Research Article

Comparative Evaluation Of The Treatment Outcomes For Horizontal Defects By Intra Oral Osseous Auto Graft Vs. Combination Of Demineralized Bone Matrix And Injectable Platelet Rich Fibrin - A Clinical And Radiographic Study

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Abstract

Background: Horizontal periodontal defects are among the most prevalent forms of alveolar bone loss, yet they remain difficult to regenerate because of limited bony support and reduced regenerative potential. This study aimed to compare the clinical and radiographic results of intraoral autogenous bone graft (ABG) and combined use of demineralized bone matrix (DMBM) and injectable platelet-rich fibrin (I-PRF) for horizontal periodontal defects. Methods: The method used was randomized, single blind, and controlled clinical trial involving 40 patients with chronic periodontitis, who were divided into two groups. A randomized single blind controlled clinical trial was conducted involving 40 patients with chronic periodontitis, divided into two groups. Group A was treated with ABG, and Group B with DMBM and I-PRF. At baseline, 3-months and 6-months, clinical parameters including periodontal probing depth (PPD), relative clinical attachment level (RCAL), plaque index (PI), gingival index (GI), bleeding on probing (BOP) and residual bone level (RBL) were assessed. Repeated-measures ANOVA, paired t-test and unpaired t-test were used to analyze the data. Results: Statistically significant improvement was seen in all six parameters (PPD, RCAL, PI, GI and RBL) at the six months follow up period in both groups ($p < 0.001$). The intergroup comparisons, however, did not show any statistically significant difference in any clinical or radiographic parameter ($p > 0.05$). Conclusion: ABG and DMBM in combination with I-PRF are effective regeneration strategies in horizontal periodontal defects. The DMBM + I-PRF combination is a minimally invasive option that has similar clinical results to the gold standard autogenous bone graft.

Keywords: Horizontal Periodontal Defects, Autogenous Bone Graft (ABG), Demineralized Bone Matrix (DMBM), Injectable Platelet-Rich Fibrin (I-PRF), Periodontal Regeneration.

Introduction

"Healing is a matter of time but it is sometimes also a matter of opportunity." — Hippocrates

Periodontal diseases are among the most common chronic inflammatory conditions affecting the oral cavity(1). Although microbial plaque is a key factor in the initiation of disease, host immune response, environmental factors and systemic conditions also affect disease progression(2). If left untreated, periodontal disease will cause clinical attachment loss, alveolar bone loss, tooth mobility, and tooth loss(3). The classification system for 2018 classifies periodontitis into four stages which are based on severity and complexity to help the dentist choose the right treatment(4).

Periodontal bone loss occurs in many different ways, primarily horizontally(5). Taking into consideration the amount of bone loss, approximately 92.2% is horizontal and 7.8% is vertical(6). Although common, horizontal defects have not been the subject of much research into regeneration due to their lack of regeneration(7). In contrast to vertical defects horizontal defects have fewer bony walls to stabilize the clot and contain the graft, making predictable regeneration of these defects difficult(8).

Today, periodontal therapy is more than just about arresting periodontal infection and inflammation; it is also about the regeneration of lost cementum, periodontal ligament and alveolar bone(9). Scaling and root planing are useful in controlling microbial plaque and inflammation, but are not restorative to the lost periodontal architecture(10). As a result, regenerative surgical techniques or bone grafting has turned into an essential therapeutic treatment for advanced periodontal defects(11).

Autogenous Bone Graft (ABG) is considered to be the gold standard, because it is all three: osteogenic, osteoconductive and osteoinductive(12). Osteoprogenitor cells promote the formation of new bone by providing

cells that synthesize bone matrix, signaling molecules and osteoblasts(13). Additionally, ABG requires another donor site, is time consuming, has a limited graft size, and may have donor site morbidity and pain post-surgery(14)..

Other regeneration materials have thus been developed. Demineralized Bone Matrix (DBM) is a material that is rich in bone morphogenetic proteins and collagen, and has an osteoinductive potential(15). Injectable Platelet-Rich Fibrin (I-PRF) consists of platelets, leukocytes, fibrin and growth factors which can be beneficial for angiogenesis, cell migration, healing and regeneration(16). DBM can be enhanced with I-PRF for its biological activity and handling.

Both ABG and DBM with I-PRF have regenerative properties but there are insufficient data directly comparing the two in horizontal defects(17). Therefore, clinical and radiographical comparisons are needed to evaluate the reduction in probing depths, gain in clinical attachment, formation of new bone and overall periodontal healing, to help you decide on an effective and predictable treatment plan(18).

Review Of Literature

A horizontal defect (horizontal bone loss) is defined as: Generalized Apical Shift: A decrease in the height of the alveolar bone such that the bone margin continues to be perpendicular to the tooth surface, as per the American Academy of Periodontology (AAP) (34) and related literature. Goldman & Cohen (1958) (35) classified the classified as 1) Suprabony defects 2) Infrabony defects 3) interradicular or furcation defects.

Choukroun et al. (19). studied the biological characteristics and clinical uses of PRF in tissue regeneration. PRF stimulates angiogenesis, immune regulation, trapping of stem cells and epithelialization. It will stimulate soft- and hard-tissue healing, neovascularization, and wound closure, as well as tissue remodeling. The study pointed out that PRF was very simple and cheap regenerative material, which was biocompatible.

In 32 patients, Thorat et al. (20) assessed the potential of an autologous platelet-rich fibrin (PRF) to aid in the treatment of chronic periodontitis-associated intrabony defects. PRF in combination with open flap debridement was effective in increasing probing-depth reduction, clinical attachment gain and bone fill when compared with debridement alone. The results showed the positive effect of PRF in periodontal wound healing and regeneration.

Gummaluri et al. (21) evaluated the effectiveness of two devil plates: titanium platelet-rich fibrin (T-PRF) and leukocyte platelet-rich fibrin (L-PRF) in treating periodontal intrabony defects (IBD). Both treatments had significant improvement in probing depth and clinical attachment. However, T-PRF had an increased bone defect fill, possibly due to its denser fibrin network and longer resorption time, showing increased regenerative potential.

Pradeep et al. (22) compared the combination of PRF and platelet rich plasma (PRP) in open flap debridement (OFD) for periodontal intrabony defects. The results of platelet concentrates compared to controls showed an improvement in probing depth, clinical attachment and bone fill in 90 defects studied. There was no significant difference between PRF and PRP, which indicates that PRF is a viable regeneration solution.

Mathew and Bhatsange(23) have tested the injectable platelet-rich fibrin (i-PRF) and DFDBA in the treatment of three-walled periodontal intrabony defects. Thirty sites were provided with either DFDBA or i-PRF with DFDBA. Both groups showed clinical and radiographic improvement, and the i-PRF group showed greater clinical improvements, indicating that i-PRF is a promising and easily-prepared regenerative adjunct.

Agarwal et al. (24) studied the use of PRF in combination with DFDBA in their study of 60 intrabony defects in 30 patients. After 12 months, there was a significant periodontal improvement in both treatment groups. The results showed that PRF could increase the regenerative ability of DFDBA as it resulted in more probing-depth reduction, clinical attachment gain, less recession, bone fill, and defect resolution.

Egierska et al., (25) discuss the clinical use of platelet-rich plasma and platelet-rich fibrin in oral surgery such as tooth extraction, implants, sinus augmentation and osteonecrosis treatment. The platelet concentrates both showed regeneration as a result of growth factors and cytokines. However, there were various methods of preparation and various clinical protocols, which restricted comparisons, and there is a need for standardization and further clinical research.

Mathur et al. (26) compared PRF and autogenous bone grafts for treating periodontal intrabony defects. thirty-eight defects were treated with open flap debridement using PRF or autogenous bone graft. Both treatments showed a significant reduction in probing depth, improvement in clinical attachment and defect fill. There were no significant differences between the two, suggesting both methods were effective in promoting periodontal regeneration.

Naidu et al. (27) studied if adding PRF to DFDBA enhanced intrabony defect regeneration in periodontal sites. Twenty-four contralateral defects were treated with either DFDBA alone or with DFDBA and PRF. There were significant clinical and radiographic improvements for both groups after 9 months. No differences were, however, noted, indicating no benefit of PRF over DFDBA alone in terms of regeneration.

Saravanan et al. (28) assessed the efficacy of PRF when used in conjunction with the PerioGlas for regeneration of intrabony defects. Thirty sites were randomly assigned to treatment and control groups and clinically and radiographically evaluated for 6 months. Both groups had radiographic defect fill, but PRF with PerioGlas showed a greater fill. This study confirmed that this method was an effective strategy for periodontal regeneration.

Gothi et al. (29) compared freeze dried bone allograft (FDBA) to demineralized freeze dried bone allograft (DFDBA) in the treatment of periodontal intrabony defects. In 10 patients 20 bilateral defects were clinically and radiographically evaluated for 6 months. The materials both showed significant improvements of periodontal parameters and reduction of defects, but there was no difference between the two, suggesting that DFDBA did not yield any advantage above FDBA.

Research Gap

Although several studies have evaluated autogenous bone grafts, platelet-rich fibrin, and demineralized bone matrix for periodontal regeneration, most investigations have focused on intrabony or vertical defects. Limited evidence is available regarding horizontal periodontal defects, particularly comparing intraoral osseous autografts with the combination of demineralized bone matrix and injectable platelet-rich fibrin. Therefore, comparative clinical evidence remains insufficient.

Statement Of The Problem

Horizontal defects present a significant clinical challenge in the management of periodontitis due to their complex morphology and the need for effective regenerative therapy. While intraoral osseous auto grafts are considered the gold standard for bone regeneration there are certain limitations for its use. The purpose of this study is to determine whether there exists a statistical difference in the regenerative outcomes with respect to the clinical and radiographic findings in horizontal defects through the addition of demineralized bone matrix (DMBM) + I-prf versus the use of auto grafts alone. This study seeks to determine the more effective treatment modality for predictable periodontal regeneration.

Aim And Objectives

Aim- To evaluate and compare the treatment outcomes for horizontal defects using autogenous bone graft (ABG) alone and combination of demineralized bone matrix with I-prf

Objectives

To compare clinical and radiographic differences of horizontal defects with placement of autogenous bone graft (ABG) alone and combination of demineralized bone matrix with injectable platelet rich fibrin (DMBM + I-prf) at 3 months and 6 months of follow up.

To assess the clinical and radiographic parameter in patients with horizontal defects treated using autogenous bone graft at 3 months and 6 months of follow up.

To assess the clinical and radiographic parameters in patients with horizontal defects treated using combination of demineralized bone matrix with injectable platelet rich fibrin (DMBM + I-prf) at 3 months and 6 months of follow up.

Primary Research Question

Is there any difference in the clinical and radiographic parameters in the treatment outcomes for horizontal defects in patients treated with intra oral osseous autograft alone and combination of demineralized bone matrix and I-prf ?

Hypothesis

Alternative- There is a difference in the clinical and radiographic outcomes for horizontal defects in patients treated with intra oral osseous auto graft alone and combination of demineralized bone matrix and I-prf.
Null hypothesis - The null hypothesis states that there is no difference in the clinical and radiographic outcomes for horizontal defects in patients treated with intra oral osseous autograft alone and combination of demineralized bone matrix with I-prf .

Materials And Methods

Study Design

The study was a randomized controlled single blind clinical trial to evaluate the clinical and radiographic effect of using Autogenous Bone Graft (ABG) and Demineralized Bone Matrix (DMBM) combined with Injectable Platelet-Rich Fibrin (I-PRF) for the treatment of horizontal periodontal defects. Ethical approval and CTRI registration (CTRI/2025/04/086066) were received. The study period was June 2024 – April 2026 (follow-up 6 months). All surgeries were performed by one operator and clinical assessments were made by a blinded examiner.

Study Setting and Population

The study was conducted at Department of Periodontology and Oral Implantology. Patients with horizontal defects in the periodontium who met the inclusion criteria were recruited and divided into two treatment groups (20 patients each) for the study.Forty patients with horizontal defects in the periodontium who met the inclusion criteria were recruited and equally divided into two treatment groups (20 patients each).

Sample Size and Sampling Technique

Sample size was calculated with SPSS version 21 with a study power of 80% and a confidence level of 95%. The minimum sample size was reduced but 40 patients (20 in each group) were accepted in case of drop-outs. The sampling was by convenience. The ABG was given to Group A and DMBM plus I-PRF to Group B.In Group A, ABG was given and in Group B, DMBM with I-PRF was given

Minimum sample size n = 2 S 2 (Z1+Z) 2/ (M1-M2)2
Minimum sample size n1 = 20, n2= 20
Total = 40
M1 = Mean test intervention M2 = Mean Control intervention
S1 = Standard deviation of M1 S2 = Standard deviation of M2
S= Pooled SD Z1 = Z value associated with alpha
Z2 = Z value associated with Beta.

Eligibility Criteria

Patients included were 30-55 years of age, chronic periodontitis, horizontal periodontal defects, probing pocket depth (PPD) ≥5 mm after Phase I therapy, and willing to participate. Patients were excluded if they had systemic

diseases, smoking, pregnancy or lactation, recent periodontal therapy or contraindications for surgery.

Inclusion and Exclusion Criteria

Patients with horizontal defects were included in this study if they had radiographic confirmation of the defect and a positive PPD >5 mm. Patients who had systemic diseases that affected wound healing, smokers, pregnant or lactating women, recent antibiotic use, or poor oral hygiene compliance were excluded.

Randomization and Allocation

The two groups were divided into equal numbers by random assignment, using a manual lottery. There were no losses to follow-up in all participants at the 6 month follow up.

Clinical Procedures

After completion of Phase I therapy, clinical records, blood investigations, diagnostic casts, acrylic stents, intraoral radiographs and photographs were taken. Flap reflection, debridement, placement of graft, suturing and periodontal dressing were done and Group B received ABG (n=15) and Group B received DMBM and I-PRF (n=15).

Outcome Measures

Plaque Index, Gingival Index, Bleeding on Probing, Periodontal Probing Depth and Relative Clinical Attachment Level were recorded at baseline, 3 months and 6 months with the use of acrylic stents and a UNC-15 probe. The radiographic evaluation was carried out with standardized intraoral periapical radiographs and the residual Bone Level was measured.

Data Management and Statistical Analysis

SPSS version 21 has been used to analyze data. The quantitative variables were presented as means ± standard deviation and normality was tested with Shapiro–Wilk test. Intragroup comparison was performed using repeated Measures ANOVA with Tukey's post hoc test while radiographic and intergroup comparison was performed by a paired and unpaired t-test. The level of statistical significance was defined as $p < 0.05$, and $p < 0.001$ as highly significant.

Results

The results of the present randomized controlled clinical trial were analyzed to compare the clinical and radiographic outcomes of Autogenous Bone Graft (ABG) and Demineralized Bone Matrix combined with Injectable Platelet-Rich Fibrin (DMBM + I-PRF) in the treatment of horizontal periodontal defects. Baseline demographic characteristics were comparable between groups. Clinical and radiographic parameters were evaluated at baseline, three months, and six months using appropriate statistical tests.'

Table 1. Comparison of Age between Group A and Group B

Group	Mean	SD
Group A	41.9	10.6
Group B	43.1	10.57

Unpaired t-test: $t = -0.358$, $p = 0.722$ (NS)

Interpretation - $p > 0.05$; age of Group A and Group B are not significantly different from each other.

Table 2. Gender Distribution of Study Participants

Group	Male, n (%)	Female, n (%)
Group A (n = 20)	10 (50.0)	10 (50.0)
Group B (n = 20)	10 (50.0)	10 (50.0)
p-value	-	1.000 (NS)

The Chi-square test ($\chi^2 = 0.000$) was used as a statistical test.

Interpretation - No difference was found in the gender distribution of the two groups ($p = 1.000$).

Table 3. Intergroup and Intragroup Comparison of Periodontal Probing Depth (PPD)

Time Interval	Group A (Control) Mean ± SD	Group B (Test) Mean ± SD	Unpaired t-test	p-value	Significance
Baseline	6.50 ± 1.10	6.40 ± 1.04	0.295	0.77	NS
3 Months	3.50 ± 1.10	3.80 ± 0.95	-0.922	0.362	NS
6 Months	3.50 ± 1.10	3.80 ± 0.95	-0.922	0.362	NS
Gain	2.95 ± 0.60	2.60 ± 0.59	1.84	0.074	NS
Intragroup Comparison (Repeated Measures ANOVA)					
Parameter	**Group A (Control)**	**Group B (Test)**			
Repeated Measures ANOVA (F-value)	152.34	138.92			
Overall p-value	<0.001	<0.001			
Baseline vs 3 Months (Tukey's post hoc)	<0.001	<0.001			
Baseline vs 6 Months (Tukey's post hoc)	<0.001	<0.001			
3 Months vs 6 Months (Tukey's post hoc)	0.781 (NS)	0.645 (NS)			

Interpretation - No significant difference between the 2 groups in terms of reduction of periodontal probing depths from baseline to 6 months ($p > 0.05$). No intergroup difference was, however, detected at any time point ($p > 0.05$) and suggested equivalent clinical effectiveness of both treatment modalities.

Table 4. Intergroup and Intragroup Comparison of Relative Clinical Attachment Level (RCAL)

Time Interval	Group A (Control) Mean ± SD	Group B (Test) Mean ± SD	Unpaired t-value	p-value	Significance
Baseline	11.55 ± 1.60	11.00 ± 1.56	0.765	0.871	NS
3 Months	8.40 ± 1.66	8.65 ± 1.66	–0.475	0.638	NS
6 Months	8.35 ± 1.66	8.65 ± 1.66	–0.570	0.57	NS

RCAL Gain	**3.30 ± 0.86**	**2.35 ± 0.60**	**1.484**	**0.146**	NS

Intragroup Comparison (Repeated Measures ANOVA)

Parameter	Group A (Control)	Group B (Test)
Repeated Measures ANOVA (F-value)	96.75	86.54
Overall p-value	<0.001	<0.001
Baseline vs. 3 Months (Tukey's post hoc)	<0.001	<0.001
Baseline vs. 6 Months (Tukey's post hoc)	<0.001	<0.001
3 Months vs. 6 Months (Tukey's post hoc)	0.722 (NS)	0.856 (NS)

Interpretation - There was a significant improvement in relative clinical attachment level (RCAL), between the baseline and 3 and 6 months in both treatment groups ($p<0.001$). The comparisons between groups at all times, however, and overall RCAL gain were not statistically significant ($p > 0.05$), suggesting that there was no significant difference between the clinical efficacy of both treatments.

Table 5. Intergroup and Intragroup Comparison of Plaque Index

Time Interval	Group A (Control) Mean ± SD	Group B (Test) Mean ± SD	Unpaired t-test	p-value	Significance
Baseline	0.675 ± 0.27	0.675 ± 0.27	0	1	NS
3 Months	0.275 ± 0.255	0.275 ± 0.25	0	1	NS
6 Months	0.30 ± 0.25	0.30 ± 0.25	0	1	NS

Intragroup Comparison (Repeated Measures ANOVA)

Comparison	Group A (Control)	Group B (Test)
Repeated Measures ANOVA (F-value)	72.18	72.18

Overall p-value	<0.001	<0.001
Baseline vs. 3 Months	<0.001	<0.001
Baseline vs. 6 Months	<0.001	<0.001
3 Months vs. 6 Months	0.611 (NS)	0.611 (NS)

Interpretation - The Plaque Index demonstrated a marked decrease from baseline to 3 and 6 months in both Group A and Group B ($p < 0.001$) reflecting good plaque control after treatment. At each assessment time, however, no differences were found between the two groups ($p = 1.000$). For intragroup analysis, repeated measures ANOVA followed by post hoc pairwise comparison was employed and for intergroup comparison independent t-test was employed.

Table 6. Intergroup and Intragroup Comparison of Gingival Index

Time Interval	Group A (Control) Mean ± SD	Group B (Test) Mean ± SD	Unpaired t-test	P-value	Significance
Baseline	0.05 ± 0.15	0.05 ± 0.15	t = 0.00	1	NS
3 Months	0.15 ± 0.23	0.15 ± 0.23	t = 0.00	1	NS
6 Months	0.175 ± 0.24	0.175 ± 0.24	t = 0.00	1	NS

Intragroup Comparison (Repeated Measures ANOVA)

Parameter	Group A (Control)	Group B (Test)
F-value	6.12	6.12
P-value	<0.001	<0.001
Significance	Significant	Significant

Pairwise Comparison (Tukey's Post Hoc Test)

Comparison	Group A (Control) P-value	Group B (Test) P-value	Significance
Baseline vs 3 Months	0.021	0.021	Significant
Baseline vs 6 Months	0.008	0.008	Significant

3 Months vs 6 Months	0.433	0.433	Not Significant

Interpretation - There was a slight increase in gingival index in both groups from baseline to 6 months. There was no statistically significant difference between the groups when compared intergroup at any follow-up interval ($p = 1.000$). When analyzing the data between groups, however, there were significant differences over time ($p < 0.001$) and significant improvement between the baseline and follow-up periods. Repeated measures ANOVA was followed by pairwise comparisons done using Tukey's post hoc.

Table 7. Intergroup and Intragroup Comparison of Bleeding on Probing (BOP)

Time Interval	Group A (Control)Mean ± SD	Group B (Test)Mean ± SD	Intergroup Comparison (Unpaired t-test)	p-value	Significance
Baseline	0.15 ± 0.36	0.15 ± 0.36	t = 0.00	1	NS
3 Months	0.10 ± 0.30	0.10 ± 0.30	t = 0.00	1	NS
6 Months	0.20 ± 0.41	0.20 ± 0.41	t = 0.00	1	NS

Intragroup Comparison (Repeated Measures ANOVA)

Comparison	Group A (Control)	Group B (Test)
Repeated Measures ANOVA (F-value)	F = 2.84	F = 2.84
p-value	0.067	0.067
Significance	NS	NS

Pairwise Comparison (Tukey's Post Hoc Test)

Comparison	Group A (Control)p-value	Significance	Group B (Test)p-value	Significance
Baseline vs 3 Months	0.21	NS	0.21	NS
Baseline vs 6 Months	0.18	NS	0.18	NS
3 Months vs 6 Months	0.298	NS	0.298	NS

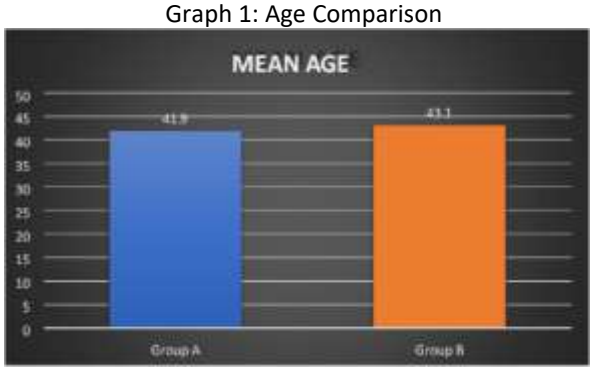
Interpretation - No statistically significant difference was found at baseline, 3 months or 6 months between Group A and Group B in the intergroup comparison of BOP ($p = 1.000$). There were also no significant differences in bleeding outcomes between the two groups at any time point (Repeated Measures ANOVA, $p = 0.067$) by intragroup analysis.

Table 8. Intergroup and Intragroup Comparison of Residual Bone Level (RBL)

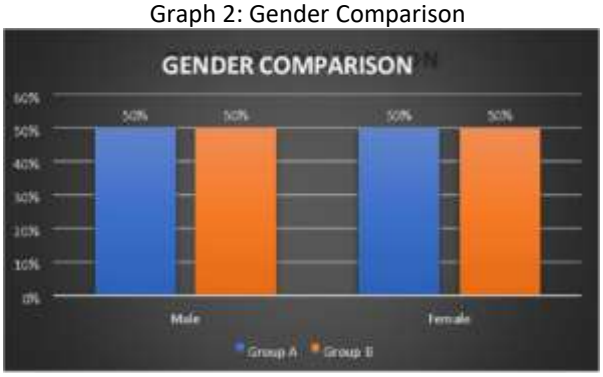
Time Interval	Group A (Control) Mean ± SD	Group B (Test) Mean ± SD	Unpaired t-test (t value)	p-value	Significance
Baseline	5.4 ± 1.04	5.1 ± 0.78	1.543	0.412	NS
6 Months	3.0 ± 0.79	3.3 ± 0.97	−1.064	0.294	NS
Total Change/Reduction	2.4 ± 0.59	1.8 ± 0.52	1.648	0.108	NS
Intragroup Comparison (Paired t-test)	t = 18.42	t = 13.21	—	—	—
p-value	<0.001	0.005	—	—	—
Significance	Highly Significant () **	Significant (*)	—	—	—

Interpretation - 6 months later, the amount of Residual Bone Level (RBL) was significantly reduced in both groups, proving good bone regeneration. There were no statistically significant differences between the two group comparisons at baseline, 6 months, and at total bone reduction (p values>0.05), indicating that treatment effectiveness was similar between the two groups.

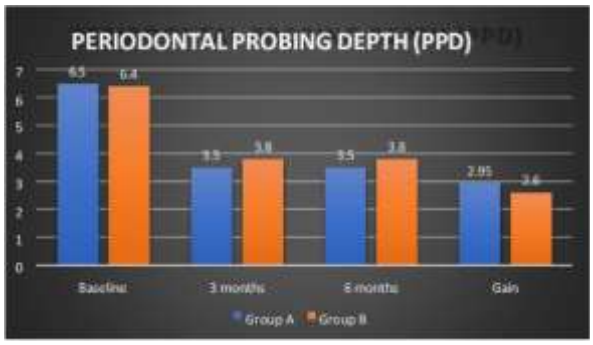
Graph 1: Age Comparison



Graph 2: Gender Comparison

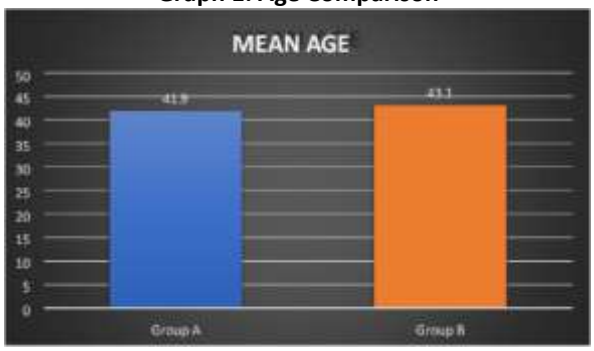


Graph 3: Intergroup and intragroup comparison of periodontal probing depth (PPD)

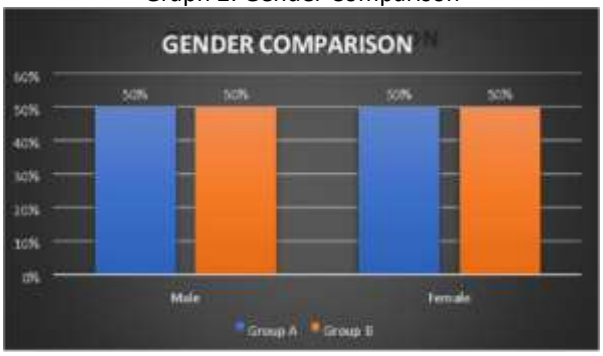


o groups.

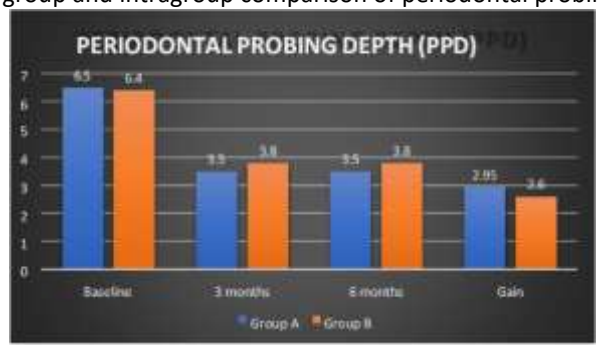
Graph 1: Age Comparison



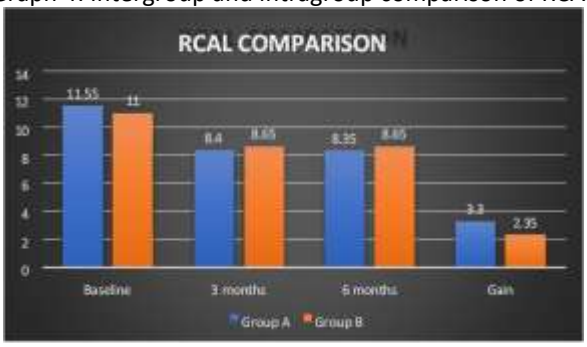
Graph 2: Gender Comparison



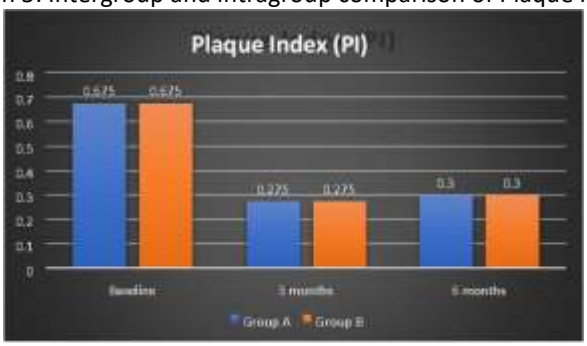
Graph 3: Intergroup and intragroup comparison of periodontal probing depth (PPD)



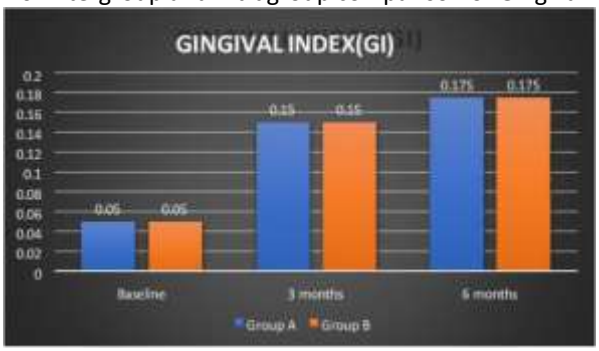
Graph 4: Intergroup and intragroup comparison of RCAL



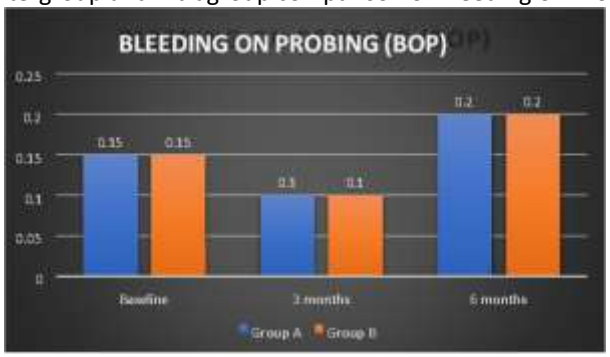
Graph 5: Intergroup and intragroup comparison of Plaque Index



Graph 6: Intergroup and intragroup comparison of Gingival Index



Graph 7: Intergroup and intragroup comparison of Bleeding on Probing (BOP)



Graph 8: Intergroup and intragroup comparison of Residual Bone Level

DISCUSSION

This present study illustrates the significant reduction in periodontal probing depth, RCL, plaque index, gingival index and residual bone level in both the treatment groups after six months follow up. The intergroup comparisons, however, failed to show statistically significant differences between the results of the two groups of treatment, Autogenous Bone Graft and Demineralized Bone Matrix and Injectable Platelet-Rich Fibrin, with both treatment modalities providing similar regeneration results. These findings are similar to those of Chadwick et al., Mathur et al. and Naidu et al. who also found clinical and radiographic improvements with regenerative biomaterials. The clinical improvement observed indicates that either therapy or combination therapy was effective in inducing periodontal healing and bone regeneration and that combination therapy could be an alternative, less invasive, method to bone regeneration without sacrificing clinical efficacy.

CONCLUSION

The present study concluded that both intraoral autogenous bone graft (ABG) and Demineralized Bone Matrix (DMBM) combined with Injectable Platelet-Rich Fibrin (I-PRF) are effective therapeutic methods to treat horizontal periodontal defects. After 6 months both groups showed statistically significant improvements in periodontal probing depth (PPD), relative clinical attachment level (R-CAL), plaque control, gingival health, and radiographic bone regeneration. The two treatment groups, however, did not differ significantly with regard to any of the clinical or radiographic features evaluated, suggesting that the treatments were equally effective. While autogenous bone graft continues to be the gold standard due to its osteogenic properties, the use of DMBM with I-PRF presents an intriguing option that avoids donor-site morbidity, surgical complexity, and improves patient comfort. Thus, horizontal periodontal defects might be treated with the combination therapy as a predictable and less invasive regeneration procedure. Additional multicenter trials with extended follow-up and more patients are suggested to confirm these results and to determine long-term clinical results.

References

1. Villoria GEM, Fischer RG, Tinoco EMB, Meyle J, Loos BG. Periodontal disease: A systemic condition. Periodontology 2000. 2024.
2. Hashim NT, Babiker R, Padmanabhan V, Ahmed AT, Chaitanya NCSK, Mohammed R, et al. The Global Burden of Periodontal Disease: A Narrative Review on Unveiling Socioeconomic and Health Challenges. International Journal of Environmental Research and Public Health. 2025.
3. Nocini R, Lippi G, Mattiuzzi C. Periodontal disease: the portrait of an epidemic. J Public Heal Emerg. 2020;
4. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: Framework and proposal of a new classification and case definition. J Periodontol. 2018;
5. Debnath K, Chatterjee A. Treatment of horizontal defect with and without platelet-rich fibrin matrix: A randomized comparative clinical study. J Indian Soc Periodontol. 2018;
6. Jayakumar A, Rohini S, Naveen A, Haritha A, Reddy K. Horizontal alveolar bone loss: A periodontal orphan. J Indian Soc Periodontol. 2010;
7. Bud E, Pop SI, Bud A, Steele BR, Vlasa A. Bony Defect Regeneration in Periodontitis: A Systematic Review of the Literature

Regarding the Use of Enamel Matrix Derivative Proteins. Dentistry Journal. 2025.
8. Gerova-Vatsova T. Investigating the Efficacy of Regenerative Therapy With Autogenous Platelet-Rich Plasma in Vertical Bone Defects. Cureus. 2024;
9. Kwon TH, Lamster IB, Levin L. Current Concepts in the Management of Periodontitis. International Dental Journal. 2021.
10. Luan J, Li R, Xu W, Sun H, Li Q, Wang D, et al. Functional biomaterials for comprehensive periodontitis therapy. Acta Pharmaceutica Sinica B. 2023.
11. Li L, Xu J, Ye C, Zhou Y, Yan F, Chen Z, et al. Biomaterials-based strategy for dental-oral tissue regeneration: current clinical application, laboratory development, and future direction. Biomaterials. 2026;
12. Liang Y, Luan X, Liu X. Recent advances in periodontal regeneration: A biomaterial perspective. Bioact Mater. 2020;
13. TaeHyun K, Ira B L, Liran L. Current Concepts in the Management of Periodontitis. Int Dent J . 2021;
14. Schallhorn RG. Present Status of Osseous Grafting Procedures. J Periodontol. 1977;
15. Khan WS, Rayan F, Dhinsa BS, Marsh D. An osteoconductive, osteoinductive, and osteogenic tissue-engineered product for trauma and orthopaedic surgery: How far are we? Stem Cells International. 2012.
16. Ivanova N, Ivanov S, Peev S, Dikova T. Types of Bone Substitutes and Their Application in Regenerative Medicine: A Systematic Review. Journal of Functional Biomaterials. 2025.
17. Ferraz MP. Bone Grafts in Dental Medicine: An Overview of Autografts, Allografts and Synthetic Materials. Materials. 2023.
18. Wang B, Feng C, Liu Y, Mi F, Dong J. Recent advances in biofunctional guided bone regeneration materials for repairing defective alveolar and maxillofacial bone: A review. Japanese Dental Science Review. 2022.
19. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, et al. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part IV: Clinical effects on tissue healing. Oral Surgery, Oral Med Oral Pathol Oral Radiol Endodontology. 2006;
20. Thorat M, Pradeep AR, Pallavi B. Clinical effect of autologous platelet-rich fibrin in the treatment of intra-bony defects: A controlled clinical trial. J Clin Periodontol. 2011;
21. Gummaluri SS, Bhattacharya HS, Astekar M, Cheruvu S. Evaluation of titanium-prepared platelet-rich fibrin and leucocyteplatelet-rich fibrin in the treatment of intra-bony defects: Arandomized clinical trial. J Dent Res Dent Clin Dent Prospects. 2020;
22. Pradeep AR, Rao NS, Agarwal E, Bajaj P, Kumari M, Naik SB. Comparative Evaluation of Autologous Platelet-Rich Fibrin and Platelet-Rich Plasma in the Treatment of 3-Wall Intrabony Defects in Chronic Periodontitis: A Randomized Controlled Clinical Trial. J Periodontol. 2012;
23. Mathew R, Bhatsange A. Demineralized freeze-dried bone allograft with/without i-Platelet-rich fibrin in 3 wall intrabony defects. Brazilian J Oral Sci. 2024;
24. Agarwal A, Gupta ND, Jain A. Platelet rich fibrin combined with decalcified freeze-dried bone allograft for the treatment of human intrabony periodontal defects: A randomized split mouth clinical trail. Acta Odontol Scand. 2016;
25. Egierska D, Perszke M, Mazur M, Duś-Ilnicka I. Platelet-rich plasma and platelet-rich fibrin in oral surgery: A narrative review. Dental and Medical Problems. 2023.
26. Mathur A, Bains VK, Gupta V, Jhingran R, Singh RP. Evaluation of intrabony defects treated with platelet-rich fibrin or autogenous bone graft: A comparative analysis. Eur J Dent. 2015;
27. Naidu NSS, Kancharla AK, Nandigam AR, Tasneem SM, Gummaluri SS, Dey S, et al. Comparative study of demineralized freeze-dried bone allograft and its combination with platelet-rich fibrin in the treatment of intrabony defects: A randomized clinical trial. Dent Med Probl. 2024;
28. Saravanan D, Rethinam S, Muthu K, Thangapandian A. The combined effect of bioactive glass and platelet-rich fibrin in treating human periodontal intrabony defects - A clinicoradiographic study. Contemp Clin Dent. 2019;
29. Gothi R, Bansal M, Kaushik M, Khattak BP, Sood N, Taneja V. A comparative evaluation of freeze dried bone allograft and decalcified freeze dried bone allograft in the treatment of intrabony defects: A clinical and radiographic study. J Indian Soc Periodontol. 2015;