Role of Platelet-Rich Fibrin in Immediate Implant Placement: A CBCT-Based Evaluation of Crestal Bone Loss, Implant Stability, and Soft Tissue Healing

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ABSTRACT

Background:

Immediate implant placement has become a predictable treatment modality for replacing missing teeth while reducing treatment time and preserving alveolar bone and soft tissue architecture. However, post-extraction crestal bone loss and soft tissue remodelling remain major challenges. Platelet-rich fibrin (PRF), an autologous platelet concentrate, has been proposed to enhance bone regeneration and soft tissue healing around immediately placed implants.

Aim:

To evaluate and compare the effect of platelet-rich fibrin on implant stability, crestal bone loss, and peri-implant soft tissue healing following immediate implant placement.

Materials and Methods:

A prospective comparative clinical study was conducted in patients requiring immediate implant placement in the esthetic zone. Participants were divided into two groups: Group I received immediate implant placement with PRF, while Group II underwent immediate implant placement without PRF. Implant stability was assessed using resonance frequency analysis, soft tissue healing was evaluated clinically, and crestal bone loss was measured using cone beam computed tomography (CBCT) at different follow-up intervals. Statistical analysis was performed to compare the outcomes between the two groups, with a significance level of $p < 0.05$.

Results:

Both groups demonstrated successful implant survival during the study period. However, the PRF group showed higher implant stability, reduced crestal bone loss, and improved peri-implant soft tissue healing compared with the control group. The use of PRF contributed to favourable biological healing and preservation of peri-implant tissues.

Conclusion:

Within the limitations of the present study, platelet-rich fibrin appears to be an effective adjunct during immediate implant placement. PRF may enhance implant stability, minimise crestal bone loss, and improve peri-implant soft tissue healing, thereby contributing to predictable clinical outcomes and improved esthetics. Further long-term randomised clinical trials with larger sample sizes are recommended to validate these findings.

Keywords:

Platelet-rich fibrin; Immediate implant placement; Crestal bone loss; Implant stability; Soft tissue healing; Cone beam computed tomography; Dental implants.

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INTRODUCTION

Dental implants have become the treatment of choice for the rehabilitation of partially and completely edentulous patients because of their high long-term survival rate, excellent function, and superior esthetic outcomes. Continuous

advancements in implant surface characteristics, surgical techniques, and prosthetic protocols have significantly improved the predictability of implant therapy over the past few decades. Among these developments, immediate implant placement into fresh extraction sockets has gained widespread acceptance as an alternative to the conventional delayed placement protocol, reducing overall treatment time while preserving the existing alveolar architecture and soft tissue contours. (1)

Following tooth extraction, physiological remodelling of the alveolar ridge is inevitable, resulting in significant horizontal and vertical bone resorption during the initial healing period. These dimensional changes may compromise implant positioning, esthetic outcomes, and long-term stability, particularly in the anterior maxillary region where preservation of hard and soft tissues is of utmost importance. (2) Although immediate implant placement minimises treatment duration and helps preserve the gingival architecture, it cannot completely prevent post-extraction crestal bone remodelling. (3)

The discrepancy between the implant diameter and the extraction socket often creates a peri-implant gap, commonly referred to as the "jumping distance." While small gaps may heal spontaneously through natural bone formation, larger defects frequently require regenerative procedures to achieve predictable osseointegration and maintain peri-implant bone levels. (4) Therefore, various regenerative materials and biologically active autologous preparations have been introduced to enhance wound healing and bone regeneration around immediate implants.

Among these regenerative approaches, Platelet-Rich Fibrin (PRF), a second-generation platelet concentrate introduced by Choukroun et al., has emerged as a promising autologous biomaterial. PRF is prepared without the addition of anticoagulants and consists of a dense fibrin matrix containing platelets, leukocytes, cytokines, and numerous growth factors that are gradually released during healing. (5) Compared with platelet-rich plasma (PRP), PRF provides a sustained release of growth factors while maintaining a three-dimensional fibrin scaffold that facilitates angiogenesis, osteogenesis, and soft tissue regeneration. (6)

Experimental studies have demonstrated that PRF promotes proliferation and differentiation of osteoblasts, enhances collagen synthesis, stimulates neovascularisation, and modulates inflammatory responses, thereby creating a favourable biological environment for bone regeneration and implant osseointegration. (7) In addition, the fibrin matrix serves as a natural scaffold supporting cellular migration and maturation during early wound healing.

Recent clinical investigations have reported that the use of PRF during immediate implant placement may improve peri-implant soft tissue healing, reduce crestal bone loss, and enhance implant stability. Randomised clinical trials have demonstrated improved healing outcomes and preservation of peri-implant tissues when PRF was used as a socket filler or regenerative adjunct during immediate implant placement (8)

Cone Beam Computed Tomography (CBCT) has become an indispensable imaging modality in implant dentistry because of its ability to provide accurate three-dimensional assessment of alveolar bone morphology, implant positioning, buccal bone thickness, and peri-implant crestal bone changes with minimal image distortion and relatively low radiation exposure. (9) CBCT enables precise evaluation of both preoperative anatomical conditions and postoperative bone remodelling, making it particularly valuable for longitudinal assessment in immediate implant therapy.

Despite encouraging evidence regarding the regenerative potential of PRF, the available literature still demonstrates variability in study design, clinical protocols, and reported outcomes. Furthermore, recently published systematic reviews have concluded that although PRF appears to enhance soft tissue healing and may reduce marginal bone loss, additional well-designed randomised clinical trials are necessary to establish definitive clinical recommendations. (10)

Therefore, the present in vivo study was undertaken to compare immediate implant placement performed with and without Platelet-Rich Fibrin using clinical parameters and Cone Beam Computed Tomography. The study aims to evaluate crestal bone loss, implant stability, and peri-implant soft tissue changes to determine the clinical effectiveness of PRF as a regenerative adjunct in immediate implant placement.

MATERIALS AND METHODOLOGY

The present prospective randomised clinical study was conducted in the Department of Prosthodontics, Crown and Bridge including Implantology, Geetanjali Dental and Research Institute, Udaipur, to evaluate the role of Platelet-Rich Fibrin (PRF) in immediate implant placement. Ethical clearance was obtained from the Institutional Ethics Committee, and written informed consent was obtained from all participants before commencement of the study.

A total of **24 patients** requiring immediate implant placement in the anterior esthetic region were selected based on the inclusion and exclusion criteria. The patients were randomly divided into two groups of 12 each. **Group I (Control)** received immediate implant placement without PRF, whereas **Group II (Test)** received immediate implant placement with PRF.

A thorough clinical examination, medical and dental history, routine blood investigations, intraoral

photographs, and preoperative Cone Beam Computed Tomography (CBCT) were performed for all patients. The implant site was evaluated clinically and radiographically before surgery.

Under local anaesthesia and strict aseptic conditions, atraumatic tooth extraction was performed to preserve the socket walls. The extraction socket was thoroughly debrided and irrigated with sterile normal saline. Implant osteotomy was prepared according to the manufacturer's recommended drilling protocol, and implants were placed to obtain adequate primary stability.

In the test group, approximately **10 mL of intravenous blood** was collected immediately before surgery in sterile tubes without anticoagulant and centrifuged according to the standard PRF protocol. The obtained Platelet-Rich Fibrin clot was separated from the red blood cell layer and placed into the jumping distance around the implant before suturing. In the control group, no PRF was used.

Healing abutments were placed wherever primary stability was achieved, and the surgical site was closed using interrupted sutures. All patients received postoperative antibiotics, analgesics, chlorhexidine mouth rinse, and oral hygiene instructions. Sutures were removed after one week, and patients were recalled periodically for follow-up.

Clinical evaluation included **implant stability (ISQ), healing index, and width of attached gingiva**, whereas radiographic evaluation of **crestal bone loss** was performed using CBCT at baseline and during follow-up. All clinical and radiographic observations were recorded and statistically analysed. Descriptive statistics, independent t-test, paired t-test, repeated measures ANOVA, and post hoc analysis were used for intergroup and intragroup comparisons. A **P value <0.05** was considered statistically significant.

Table 5.1: Implant Stability Assessment at Three Different Time Intervals in Two Groups

Group	Baseline (Mean ± SD)	3 Months (Mean ± SD)	6 Months (Mean ± SD)	p-value
With PRF	70.08 ± 3.08	65.25 ± 1.42	69.66 ± 1.82	0.001*
Without PRF	65.50 ± 6.34	55.83 ± 2.44	60.16 ± 2.69	0.001*

Interpretation

Implant stability changed significantly over the follow-up period in both groups. The PRF group maintained higher ISQ values than the non-PRF group, indicating better implant stability throughout the study period.

Table 5.2: Width of Attached Gingiva at Three Different Time Intervals

Time Interval	With PRF (Mean ± SD)	Without PRF (Mean ± SD)	p-value
Baseline	3.35 ± 0.20	3.35 ± 0.14	1.000
2 Months	3.61 ± 0.23	3.45 ± 0.14	0.049*
3 Months	4.25 ± 0.20	3.55 ± 0.14	0.001*

Interpretation

The width of attached gingiva increased in both groups during follow-up. However, the increase was significantly greater in the PRF group at both two and three months.

Table 5.3: Healing Index Between Two Groups

Time Interval	With PRF	Without PRF	p-value
7 Days	Higher healing scores	Lower healing scores	0.002*
14 Days	Majority Score 5	Majority Score 3	0.002*

Interpretation

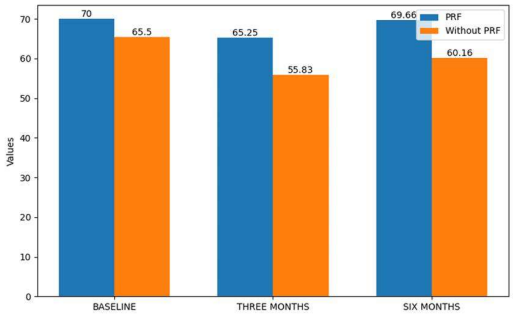
Soft tissue healing was significantly better in the PRF group than in the control group at both 7 and 14 days, indicating faster and more favourable wound healing with PRF.

Table 5.4: Crestal Bone Loss (Mean ± SD) at Different Time Intervals

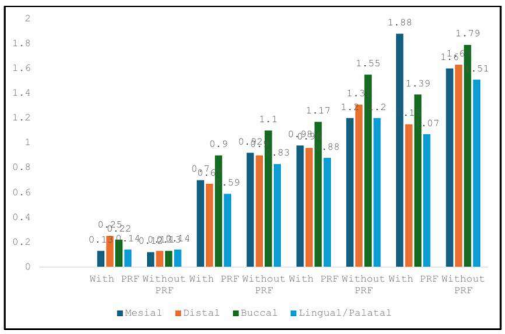
Surface	Group	Baseline	3 Months	6 Months	12 Months
Mesial	With PRF	0.13 ± 0.11	0.70 ± 0.10	0.98 ± 0.13	1.88 ± 2.59
	Without PRF	0.12 ± 0.07	0.92 ± 0.11	1.29 ± 0.12	1.60 ± 0.12
Distal	With PRF	0.25 ± 0.18	0.67 ± 0.12	0.96 ± 0.11	1.15 ± 0.14
	Without PRF	0.13 ± 0.11	0.90 ± 0.12	1.31 ± 0.11	1.63 ± 0.10
Buccal	With PRF	0.22 ± 0.25	0.90 ± 0.12	1.17 ± 0.16	1.39 ± 0.16
	Without PRF	0.13 ± 0.10	1.13 ± 0.07	1.55 ± 0.12	1.79 ± 0.17
Lingual/Palatal	With PRF	0.14 ± 0.10	0.59 ± 0.08	0.88 ± 0.09	1.07 ± 0.11
	Without PRF	0.14 ± 0.08	0.83 ± 0.10	1.23 ± 0.10	1.51 ± 0.11

Interpretation

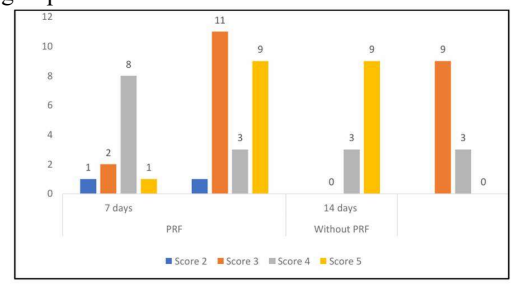
Crestal bone loss increased progressively in both groups throughout the follow-up period. However, bone loss remained consistently lower in the PRF group at all assessed surfaces, suggesting that PRF effectively reduced peri-implant bone resorption.



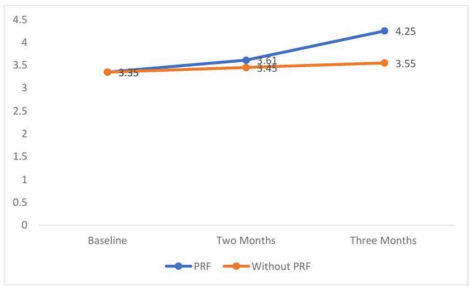
Graph 1: Implant stability assessment at three different time intervals in two groups



Graph 2: Bone loss between the two groups at different time intervals.



Graph 3: Healing index between the two groups at different time intervals



Graph 4: Width of attached gingiva at three different time intervals between the two groups

DISCUSSION

Immediate implant placement has become a predictable treatment modality that reduces treatment duration while preserving the alveolar architecture and esthetics. However, post-extraction crestal bone resorption and peri-implant soft tissue changes remain major clinical concerns. The application of platelet-rich fibrin (PRF) has therefore gained considerable attention because of its regenerative potential and autologous nature **(1–3).**

PRF is a second-generation platelet concentrate that forms a fibrin matrix rich in platelets, leukocytes, and growth factors capable of promoting angiogenesis, osteogenesis, and soft tissue regeneration **(4–8)**. The gradual release of platelet-derived growth factor (PDGF), transforming growth factor-β (TGF-β), and vascular endothelial growth factor (VEGF) enhances wound healing and bone maturation, consequently enhancing implant osseointegration **(9–12)**.

In the present study, implant stability increased progressively throughout the follow-up period in both groups; however, the PRF group displayed superior stability compared with the control group. Similar results have been reported by **Boora et al. (13)**, who observed significantly higher implant stability and improved peri-implant tissue response in implants placed with PRF. The positive effect of PRF on osseointegration may be attributed to accelerated bone remodelling and continuous release of growth factors, as demonstrated in earlier experimental studies **(10–12).**

The PRF group also exhibited reduced crestal bone loss compared with the control group. Preservation of marginal bone is crucial for long-term implant survival and esthetic success. Comparable findings were reported by **Elbrashy et al. (14)**, who demonstrated that PRF used as a socket-filling material produced clinical and radiographic outcomes comparable to deproteinized bovine bone during immediate implant placement. Similarly, **Iram et al. (15)** observed significantly lower crestal bone loss and improved peri-implant healing in patients treated with PRF.

Improved peri-implant soft tissue healing observed in the present study may be explained by enhanced angiogenesis, collagen synthesis, and epithelial maturation associated with PRF. These conclusions are consistent with the observations of **Del Corso et al. (16)** and **Peck et al. (17)**, who reported favorable soft tissue healing and predictable esthetic outcomes following the use of leukocyte-rich PRF during immediate implant placement. Likewise, **Sehgal et al. (18)** demonstrated satisfactory esthetic outcomes following the use of L-PRF in immediate implants placed in the esthetic zone.

The findings of the present study are also confirmed by recent evidence from systematic reviews. **Pitman et al. (19)** concluded that immediate implant placement is a predictable treatment modality when adequate primary stability and appropriate case selection are achieved. Furthermore, **Qin et al. (20)** reported that preservation of peri-implant hard and soft tissues plays a key role in achieving successful esthetic outcomes following immediate implant placement. Overall, the findings of the present study suggest that the adjunctive use of PRF may improve implant stability, reduce crestal bone loss, and

enhance peri-implant soft tissue healing following immediate implant placement. Although the results are encouraging, larger randomised clinical trials with longer follow-up periods are recommended to reinforce these findings further and establish standardised treatment protocols. Furthermore, the findings of the present study are supported by several recent clinical investigations. **Elbrashy et al. (21)** reported that PRF used as a socket-filling material during immediate implant placement produced favourable clinical and radiographic outcomes comparable to deproteinized bovine bone graft, suggesting that PRF can serve as an effective autologous regenerative material. Similarly, **Iram et al. (22)** demonstrated that immediate implant placement with PRF resulted in better soft tissue healing and preservation of peri-implant tissues than implant placement without PRF. The higher implant stability observed in the present study is also consistent with the findings of **Tözüm et al. (23)**, who reported a significant relationship between resonance frequency analysis (RFA)-based implant stability along with reduced peri-implant bone loss during osseointegration. Since peri-implant soft tissue health is crucial for long-term esthetic success, the **Pink Esthetic Score (PES)** proposed by **Fürhauser et al. (24)** provides a reliable method for evaluating peri-implant esthetics. It supports the value of preserving soft soft tissue structure. Moreover, **Kan et al. (25)** demonstrated that immediate implant placement with provisionalization successfully maintains facial gingival tissue stability, emphasising that preservation of hard and soft tissues is essential for predictable esthetic outcomes.

CONCLUSION

The findings of the present study suggest that the adjunctive use of platelet-rich fibrin (PRF) during immediate implant placement may provide favourable clinical and radiographic outcomes. PRF demonstrated improved implant stability, reduced crestal bone loss, and enhanced peri-implant soft tissue healing when compared with immediate implant placement without PRF. These beneficial effects are likely attributable to the continuous release of growth factors and the biological properties of the fibrin matrix, which promote angiogenesis, osteogenesis, and tissue regeneration. Therefore, PRF can be considered a simple, autologous, and cost-effective adjunct for immediate implant therapy, particularly in the esthetic zone. However, further well-designed randomised controlled trials with larger sample sizes and longer follow-up periods are required to confirm these outcomes and establish standardised clinical protocols.

References

1. Elbrashy A, Osman AH, Shawky M, Askar N, Atef M. Immediate implant placement with platelet-rich fibrin as space-filling material versus deproteinized bovine bone in maxillary premolars: A randomised clinical trial. **Clin Implant Dent Relat Res.** 2022;24(3):320-328. **doi:10.1111/cid.13075. PMID:35353941.**
2. Pitman J, Seyssens L, Christiaens V, Cosyn J. Immediate implant placement with or absent immediate provisionalization: A systematic review and meta-analysis. **J Clin Periodontol.** 2022;49(10):1012-1023. **doi:10.1111/jcpe.13686. PMID:35734911.**
3. Qin R, Chen Y, Han C, Wu D, Yu F, He D. Immediate implant placement with or excluding immediate provisionalization in the maxillary esthetic zone: A systematic review and meta-analysis. **Int J Oral Maxillofac Implants.** 2023;38(3):422-434. **doi:10.11607/jomi.10112. PMID:37279220.**
4. Kotsakis GA, Nguyen TT, Siormpas K, Pikos MA, Pohl S, Tarnow D, et al. Clinical outcomes of retention of the buccal root section combined with immediate implant placement: A systematic review of longitudinal studies. **Clin Implant Dent Relat Res.** 2023;25(1):23-34. **doi:10.1111/cid.13150. PMID:36331494.**
5. Pliatkute I, Pliavga V, Jakonyte A, Juodzbalys G. The efficacy of platelet-rich fibrin in immediate dental implant placement: A systematic literature review. **Minerva Stomatol.** 2026;75(2):110-126. **doi:10.23736/S2724-6329.25.05171-X. PMID:41378897.** *(Published online in 2025)*
6. Giammarinaro E, Baldini N, Covani U, Menini M, Pesce P, Marconcini S. Does platelet-rich fibrin enhance the outcomes of peri-implant soft tissues? A systematic review. **BMC Oral Health.** 2025;25:615. **doi:10.1186/s12903-025-05922-6. PMID:40264081.**
7. Ma G, Wu C, Shao M. Simultaneous implant placement with autogenous onlay bone grafts: A systematic review and meta-analysis. **Int J Implant Dent.** 2021;7(1):61. **doi:10.1186/s40729-021-00311-4. PMID:33928458.**
8. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, et al. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part I: Technological concepts and evolution. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;101(3):e37-e44. doi:10.1016/j.tripleo.2005.07.008. PMID:16504849.
9. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, et al.

Platelet-rich fibrin (PRF): Part IV. Clinical effects on tissue healing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;101(3):e56-e60. doi:10.1016/j.tripleo.2005.07.011. PMID:16504852.

10. Ehrenfest DM, Rasmusson L, Albrektsson T. Classification of platelet concentrates: From pure platelet-rich plasma (P-PRP) to leucocyte- and platelet-rich fibrin (L-PRF). Trends Biotechnol. 2009;27(3):158-167. doi:10.1016/j.tibtech.2008.11.009. PMID:19187989.
11. He L, Lin Y, Hu X, Zhang Y, Wu H. A comparative study of platelet-rich fibrin (PRF) and platelet-rich plasma (PRP) on the effect of proliferation and differentiation of rat osteoblasts in vitro. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009;108(5):707-713. doi:10.1016/j.tripleo.2009.06.044. PMID:19836730.
12. Kang YH, Jeon SH, Park JY, Chung JH, Choung YH, Choung HW, et al. Platelet-rich fibrin is a bioscaffold and reservoir of growth factors for tissue regeneration. Tissue Eng Part A. 2011;17(3-4):349-359. doi:10.1089/ten.TEA.2010.0327. PMID:20818962.
13. Thorat M, Pradeep AR, Pallavi B. Clinical effect of autologous platelet-rich fibrin in the treatment of intrabony defects. J Clin Periodontol. 2011;38(10):925-932. doi:10.1111/j.1600-051X.2011.01760.x. PMID:21883325.
14. Hauser F, Gaydarov N, Badoud I, Vazquez L, Bernard JP, Ammann P. Clinical and histological evaluation of postextraction platelet-rich fibrin socket filling. Clin Oral Investig. 2013;17(3):769-777. doi:10.1007/s00784-012-0725-6. PMID:22527167.
15. Boora P, Rathee M, Bhoria M. Effect of platelet-rich fibrin (PRF) on peri-implant soft tissue and crestal bone in one-stage implant placement: A randomised controlled trial. J Clin Diagn Res. 2015;9(4):ZC18-ZC21. doi:10.7860/JCDR/2015/12636.5788. PMID:25954713.
16. Bhola M, Neely AL, Kolhatkar S. Immediate implant placement: Clinical decisions, advantages, and disadvantages. J Prosthodont. 2008;17(7):576-581. doi:10.1111/j.1532-849X.2008.00359.x. PMID:18793237.
17. Juodzbalys G, Wang HL. Soft and hard tissue assessment of immediate implant placement: A case series. Clin Oral Implants Res. 2007;18(2):237-243. doi:10.1111/j.1600-0501.2006.01312.x. PMID:17348889.
18. Del Corso M, Mazor Z, Rutkowski JL, Dohan Ehrenfest DM. The use of leukocyte- and platelet-rich fibrin during immediate postextractive implantation and loading. Implant Dent. 2012;21(3):226-233. doi:10.1097/ID.0b013e31825448b6. PMID:22584772.
19. Peck MT, Marnewick J, Stephen LX. The use of leukocyte- and platelet-rich fibrin (L-PRF) to facilitate implant placement in bone-deficient sites. Implant Dent. 2012;21(5):423-428. doi:10.1097/ID.0b013e31826774d0. PMID:23018758.
20. Sehgal M, Puri L, Yadav S, Malhotra P, Phukela SS, Yadav B, et al. Immediate dental implants enriched with L-PRF in the esthetic zone. Case Rep Dent. 2018;2018:9867402. doi:10.1155/2018/9867402. PMID:30627456.
21. Elbrashy M, Shaker M, El Askary A. Immediate implant placement with platelet-rich fibrin as space-filling material versus deproteinized bovine bone in maxillary premolars: A randomised clinical trial. Clin Implant Dent Relat Res. 2022;24(3):320-328. doi:10.1111/cid.13075.
22. Iram J, Ajaz S, Hussain SS, Irshad A, Shahid H, Jahangir I. Immediate dental implant placement with and without platelet-rich fibrin (PRF) in esthetic zone: A comparative study. Natl J Maxillofac Surg. 2024;15(3):467-473. doi:10.4103/njms.njms_42_23. PMID:39830456.
23. Tözüm TF, Türkyılmaz I, McGlumphy EA. Relationship between dental implant stability determined by resonance frequency analysis and peri-implant vertical bone loss during osseointegration. Int J Oral Maxillofac Implants. 2008;23(3):523-529. PMID:18548929.
24. Fürhauser R, Florescu D, Benesch T, Haas R, Mailath G, Watzek G. Evaluation of soft tissue around single-tooth implant crowns: The pink esthetic score. Clin Oral Implants Res. 2005;16(6):639-644. doi:10.1111/j.1600-0501.2005.01193.x. PMID:16307570.
25. Kan JY, Rungcharassaeng K, Lozada JL, Zimmerman G. Facial gingival tissue stability after immediate implant placement and provisionalization. J Prosthet Dent. 2011;105(2):117-123. doi:10.1016/S0022-3913(11)60010-9. PMID:21262407.