033). Both genders showed almost similar results for allergic reactions related to the alginate impression material; however p-value is significant (p-value <0.001). Females were comfortable with the alginate impression procedure and will recommend it in the future. The majority of females felt that the dental staff actively sought their feedback.

Table 3 presents the results of Regression analysis,

Table 1: Demographic Details and Feedback Responses regarding Alginate Impression among patients (n=150)

Variables	Median (Q1-Q3)	Range
Age (years)	38.50 (34-49)	25-68
Gender	n	%
Male	78	52
Female	72	48
Questions	Responses	n(%)
How satisfied were you with the alginate impression procedure?	Very Satisfied	45 (30.0)
	Satisfied	42(28.0)
	Neutral	28(18.7)
	Dissatisfied	35(23.3)
Do you experience any discomfort or pain during the alginate impression procedure?	Yes	28 (18.7)
	Somewhat	28 (18.7)
	No	94 (62.6)
Were you informed about the purpose and steps involved in the alginate impression procedure?	Yes	70 (46.6)
	Partially	61 (40.7)
	No	19 (12.7)
Describe the level of anxiety before the alginate impression procedure	Very anxious	8 (5.3)
	Somewhat anxious	37 (24.7)
	Neutral	41 (27.3)
	Somewhat calm	37 (24.7)
	Very calm	27 (18.0)
What aspect of the alginate impression procedure did you find?	Positive	76 (50.7)
	Negative	74 (49.3)
Did you notice any allergic reactions or sensitivity related to the alginate material used?	Yes	8 (5.3)
	Not sure	26 (17.4)
	No	116 (77.3)
On a scale of 1-10, rate the professionalism of the dental staff during the alginate impression.	Low Professionalism	19 (12.7)
	Moderate Professionalism	67 (44.7)
	High Professionalism	64 (42.6)
Would you be comfortable undergoing another alginate impression in the future?	Yes	94 (62.7)
	May be	46 (30.7)
	No	10 (6.6)
Did you feel that the dental staff actively sought and considered your feedback or concerns?	Yes	90 (60)
	Not sure	42 (28)
	No	18 (12)
Would you recommend alginate impression to a friend or family member based on your overall experience?	Definitely	65 (43.3)
	Probably	53 (35.3)
	Not sure	26 (17.3)
	Probably Not	6 (4.0)

Table 2: Feedback of Alginate Impression Procedure according to gender (males = 78 and females =72)

Questions with Responses	Gender		p-value
	Male n(%)	Female n(%)	
How satisfied were you with the alginate impression procedure?			
Very Satisfied	18 (23.1)	27 (37.5)	
Satisfied	23 (29.5)	19 (26.4)	0.221
Neutral	15 (19.2)	13 (18.1)	
Dissatisfied	22 (28.2)	13 (18.1)	
Do you experience any discomfort or pain during the alginate impression procedure?			
Yes	14 (17.9)	14 (19.4)	
No	48 (61.5)	46 (63.9)	0.829
Somewhat	16 (20.5)	12 (16.7)	
Were you informed about the purpose and steps involved in the alginate impression procedure?			
Yes	21 (26.9)	49 (68.1)	
No	12 (15.4)	7 (7.9)	<0.001*
Partially	45 (57.7)	16 (22.2)	
Describe the level of anxiety before the alginate impression procedure.			
Very anxious	5 (6.4)	3 (4.2)	
Somewhat anxious	23 (29.5)	14 (19.4)	
Neutral	24 (30.8)	17 (23.6)	0.082
Somewhat calm	12 (15.4)	25 (34.7)	
Very calm	14 (17.9)	13 (18.1)	
What aspect of the alginate impression procedure did you find?			
Positive	33 (42.3)	43 (59.7)	0.033*
Negative	45 (57.7)	29 (40.3)	
Did you notice any allergic reactions or sensitivity related to the alginate material used?			
Yes	1 (1.3)	7 (9.7)	
No	56 (71.8)	60 (83.3)	<0.001*f
Not sure	21 (26.9)	5 (6.9)	
On a scale of 1-10, rate the professionalism of the dental staff during the alginate impression.			
Low Professionalism	9 (11.5)	10 (13.9)	
Moderate Professionalism	34 (43.6)	33 (45.8)	0.823
High Professionalism	35 (44.9)	29 (40.3)	
Would you be comfortable undergoing another alginate impression in the future?			
Yes	41 (52.6)	53 (73.6)	
No	4 (5.1)	6 (8.3)	0.006*
May be	33 (42.3)	13 (18.1)	
Did you feel that the dental staff actively sought and considered your feedback or concerns?			
Yes	34 (43.6)	56 (77.8)	
No	10 (12.8)	8 (11.1)	<0.001*
Not sure	34 (43.6)	8 (11.1)	
Would you recommend alginate impression to a friend or family member based on your overall experience?			
Definitely	18 (23.1)	47 (65.3)	
Probably	37 (47.4)	16 (22.2)	<0.001*f
Not Sure	19 (24.4)	7 (9.7)	
Probably Not	4 (5.1)	2 (2.8)	

P-value was calculated by using the Chi-square test and Fisher's exact test. significant in Chi-square and *f in Fisher's exact test*

showing females were 2.5 times more satisfied as compared to males, concerning dissatisfaction (p-value = 0.045). Females were 6.5 times more informed about the purpose and steps involved in the alginate impression procedure than males (p-value < 0.001). Females were more likely to find positive aspects of alginate impression in comparison to males, with a CI of 1.05-3.87 (p-value =0.034). Females were more comfortable with the alginate impression procedure

Table 3: Logistic regression of Feedback of Alginate Impression Procedures according to gender (males = 78 and females =72)

	Univariate Crude OR (95% CI)	p-value	Multivariate Adjusted OR (95% CI)	p-value
How satisfied were you with the alginate impression procedure?				
Very Satisfied	2.53 (1.02-6.29)	0.045*	0.57 (0.12-2.68)	0.48
Satisfied	1.39 (0.55-3.94)	0.47	0.47 (0.10-2.08)	0.32
Neutral	1.46 (0.53-4.03)	0.45	1.23 (0.32-4.61)	0.75
Dissatisfied	Reference		Reference	
Do you experience any discomfort or pain during the alginate impression procedure?				
Yes	1.33 (0.46-3.82)	0.592		
Somewhat	1.27 (0.54-2.99)	0.572		
No	Reference			
Were you informed about the purpose and steps involved in the alginate impression procedure?				
Yes	6.56 (3.05-14.11)	<0.001*	9.07 (2.65-31.06)	<0.001*
Partially	1.64 (0.55-4.89)	0.375	2.22 (0.62-7.92)	0.21
No	Reference		Reference	
Describe the level of anxiety before the alginate impression procedure.				
Very anxious	0.64 (0.12-3.25)	0.597		
Somewhat anxious	0.65 (0.24-1.79)	0.41		
Neutral	0.76 (0.28-2.02)	0.587		
Somewhat calm	2.24 (0.80-6.23)	0.121		
Very calm	Reference			
What aspect of the alginate impression procedure did you find?				
Positive	2.02 (1.05-3.87)	0.034*	0.36 (0.10-1.31)	0.123
Negative	Reference		Reference	
Did you notice any allergic reactions or sensitivity related to the alginate material used?				
Yes	29.4 (2.91-296.53)	0.004*	32.09 (2.40-428.20)	0.009
Not sure	4.5 (1.58-12.74)	0.005*	6.01 (1.67-21.61)	0.006
No	Reference		Reference	
On a scale of 1-10, rate the professionalism of the dental staff during the alginate impression.				
Low Professionalism	1.34 (0.48-3.74)	0.575		
Moderate Professionalism	1.17 (0.58-2.32)	0.652		
High Professionalism	Reference			
Would you be comfortable undergoing another alginate impression in the future?				
Yes	3.28 (1.53-7.01)	0.002*	1.59 (0.56-4.52)	0.383
May be	3.80 (0.92-15.73)	0.065	3.02 (0.44-20.41)	0.257
No	Reference		Reference	
Did you feel that the dental staff actively sought and considered your feedback or concerns?				
Yes	7.00 (2.90-16.88)	<0.001*	3.98 (1.13-13.92)	0.031
Not sure	3.40 (1.01-11.37)	0.047*	3.10 (0.81-11.87)	0.098
No	Reference		Reference	
Would you recommend alginate impression to a friend or family member based on your overall experience?				
Definitely	5.22 (0.87-31.03)	0.069		
Probably	0.86 (0.14-5.21)	0.874		
Not Sure	0.73 (0.11-4.95)	0.753		
Probably Not	Reference		Reference	

Univariate and Multivariable logistic regression analysis was performed and Crude Odds ratio (cOR) and Adjusted Odds Ratio (aOR) were reported with 95% Confidence interval (CI)

than males (p-value =0.002). All statistically significant variables at the p-value of 0.05 were subjected to the multivariate analysis and found that females were more likely to be informed, felt less allergic reactions and felt more involvement of dental staff actively in seeking the feedback.

DISCUSSION

This study assessed patient satisfaction and discomfort level with the alginate impression procedure and explore the patient communication and feedback among male and female participants and hence findings of the study revealed clear gender-based variations in experiences of the patients with alginate impression procedure. A more positive overall perception is reflected by the female participants showing greater satisfaction with less discomfort and demonstrated a stronger willingness to recommend the procedure to others in the comparison to male participants. The use of alginate as an impression material remains prevalent in the dental

practice due to its cost-effectiveness, reliability and ease of handling properties. Several studies reported around the world showed use of alginate as impression materials. 59 (20.3%) of the respondents from a study published by Alhoumaidan et al. preferred alginate. Another study by Ansari, A.S et al reported female dental students used alginate more than males dental students while a study carried out in Pakistan showed 90% of participants selected alginate for impression.[10,11]

The significant association, as indicated by p-value <0.001 between the level of understanding and comprehension of purpose and steps of taking alginate impression and gender, was found in the current investigation. It was observed that the majority of the participants were sure to get informed about alginate impression (n=70, 46.7%). This is comparable to the findings of a study by Pei D et al that found 97.33% of 187 patients considered it imperative to provide adequate information before the impression-taking procedure.[11] Furthermore, the higher level of comprehension was among the female (68.1%) as compared to male participants (26.9 %). The variations in past experiences, engagement during procedure, or differences in learning approaches among males and females explain this disparity. The smooth impression-taking procedure can be ensured by improved patient education before the procedure and may be helpful to alleviate anxiety and comfort. This can be aided by visual aids or short instructional videos.

The remarkable percentage (p-value 0.033) of positive responses regarding alginate impression material over negative responses reported in the said study was aligned with the results of the study by Bosoni et al who found no difference in pain even when the participants underwent impression technique with alginate impression material and digital impression technique although result was not statistically significant (p-value = 0.686, difference -0.2; 95% CI: -1.5 to 1.0).[13] Furthermore, this difference persists in the male and female participants of our study, where the majority of females provided positive and males showed negative responses. This difference is statistically significant and persists in Univariate analysis, but becomes insignificant in multivariate analysis. The review reported no allergic reactions after impression; hence, alginate is mostly known for its biocompatibility and has been approved by the FDA for its multiple uses.[14]

Female respondents showed positive strong inclination, with 65.3% stating they would recommend the procedure. In contrast, male respondents probably they will refer to their friends and family members. This showed female participants had a greater level of satisfaction and confidence in the procedure. The results reveal significant differences in responses between male and female participants ($p < 0.001$), indicating that gender may influence the perception of the procedure's effectiveness and comfort. Furthermore, this could reflect the difference in the communication dynamics between the genders suggesting that males need more explanation of the procedures.

A key finding of the study was that 37.5% of female participants reported being more satisfied than male participants who were satisfied with alginate impression. Although the result was statistically significant in univariate analysis, however, this suggests a slight trend towards higher satisfaction among female participants. There could be several potential reasons for the observed trend of higher satisfaction levels among female participants, including differences in expectations, pain tolerance, and communication styles that could influence subjective response. Earlier studies indicate that women tend to report greater satisfaction with healthcare interactions when they find the process to be comprehensive and the practitioner to be empathetic. This might partly explain the observed trend.[15]

Furthermore, the study assessed the level of discomfort and pre-procedural anxiety and reported no discomfort during the procedure, with a substantial proportion of 61.5% males and 63.9% females. There was no significant gender difference in perceived discomfort, which is suggestive of good tolerance of alginate impressions across both genders. Consistent with findings of a study by Serrano-Velasco et al, reporting total comfort during alginate impression.[16] In a systematic review, no change in the level of perceived anxiety in alginate or scanner impression technique, although all articles favored scanners.[17]

Hence, the consistent response may reflect the uniformity of the procedural technique or be reported as the result of the familiarity of the participants with this procedure. This is further supported that females were calmer than their male counterparts.

The use of digital impressions has brought revolution in the field of prosthodontics in terms of recording intraoral impressions in terms of patient comfort and greater acceptability; however, their use could be limited by the cost and affordability and capturing the distal areas effectively. A study by Yun MJ showed that digital impressions can increase patient satisfaction by eliminating unpleasant conventional impression materials and improving dental experience for both practitioners and patients. However, this study does not compare the conventional and digital methods.[18]

The strength of the study lies in its uniqueness, focusing on patient communication with perception of gender related insight; perhaps this could be the first study. This study focused on patient-centered feedback rather than clinician-centered feedback. This study effectively addresses how patient satisfaction and communication may vary across

gender lines. Considering these dynamics permits dental professionals to tailor their approaches, fostering better patient engagement, which can contribute to improved patient-centered care and procedural refinement. Enhanced communication strategies may reduce patient anxiety and promote greater cooperation during procedures, resulting in more accurate impressions and a smoother workflow for dental staff.

The limitation of the study is that it focuses on only one type of material rather than comparing different impression materials on the same patients. The study found satisfaction, discomfort and procedural feedback response of the patient, which are subjective measures that may vary. Recall bias may affect since the study participants were asked about experiences from a procedure that was conducted within the last two or three weeks. Moreover, the use of a non-probability sampling technique may perhaps reduce the generalizability of the findings, so future studies should consider random or stratified sampling to overcome this issue; nevertheless, Cronbach's alpha was used for the validation of the questionnaire.

The future recommendations are to add a comparative group using digital impression material to enhance significance and generalizability. A short-term follow-up (e.g., 1 week later) to reassess satisfaction or retention of procedural understanding could offer additional insights. These results suggest that gender may play an influential role in shaping patient attitudes toward routine dental procedures, which is consistent with broader literature indicating that females often show higher compliance and positive health-seeking behaviors. The high quality standards in the patient care needs feedback and at the same time, the low satisfaction among the male participants strongly requires for the targeted educational approach to address this gender difference in the perception.

CONCLUSION

The study concluded the differences in the understanding, experience and perception of the alginate impression procedure precisely across gender. Females showed more positive feedback with a high level of satisfaction as compared to males. These consistent and positive responses with higher satisfaction levels and robust future recommendations to friends and family by females strongly highlight the need for targeted educational interventions, especially designed for males.

CONFLICT OF INTEREST

No conflict of interest to declare.

FUNDING RESOURCES

No funding or grant was applied for this research.

ACKNOWLEDGEMENT

We acknowledged the participants of the study.

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