*IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*
*e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 7 Ser.4 (July 2025), PP 16-25*
*www.iosrjournals.org*

# Awareness And Practices Towards Soft Tissue Management Among Dental Implant Practitioners: A Questionnaire Survey Study

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***Abstract:***
***Background****: Implant dentistry has emerged as a pivotal prosthetic solution for the replacement of missing teeth, in response to growing patient expectations for functional efficiency and aesthetic excellence. With increasing patient expectations for long term replacement fixed solution for missing natural teeth, the field has witnessed significant advancements. While implantology addresses a longstanding clinical need, it also presents potential complications if not meticulously planned. These complications often stem from insufficient bone volume or inadequate soft tissue contours around the implant site, directly impacting both the functional stability and the aesthetic integration of the implant. To mitigate such risks and ensure the longevity and natural appearance of the restoration, precise manipulation of the surrounding tissues is essential. Therefore, a comprehensive understanding of both soft and hard tissue management is imperative for implant practitioners to achieve optimal outcomes.*
***Aims and Objectives:*** *This study aimed to assess the awareness, attitudes, and clinical practices of dental implant practitioners concerning soft tissue management in implant dentistry.*
***Materials and Methods****: A cross-sectional questionnaire-based survey was conducted among 200 dental professionals. Data were collected via Google Forms using a structured questionnaire comprising 17 items designed to evaluate practitioners' perceptions of the importance of soft tissue management, awareness of associated complications, and familiarity with available treatment modalities.*
***Results****: The survey indicates a positive shift towards recognizing soft tissue's critical role in implant success and prognosis.*
***Conclusion:*** *While a majority of implant practitioners acknowledged the importance of meticulous peri-implant soft tissue management, a discernible gap was observed between awareness and implementation. Many respondents lacked adequate knowledge and failed to adopt appropriate clinical measures necessary for optimizing soft tissue contours around dental implants. This disconnect is largely attributed to insufficient knowledge and training in contemporary soft tissue augmentation techniques, underscoring the need for enhanced educational initiatives in this domain.*
***Key Word****: Dental implants, soft tissue management, peri-implant tissues, awareness, treatment planning, implant complications.*

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Date of Submission: 04-07-2025 Date of Acceptance: 14-07-2025

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## I. Introduction

The advent of dental implants has significantly transformed the landscape of restorative and prosthetic dentistry, offering patients a predictable and long-term solution for replacing missing teeth. With their ability to restore function, aesthetics, and comfort, implants have become a widely accepted treatment modality across diverse clinical situations. However, the long-term success of implant therapy is not solely determined by osseointegration—the direct structural and functional connection between bone and the implant surface—but is equally dependent on the maintenance of healthy peri-implant soft tissues.

Peri-implant soft tissues play a vital role in forming a protective barrier around the implant's transmucosal component. This soft tissue seal prevents bacterial ingress and mechanical irritation, thereby preserving the underlying bone and maintaining peri-implant health. [1]

Anatomically, this soft tissue attachment consists of a junctional epithelium and connective tissue zone. However, unlike the periodontium of natural teeth, implants lack essential components such as Sharpey's fibers,

periodontal ligament, cementum, and bundle bone. This anatomical difference renders the peri-implant soft tissue more susceptible to inflammation, recession, and other complications, especially in the absence of adequate keratinized mucosa.[2]

Emerging clinical evidence suggests that a minimum of 2 mm of keratinized gingiva is beneficial for maintaining peri-implant health and facilitating plaque control.[3] Additionally, the thickness and biotype of the peri-implant mucosa have been linked to the aesthetic and biological outcomes of implant therapy.[4] Therefore, appropriate management of soft tissues—including preservation of existing keratinized tissue, augmentation where necessary, and atraumatic surgical techniques—is paramount in modern implant planning.

In long term clinical studies, it was found that the failure rate of implants was increasing owing to improper treatment planning and neglecting the reasons that might cause complications such peri – implantitis, etc.[5]

Despite these insights, earlier implant philosophies placed greater emphasis on achieving osseointegration, often overlooking the significance of peri-implant soft tissue integrity. As aesthetic demands have risen, particularly in the anterior maxillary zone, soft tissue management has become a key determinant of treatment success.

However, a gap remains in the literature regarding how well dental professionals incorporate soft tissue considerations into implant planning and execution. While advances in materials and techniques now allow for predictable soft tissue augmentation—including connective tissue grafts, acellular dermal matrices, and minimally invasive flap designs—the extent to which practitioners are aware of and implement these modalities is unclear.

This study was designed to evaluate the current level of awareness, knowledge, and clinical practices related to soft tissue management among implant practitioners. Through a structured questionnaire, we aimed to assess how dental professionals perceive the importance of soft tissue preservation, their familiarity with treatment options, and their routine clinical application of soft tissue management principles in implant dentistry.

## II. Material And Methods

A cross-sectional, questionnaire-based online survey was conducted between October 2024 and May 2025 through Google Forms. The study was initiated at C.S.M.S.S. Dental College and Hospital, Chhatrapati Sambhajinagar, Maharashtra, India, and targeted dental postgraduate students and practicing dental professionals across India. The structured questionnaire comprised 17 questions designed to assess participants' awareness regarding the significance of soft tissue management in implant dentistry, as well as their knowledge and practices related to digital dentistry.

**Study Design:**

Cross-sectional, questionnaire-based online survey.

**Study Location:**

This study was conducted at C.S.M.S.S. Dental College and Hospital, Chhatrapati Sambhajinagar, Maharashtra, India, and extended across various regions of India through digital distribution of the questionnaire. It targeted dental postgraduate students and practicing dental professionals involved in implant dentistry.

**Study Duration:**

October 2024 to May 2025.

**Sample Size:**

A total of 120 participants, including postgraduate dental students and practitioners actively involved in implant dentistry, were included in the study.

**Sample Instrument:**

This online questionnaire was constructed comprising questions related to demographic data, followed by inquiries concerning knowledge and perceptions toward the use of digital dentistry among dental professionals.

**Sample Size Calculation:**

Considering a confidence level of 95% and a margin of error of 7%, the minimum required sample size was calculated to be approximately 109. To enhance reliability and account for potential incomplete responses, a final sample size of 120 participants was targeted and successfully achieved through convenience sampling.

**Subjects & Selection Methods:**

Participants were selected using purposive sampling and were invited to complete an online survey circulated via institutional mailing lists, professional dental forums, and social media platforms. Eligible participants included postgraduate students currently enrolled in dental specialties and licensed dental practitioners with clinical experience in implant dentistry.

**Inclusion Criteria:**

- Postgraduate students pursuing dental specialties.
- Dental practitioners with clinical experience in implant dentistry.
- Individuals who provided informed consent and completed the entire questionnaire.

**Exclusion Criteria:**

- Undergraduate dental students.
- Practitioners not involved in implant procedures.
- Incomplete or duplicate survey responses.

**Procedure Methodology:**

The participants were presented with a standardized, pre-tested questionnaire comprising 16 closed-ended questions and 1 open-ended question. This questionnaire was developed based on comprehensive research aimed at understanding the significance, treatment modalities, and recent trends in soft tissue management around implants. After obtaining informed consent, participants were asked to complete a self-administered questionnaire using Google Forms.

Prior to the main study, a pilot test was conducted with 20 young adults to assess the validity and comprehensibility of the questionnaire. The pilot study results indicated that the questionnaire was clear and understandable, necessitating no further revisions. The questions were presented in English and were multiple-choice, requiring participants to select the most relevant answer. To maintain the integrity of the responses, the questionnaires were completed under supervision to prevent any interpersonal communication. Participants were informed about the importance of providing honest and confidential answers. Since, the study was an online survey, the forms were regulated via various social media platforms and could be conveniently filled by the participants.

**Statistical Analysis:**

The data collected was entered in an Excel sheet and subjected to statistical analysis using SPSS version 20. Chi square test was done. The independent variables are age and experience in dentistry while dependent variables are knowledge, attitude and practice of management of soft tissue for optimal implant placement. The level of significance was set at $p<0.05$.

## III. Result

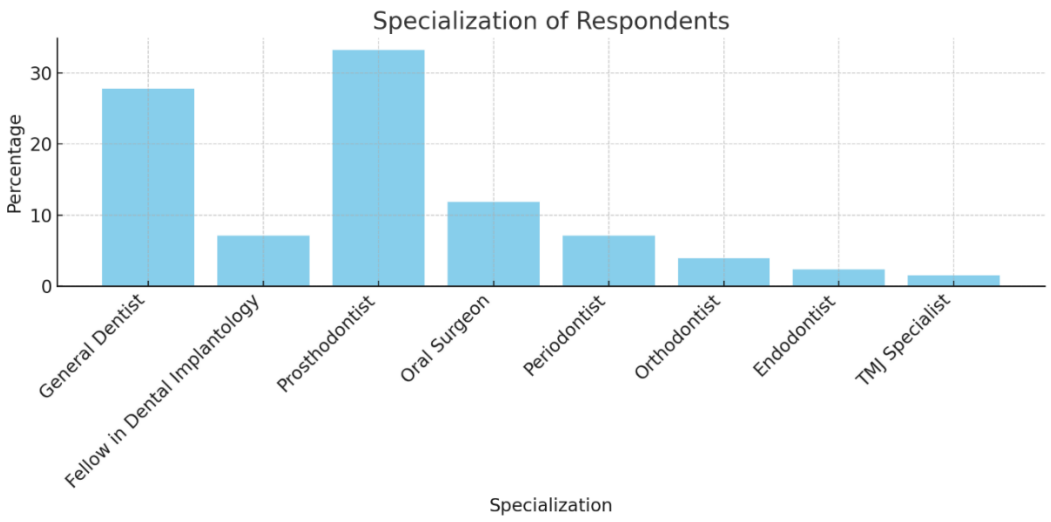


**Figure 1**

- Amongst total of 126 dental professionals that participated in the study, which aimed to evaluate their knowledge, attitude, and clinical practices concerning soft tissue management in implant dentistry, majority were Prosthodontists (33.3%) and General Dentists (27.8%), followed by Oral Surgeons (11.9%), Periodontists, and other specialists. (Fig. 1)
- This diversity ensured inputs from both surgical and prosthetic perspectives of implantology.

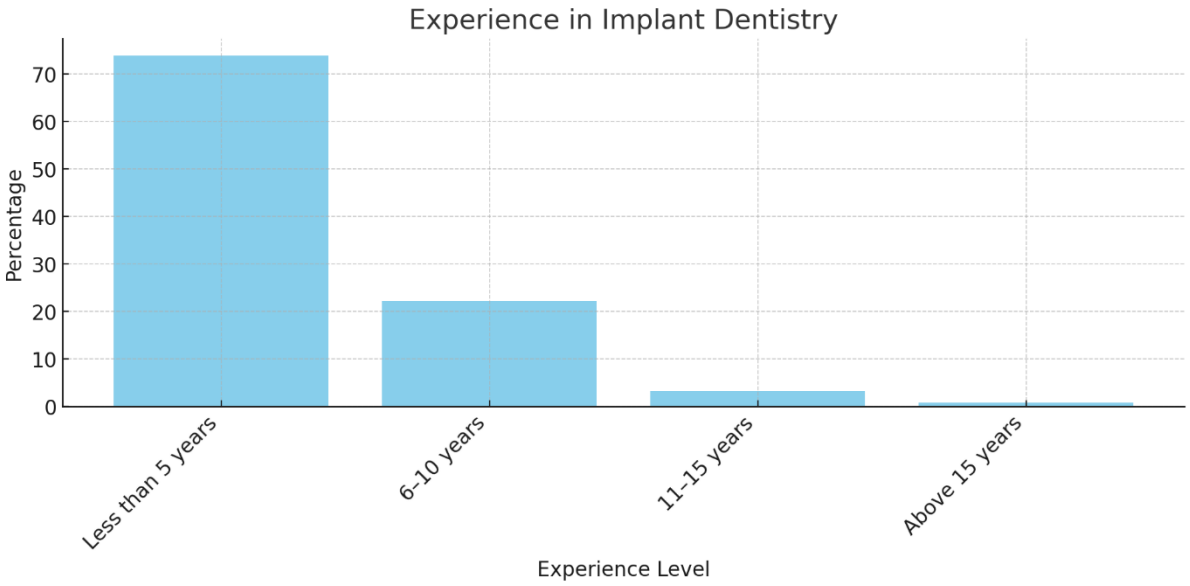


**Figure 2**

**Experience in Implant Dentistry**

- Most respondents (73.8%) had less than 5 years of experience in implant dentistry, suggesting a population with more contemporary education but possibly less clinical exposure.
- A smaller group (22.2%) had 6–10 years of experience, while very few had over a decade(Fig 2)

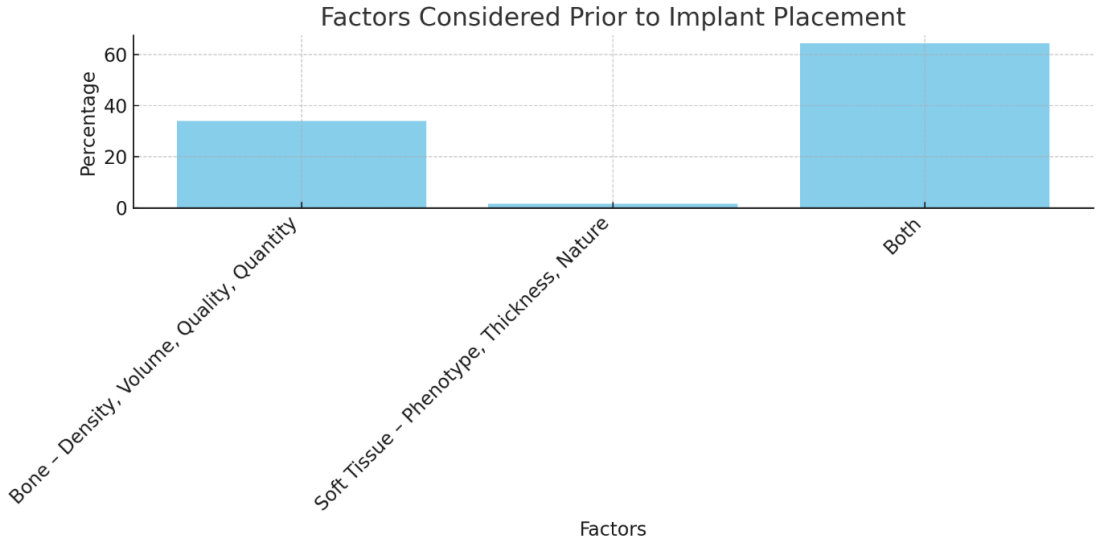


**Figure 3**

**Clinical Considerations in Implant Planning**

- 64.3% considered both bone and soft tissue parameters (phenotype, volume, density, etc.) during treatment planning.
- However, 34.1% still prioritized bone-related factors alone, indicating a knowledge gap in soft tissue significance(Fig 3)

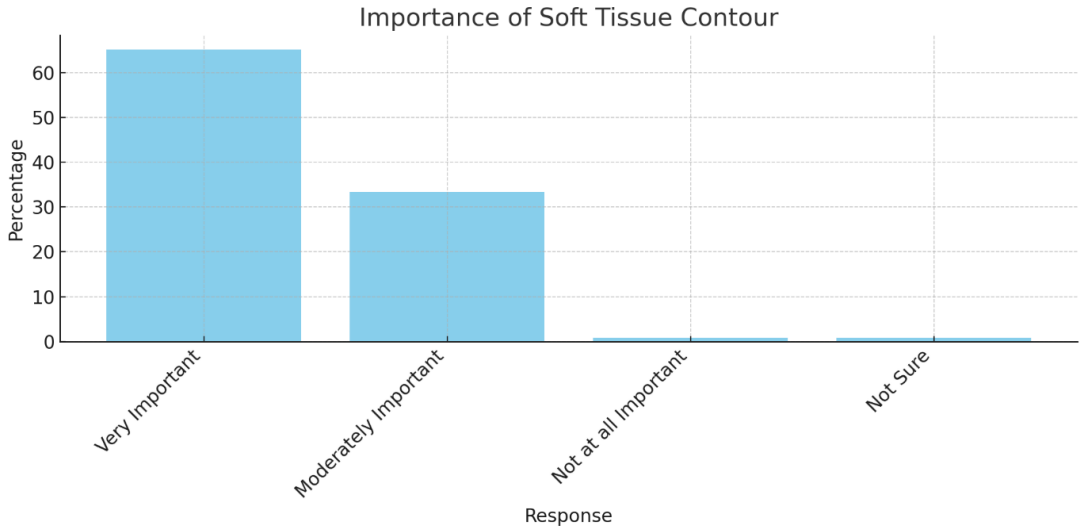


**Figure 4**

**Perception of Soft Tissue Contour**

- A large portion (65.1%) deemed soft tissue contour "very important" for achieving aesthetic success with implants.
- 33.3% considered it "moderately important," reflecting good awareness overall.(Fig 4)

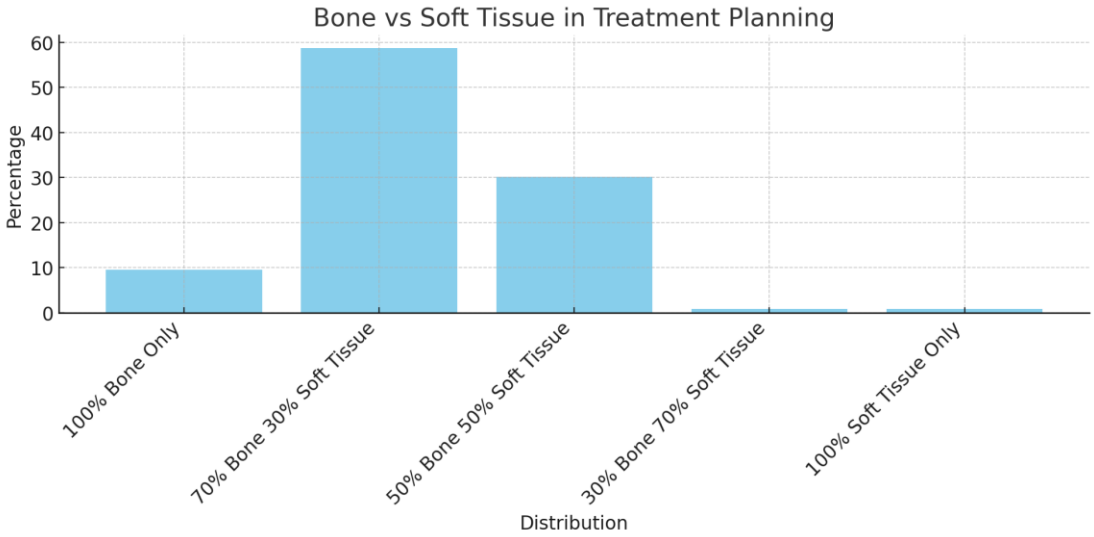


**Figure 5**

**Bone vs. Soft Tissue Importance in Treatment Planning**

- 58.7% believed bone carried 70% weight and soft tissue 30%, suggesting a tilt toward bone-centric planning.
- 30.2% supported an equal (50/50) importance model, reflecting evolving attitudes.
- Very few leaned exclusively toward soft tissue or bone. (Fig. 5)

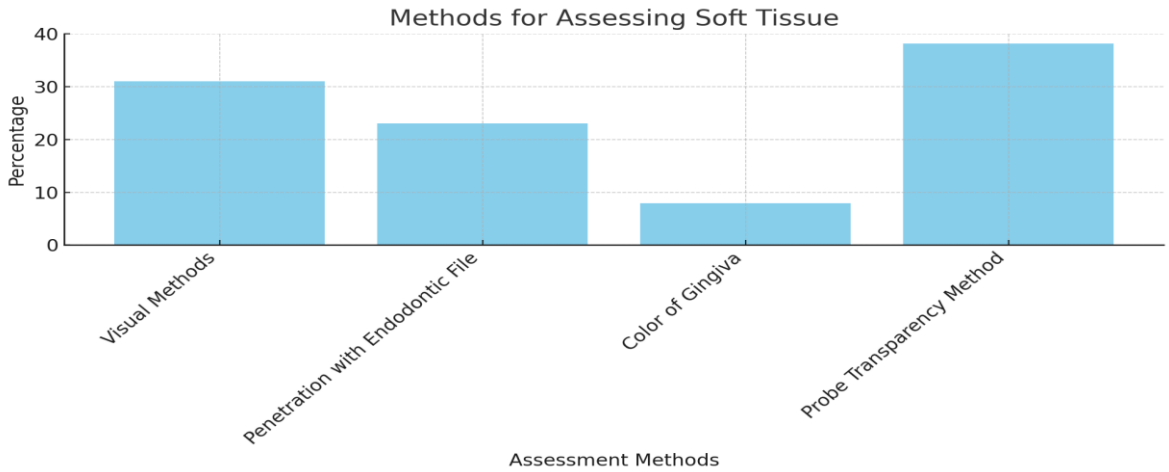


**Figure 6**

**Methods for Soft Tissue Assessment**

Respondents reported using multiple methods to assess soft tissue quality before implant placement:

- Probe transparency method was the most used (38.1%)
- Visual assessment followed closely (31%)
- Others used penetration with endodontic files (23%) and gingival colour observation (7.9%)

**Overall Insights**

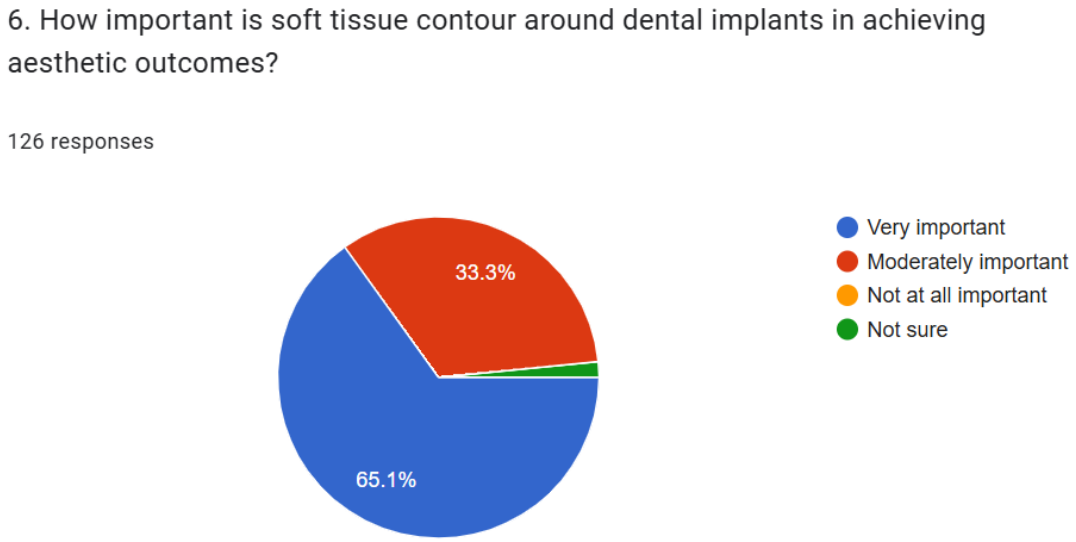


**Figure 7**

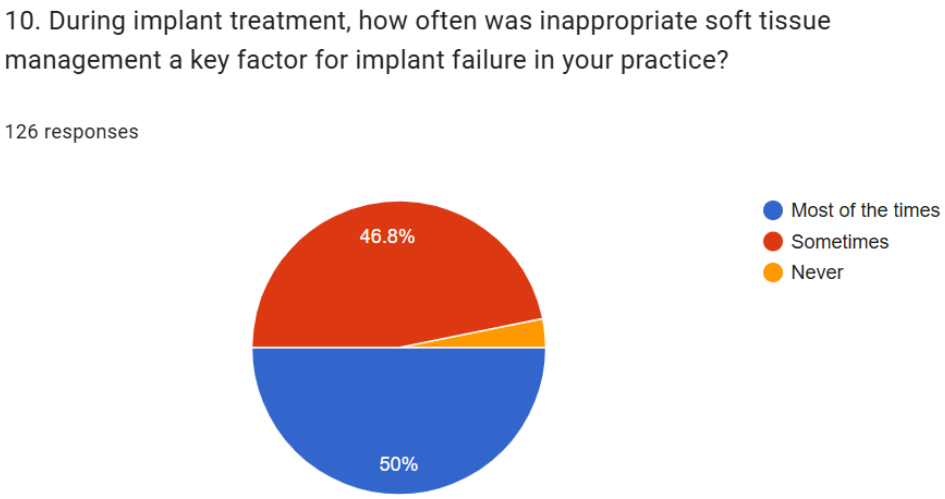


**Figure 8**

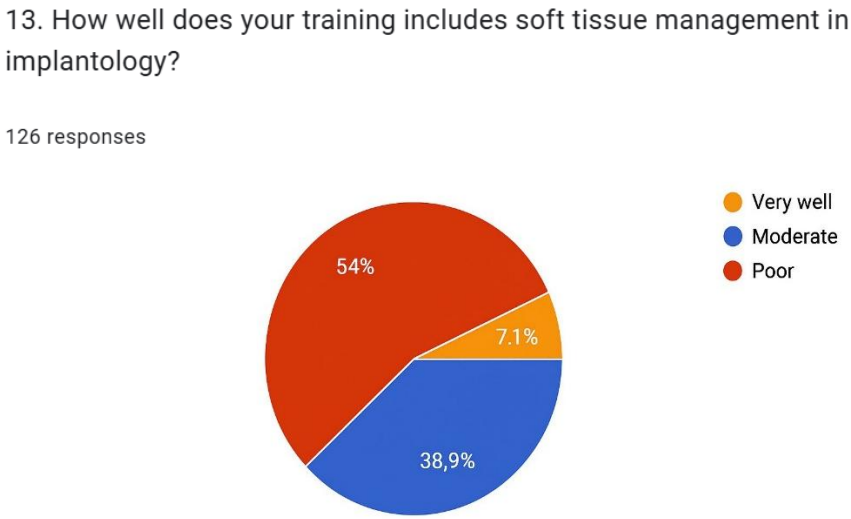


**Figure 9**

- The survey revealed a positive trend toward acknowledging the importance of soft tissue in implant success.
- Majority practitioners understand the importance of evaluation of soft tissue around implants (Fig.7), at the same time they are also aware of how inappropriately managed soft tissue can lead to failures and affect long term prognosis of implants (Fig.8)
- But still it has been noticed that not many respondents received a thorough training for use of various technique and procedures required to plan and manage the soft tissue. (Fig. 9)
- However, a knowledge-practice gap remains, particularly in the balanced assessment of both hard and soft tissues and their impact on long-term aesthetics and peri-implant health.

## IV. Discussion

The creation of a biologically effective and structurally stable soft tissue barrier around dental implants at the transmucosal junction is critical for both the long-term success of the implant and the achievement of optimal aesthetic outcomes. This soft tissue interface, often referred to as the peri-implant mucosal seal, functions as a defensive zone, protecting the underlying osseointegrated bone-implant interface from bacterial infiltration, mechanical trauma, and environmental irritants. The strategic establishment of this soft tissue barrier is not merely a biological necessity but a cornerstone in modern implantology, particularly in the aesthetic zone, where tissue symmetry, volume, and health play pivotal roles in overall treatment success.[1]

**The Nature of Soft Tissue Attachment Around Implants**

Research by Schupbach and Glauser has demonstrated that peri-implant mucosa bears considerable histological similarity to the gingiva surrounding natural teeth. Structurally, peri-implant tissues include a robust keratinized oral epithelium, a sulcular epithelium providing immunological defense, and a junctional epithelium that adheres to the titanium surface of the implant through hemidesmosomal attachments.[7] These structures collectively form what is known as the permucosal seal, which plays a vital role in preventing the apical migration of bacteria.

However, there are critical differences. Unlike natural dentition, the implant lacks true connective tissue fiber insertion such as dentogingival or dentoperiosteal fibers, which in natural teeth insert perpendicularly into the cementum. Around implants, collagen fibers tend to run parallel to the implant surface. This anatomical difference renders the peri-implant mucosa more susceptible to microbial invasion and inflammatory breakdown, emphasizing the need for optimal soft tissue design and maintenance.[7]

**Factors Influencing Peri-Implant Soft Tissue Health**

The health of peri-implant soft tissue is governed by a multitude of internal and external factors. These factors can impact the healing process, the long-term maintenance of the mucosal seal, and the aesthetic integration of the implant prosthesis.

**Internal Factors**

1. General Health and Age: Patients with systemic comorbidities such as diabetes mellitus or cardiovascular disease tend to exhibit impaired wound healing, diminished immune response, and higher rates of implant-related complications. Similarly, advanced age may correlate with a decrease in regenerative capacity, negatively influencing soft tissue health and stability.[7]
2. Keratinized and Attached Mucosa: Adequate width of keratinized mucosa (KM) has been shown to promote improved plaque control, reduce mucosal inflammation, and enhance patient comfort during brushing. Clinical studies suggest that a KM width of at least 2 mm is associated with healthier peri-implant tissues and lower incidence of mucositis and peri-implantitis. In contrast, insufficient KM has been associated with soft tissue inflammation, mucosal recession, and increased plaque retention.[7]
3. Vestibular Depth: Adequate vestibular depth supports the stability of soft tissue and facilitates easier plaque control by the patient. Shallow vestibules may hinder prosthetic design and hygiene maintenance, thereby predisposing the site to inflammation.
4. Periodontal Status of Adjacent Dentition: The health of the surrounding natural dentition is strongly correlated with implant health. Periodontal pathogens from diseased adjacent teeth may colonize the implant site, especially in cases where cross-contamination and poor oral hygiene practices are present.[7]

**External Factors**

1. Tobacco Use: Smoking is an established risk factor for compromised soft tissue healing. Nicotine reduces capillary blood flow and oxygenation, directly impairing fibroblast function and collagen production. As a result, smokers have significantly higher rates of implant failure and peri-implantitis. Moreover, the incidence of mucosal recession is markedly higher in tobacco users.[7]
2. Soft Tissue Rest During Healing: A non-disturbed healing period post-implant placement is essential. Excessive micro-movements or early loading can interrupt the tissue maturation process, compromising the integrity of the mucosal seal. Resting the soft tissues allows for better collagen organization and stable junctional epithelium formation.
3. Oral Hygiene Maintenance: The accumulation of bacterial plaque is a primary etiological factor in the development of peri-implant mucositis and peri-implantitis. Regular professional maintenance, along with patient education on interdental cleaning and proper brushing techniques, is essential in preserving the health of peri-implant tissues.[7]
4. Preservation of Biological Width: Placing the prosthetic margin at least 0.5–1 mm coronal to the sulcus base ensures that the soft tissue has sufficient biological width to maintain its integrity. Violation of this space may provoke chronic inflammation and subsequent marginal bone loss.[7]

**Implant Placement Considerations**

A series of surgical and prosthetic factors directly influence soft tissue outcomes:

- Timing of Placement: Immediate and early implant placements post-extraction can minimize ridge resorption and facilitate preservation of the soft tissue contours. Delayed placements may result in more significant bone loss, necessitating additional augmentation procedures.[7]

- Implant Size and Positioning: Implants should mimic the mesiodistal and buccolingual dimensions of the natural tooth to provide proper support for the overlying soft tissues. The implant platform should be placed approximately 2 mm apical to the cementoenamel junction (CEJ) of the adjacent teeth to promote natural tissue emergence.
- Buccolingual and Faciolingual Angulation: Ideally, the implant should be positioned 1 mm within the buccal bone and should emerge directly beneath the incisal edge. This allows for optimal esthetic contouring and prevents labial recession.[7]
- Crown-Abutment Junction (CAJ): Aligning the CAJ with the CEJ of adjacent teeth allows for natural gingival architecture and avoids abrupt transitions that might hinder soft tissue adaptation.
- Inter-Implant Distance: A minimum inter-implant distance of 3 mm is necessary to preserve interdental papillae and crestal bone. Implants placed too close together can lead to the "crater effect" and black triangles due to papillary loss.
- Surgical Protocol (Submerged vs. Non-Submerged): While both methods have their indications, non-submerged implants often result in more predictable soft tissue adaptation by minimizing disruption during second-stage surgery.[7]

**Predicting Aesthetic Outcomes: Diagnostic Keys by John Kois**

John Kois identified five diagnostic parameters that significantly influence the esthetic outcomes of peri-implant soft tissues even before tooth extraction:

1. Ideal Tooth Position: Proper alignment in all three spatial planes enhances soft tissue predictability.
2. Flat Gingival Scallop: Patients with flatter gingival profiles are less prone to recession and present more predictable soft tissue adaptation.
3. Periodontal Biotype: A thick and fibrotic biotype is more resilient to trauma and recession, whereas thin biotypes are more susceptible to papillary loss and recession.
4. Tooth Shape: Square-shaped teeth, with shorter clinical crowns and broader cervical areas, support better papillary fill and soft tissue symmetry.
5. Coronal Position of the Osseous Crest: A more coronal bone crest is associated with improved soft tissue stability and esthetic predictability.[7]

**Prosthetic Considerations in Soft Tissue Management**

The prosthetic phase significantly influences the final soft tissue outcome:

- **Emergence Profile Design:** A custom-designed emergence profile supports the free gingival margin and interdental papilla, ensuring a harmonious gingival contour. The biological width must be respected during prosthetic design to avoid inflammatory complications.
- **C-Shaped Surgical Guides:** These assist in precisely orienting implants and ensure that soft tissue contours are preserved during osteotomy preparation.
- **CAD-CAM PEEK Socket Sealing Abutments:** These, when combined with flapless extraction and 3D-guided implant placement, provide a minimally invasive approach with superior precision, reducing post-operative morbidity and soft tissue trauma. The digital workflow minimizes chairside time and allows accurate customization of emergence profiles.[8]
- **Customized Healing Abutments:** Individually tailored healing abutments, fabricated using micro-filled composites or CAD-based designs, allow the surrounding soft tissues to mature in a form that mimics the natural gingival architecture, improving aesthetic integration and potentially reducing the need for second-stage surgical corrections.[9]
- **Provisional Restorations:** These serve as diagnostic tools for soft tissue shaping, allowing assessment of zenith position, gingival margin level, labial fullness, and papillary fill before final restoration. Adjustments can be made during this phase to ensure optimal tissue harmony.[10]
- **Platform Switching:** This approach, involving the use of a smaller-diameter abutment on a larger-diameter implant collar, helps in shifting the inflammatory infiltrate away from the crestal bone. As a result, platform switching preserves marginal bone and supports the stability of the peri-implant soft tissue seal, thereby enhancing long-term esthetics and function.[12]

  Drawing from Lertwongpaisan et al. (2023) and Alanazi (2024), effective soft tissue management is paramount for both the biological integration and aesthetic success of dental implants. Specifically, the design of components like customized healing abutments can significantly influence soft tissue dimensional stability around immediate implant placements, impacting long-term peri-implant health. Furthermore, meticulous soft tissue handling is a critical determinant in preventing and resolving aesthetic complications in the esthetic zone, contributing directly to patient satisfaction.[13,14]

  Building upon the foundational understanding established by studies such as Buser et al. (1992) on the biological reactions of soft tissues to implant materials, the focus of implantology has progressively

evolved. Salama et al. (1997) highlighted this shift by introducing an esthetically oriented revision to original implant protocols, underscoring the critical role of meticulous soft tissue management in achieving predictable and pleasing aesthetic outcomes. This comprehensive approach aligns with contemporary consensus statements, as summarized by Klinge et al. (2015), which emphasize that successful implant therapy critically depends on integrating patient-specific biological factors and aesthetic demands through optimal soft tissue management.[15,16,17]

## V. Conclusion

Within the limitations of this study, it was seen that while advancements in hard tissue regeneration have been significant, soft tissue management remains a greater challenge. Majority of implant practitioners are still unaware of how magnanimous changes can be brought about in the field of implantology if surgical and restorative dentists come together to optimize soft tissue. With advancements in both soft tissue augmentation techniques and prosthodontic treatment modalities, the ability to maintain or restore healthy gum tissue around implants has proven to be just as essential as the implant itself. Improved procedures have not only enhanced the prognosis but also facilitated better integration of implants within the oral environment as it directly impacts the long-term success of implants by ensuring healthy peri-implant tissues, preventing complications like peri-implantitis, maintaining optimal esthetics, and facilitating good hygiene practices around the implant site, ultimately contributing to patient comfort and satisfaction.

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