IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 21, Issue 8 Ser.9 (August. 2022), PP 33-41
www.iosrjournals.org

Is the use of PRF combined with bioactive glass grafting material is a valid treatment option?

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Background*: Periodontal therapy of intra-bony defects represents a major challenge for clinicians. Conventional surgical techniques can not restore the lost tissue architectures and functions. Therefore, some regenerative materials as bone grafts and bone substitutes were developed to achieve this target. Alloplasts (as bioactive glass) are utilized to overcome the autografts and allograft intrinsic limitations. Thus, the objectives of present study were to evaluate the efficacy of regenerative potentials of bioactive glass bone substitute and to assess clinically and radiographically the platelets rich fibrin (PRF) ability to augment the regenerative ability of bioactive glass bone substitute in stage III grade B periodontitis.*

Patients, Materials and Methods*: In this study, ten patients diagnosed with stage III periodontitis grade B with multiple intrabony defects (20 defects) were selected and received phase one therapy. A split mouth randomized study was conducted and treat one intrabony defects with bioactive glass bone substitute alone while the second defect treated with bioactive glass bone substitute covered by PRF membrane. Clinical and radiographic parameters were performed at baseline and after 6 months post-operative.*

Results*: Intra-groups significant improvement in all tested clinical and radiographic parameters (plaque index, gingival index, probing depth index, clinical attachment loss, bone depth and width) were found. However, intergroup comparison showed significant difference only in pocket probing depth were found while non significant difference were found regarding other tested parameters.*

Conclusion: *PRF is an autologous, biocompatible, economic and easily prepared material when used with bone substitute material help in promoting better clinical outcomes and wound healing.*

Key Word*: Bioactive glass, PRF, intra-bony defect.*

Date of Submission: 13-08-2022 Date of Acceptance: 29-08-2022

I. Introduction

Periodontitis is a chronic multifactorial inflammatory disease associated with dysbiotic plaque biofilms, characterized by destruction of the tooth-supporting tissues[1] There are several risk factors for periodontal disease such as smoking, poor oral hygiene, medication, diabetes, age, stress, and heredity[2] Periodontitis accounts for a substantial proportion of masticatory dysfunction, results in significant increased dental care costs, and has a marked negative impact on general health[1.]

Periodontal disease affects 10–15% of adult populations worldwide. In United States, recent studies suggest that periodontal disease affects 50% of population over thirty years of age and is the utmost cause of tooth loss among adults. WHO had reported incidence of 80% of periodontal diseases in Egypt 2014. Despite this high prevalence of periodontal diseases, no definite preventive measures are undertaken to screen, prevent or to address this health issue to establish a stable periodontal health protocol program[3,4].

The primary goal of periodontal therapy is to decrease the progression of periodontal disease to maintain natural dentition in health and function[5]. This goal can be accomplished by nonsurgical therapy in patients with mild‑to‑moderate periodontitis, whereas in advanced cases, particularly in the presence of

intrabony defects, surgical procedures that regenerate the supporting periodontal tissues may be employed. For the treatment of intrabony defects, a variety of therapeutic approaches, including nonsurgical, various surgical resection, and regenerative surgical techniques, have been used with varying degrees of success[6.]

Non-surgical treatment is an essential step of periodontal treatment, including patient education and instruction of oral health care, mechanical debridement which allows wound healing, and attachment gain and may allow new bone formation[7.] Non-surgical treatment may not always reduce or eliminate the anaerobic infection at the base of the deep pocket because of the anatomy of the roots, bacterial invasion into the soft tissue lining of the pocket, and dentinal tubules hamper the complete elimination of all pathogens from the periodontal pockets. In addition, recently treated sites may be re-colonized by pathogenic bacteria from other areas of the oral cavity (intra-oral translocation[8.]

Surgical intervention is considered the treatment of choice for intrabony defects, which have not resolved following completion of cause-related periodontal therapy. Such cases of deep and intrabony periodontal defects should be treated surgically by process called open flap debridement (OFD), to allow access and visibility to the diseased area for removal of all diseased tissue, and allows proper healing[9.]

Repair, represent the type of healing following OFD. It is characterized by the replacement of destructed periodontal tissue with epithelial tissue and/or connective tissue, resulting in the formation of long junctional epithelium and scar tissue. But, the healing with long junctional epithelium is weak and may be destroyed easier than normal tissue. Thus, repair is not the one of the top postsurgical healing outcomes required[9]. For this reason, dental researchers and clinicians are continuously working to develop these therapeutic outcomes in order to regenerate both the architecture and function of the damaged periodontal tissues. They demonstrated method to prevent epithelial in growth to the defect site and permit only a selective periodontal cells proliferation in attempt to regenerate all tooth-supporting tissues i.e., cementum, periodontal ligament, and alveolar bone that similarly to the originally lost periodontal tissues[10]

Using bone replacement grafts (BRGS) in the treatment of intrabony defects shows greater clinical bone defect fill than flap debridement alone[11]. Additionally, they reported that, regeneration of lost bone and attachment apparatus could be achieved by the use of bone grafts/replacement materials, root bio-modification, barrier membranes, or various combinations. Bone grafts or bone substitute materials provide a structural framework for clot development, remodeling, and maturation and aid in supporting bone formation in osseous defects[12]. Special requirements for bone grafting materials are required to obtain the ideal properties during the healing process, such as osteoconduction, osteoinduction, and osteogenesis[13.]

Bioactive glasses (BGs) are biocompatible, biodegradable, and multifunctional bone substitute materials, which have been shown to promote osteogenic, angiogenic, and antibacterial activities and are able to induce various tissue regenerative processes, including bone and periodontal tissue regeneration. The first BG (45S5 BG) with the composition 45 SiO2 , 24.5 Na 2 O, 24.5 CaO and 6 P 2 O 5 (wt%) was introduced by Prof. Larry Hench in 1969. Since the invention of 45S5 BG, numerous BGs based on silicate, phosphate, and borate compositions have been developed[14,15].

BGs trigger and enhance cellular activities in tissue regenerative processes mainly through their dissolution products (released ions, induced biomineral precipitation)[16,17]. Particularly, the released ions, depending on their type and concentration, can stimulate various biological activities to induce osteogenesis, angiogenesis as well as antibacterial and anti- inflammatory effects[16,18]. Besides the dissolution products, the morphology, surface topography, and surface chemistry of BGs can also affect cellular activities and ultimately influence tissue regeneration and therapeutic outcome[19].

Unfortunately, **Sculean et al.** reported that, using BG material in treatment of periodontal defects show only new bone formation without periodontal ligament and cementum formation, and provide repair rather than regeneration[20]. Therefore, for periodontal regeneration of intraosseous defects, root-conditioning agents, guided tissue regeneration procedures, bone replacement grafts and growth attachments factors or combination of these materials have been used with various degree of success[21.]

Growth factors play a pivotal role in periodontal regeneration. The topical uses of Platelets Rich Fibrin (PRF) have achieved great popularity in various fields of medicine, especially in dentistry, oral maxillofacial surgery, cosmetics and plastic surgery[22]. PRF is a second-generation platelet concentrate comprising of complex network of micro fibrins with entrapped platelets and leucocytes[23].

PRF membrane stabilizes the clot, prevents retraction, maintains space, and creates a consistency that resists displacement, thereby inhibiting the soft tissue invasion[24]. Also, its well‑structured, organized fibrin acts as a scaffold for migrating cells during tissue repair. Some studies have demonstrated that, although PRF accelerates the soft tissue wound closure. it does not have any positive effect on bone healing[25]. While others reported that, it improves the healing mechanisms and periodontal regeneration in intrabony defects[26]. Consequently, a question has been raised about whether the use of PRF combined with bioactive glass grafting material is a valid treatment option.

Is the use of PRF combined with bioactive glass grafting material is a valid treatment option?

The objectives of the present study were to evaluate the efficacy of regenerative potential of bioactive glass graft material and to clinically and radio-graphically assess the PRF ability to augment the regenerative ability of the bioactive glass.

II. Patients, Material And Methods

Ten patients aged between 35 and 50 years old were included in the study. They were selected from the outpatient clinic of the Oral Medicine and Periodontology department, Faculty of Dentistry, Mansoura University. This study was approved by the Internal Ethical Committee of the Faculty of Dentistry, Mansoura University by A12120219.

All participants were diagnosed stage III periodontitis grade B according to the 2018 periodontal classification with a periapical radiograph showing vertical bone loss. Split-mouth design was applied in this study to allow standardization in the evaluation of regenerative materials outcome.

Inclusion and Exclusion Criteria

Patients of both sexes with an age range of 35 - 50 years whom were diagnosed with stage III periodontitis with radiographic evidence of vertical bone defect in more than one site without a history of parafunction habits were included in the study. While, patients with systemic diseases that preclude surgical procedures (such as history of chemo or radiotherapy, heart disease, immune-compromised), pregnant or lactating females, tobacco use, horizontal bone defects, and traumatic occlusion were excluded.

All data and information about the treatment protocol, study materials, expected benefits and risks, regular follow-up visit schedules, and treatment options were discussed with all patients. They all agreed to be enrolled as participants in the study and signed a written informed consent.

Patients' Grouping:

At time of surgery, periodontal defects were divided into two groups using coin toss (10 defects each).Group I represents the control site in which grafting of bone defect was done using bioactive glass bone substitute material. While, Group II represents a test site in which grafting of the defect was done using of platelet rich fibrin as a membrane over alloplastic bone substitute material (Bioactive Glass mixed with saline solution).

Clinical Periodontal parameters

Periodontal indices (Plaque index, Gingival index, Probing pocket depth and clinical attachment loss) were evaluated for each participant at baseline and 6 months after treatment.

Radiographic evaluation

Panoramic radiographs and digital periapical radiographs with customized techniques were used to confirm the presence of vertical bone defects in each patient and also assess the defect healing after treatment

Pre-surgical phase (phase one therapy)

Before the surgical phase, phase I periodontal therapy is performed, which includes full mouth debridement, scaling, and root planing using an ultrasonic device with special tips and root planning was done using gracey curette in two visits with a one-week interval. Patients were instructed to maintain good oral hygiene by tooth brushing, flossing, and using chlorhexidine mouth wash.

All patients were re-examined after four weeks of periodontal therapy to evaluate the site of surgery, patient cooperation, and maintaining good oral hygiene and PPD and CAL were still equal to or more than 5 mm with radiographic evidence of intrabony defect presence. Patients with poor oral hygiene were excluded from this study.

Flap design

Application of an aseptic solution to the surgical site was performed by using chlorhexidine solution followed by full thickness flap elevation. After exposure of the defect site, all granulation tissue was removed using sharp scalers and curettes and ultrasonic scalers. Root bio-modification was done by using EDTA solution application on the root surface, washed by water, and then the defect site was ready for bone substitute graft application.

The periodontal defects were allocated randomly using a coin toss by a masked blind dentist into two equal groups (10 defects each) Group I represents the control site in which grafting was done using bioactive glass bone substitute material while Group II represents a test site in which grafting was done using a covering

layer of platelet rich fibrin as a membrane over alloplastic bone substitute material (Bioactive Glass). The flap was sutured by using polypropylene suture size 5/0 with vertical matrix suture.

Post-operative instructions

Patient was instructed to use of ice packs over the surgical area on the operation day and warm packs for the next two days to increase blood supply and accelerate wound healing. They were advised to avoid eating spicy food or chewing hard food to avoid micro-motion in the surgical site. Instructions to maintain optimum oral hygiene were given to all patients by using chlorhexidine mouth wash 3/day for 5 days. Then after this period, patients were instructed to use ultra-soft tooth brush bristles for additional two weeks then they resumed the standard oral hygiene procedures.

Post-operative medications were prescribed, including anti-inflammatory and analgesics were also prescribed as diclofenac potassium 50 mg tablets 2 times/day for three days with chlorhexidine mouth rinse for 2 weeks.

Post-surgical assessment

Suture removal was done after 14 days of surgery for all patients with no probing at the surgical site. Follow up for all patients each month for 6 months after surgery with regular motivation about good oral hygiene measures and make sure there are no complications related to the surgical site. After 6 months, reassessment of clinical parameters and radiographic records including digital periapical radiograph with long paralling techniques were performed using customized bite block for standardization.

Statistical Analysis

Data were tabulated, coded then analyzed using the computer program GraphPad Prism 8 software (GraphPad Software, San Diego, Canada) to obtain

Analytical statistics :

- In the statistical comparison between the different groups, the significance of difference was tested using one of the following tests -:
- Student's t-test (Paired): -Used to compare between mean of two related groups of numerical (parametric) data.
- Wilcoxon matched-pairs signed rank test: Used to compare between two related groups of numerical (non-parametric) data .
- A P value <0.05 was considered statistically significant. While P value <0.001 was considered highly statistically significant.

III. Results

Ten patients were included in the study with the split mouth technique, with a total number of twenty surgical sites. The study group included both sex- (six male patients and four female patients) with a mean age standard deviation of 31.1±2.11 years.

Table 1: Shows the demographic data of the study groups

	Study groups	
	Bioactive Glass **N=10**	**Bioactive Glass + PRF** **N=10**
Age/years **Mean±SD**	31.10±2.11	
Sex **Female** **Male**	N (%) 4(40.0) 6(30.0)	

Mean age of the studied cases is 31.1 years and split mouth design study makes no difference between both groups.

Table (2): Shows the comparison of clinical indices among studied groups and between baseline (BL) and after 6 months

	Bioactive	**Bioactive**	**P value**

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		Glass N=10	Glass + PRF N=10	
Plaque Index (PI)	BL	2.20±0.63	2.30±0.67	P2>0.9999
	T1	0.60±0.52	0.60±0.52	P2>0.9999
P value		P2=0.002**	P2=0.002**	
Percentage improvement between BL and T1		73.91%	72.72%	
Gingival Index (GI)	BL	1.5±0.71	1.5±0.71	P2>0.9999
	T1	0.6±0.52	0.4±0.52	P2=0.5
P value		P2=0.0156*	P2=0.0039**	
Percentage improvement between BL and T1		60%	73.33%	
Periodontal Probing Depth (**PPD**)	BL	7.5±0.75	7.55±0.79	P1=0.8793 t=0.1562, df=9
	T1	3.24±0.58	2.4±0.76	P1=0.034* t=2.497, df=9
P value		P1<0.0001** t=12.82, df=9	P1<0.0001** t=13.75, df=9	
Percentage improvement between BL and T1		56.8%	68.21%	
Clinical Attachment Loss (CAL)	BL	7.4±1.74	7.85±0.78	P1=0.4462 t=0.7965, df=9
	T1	3.85±0.75	3.65±1.15	P1 = 0.583 t=0.5695, df=9
P value		P1=0.0001** t=6.339 df=9	P1<0.0001** t=17.64 df=9	
Percentage improvement between BL and T1		47.97%	53.50%	
Defect Depth	BL	3.26±0.69	2.9±0.51	P1=0.2153 t=1.333, df=9
	T1	2.01±0.65	1.69±0.54	P1 = 0.2299 t=1.288, df=9
	Bone gain	1.25±0.22	1.21±0.19	P1 = 0.7022 t=0.3948, df=9
P value between BL-T1		P1<0.0001** t=18.19, df=9	P1<0.0001** t=20.01, df=9	
Percentage improvement between BL and T1		38.34%	41.72%	
Defect width	BL	2.59±0.86	2.16±0.71	P1=0.201 t=1.380, df=9
	T1	1.78±0.61	1.48±0.69	P1 = 0.2668 t=1.184, df=9
P value		P1<0.0001** t=8.440, df=9	P<0.0001** t=18.94, df=9	
Percentage improvement between BL and T1		31.27%	31.48%	

Used test: P1: Student's t-test (Paired) & P2: Wilcoxon matched-pairs signed rank test.
***p value is highly significant at level ≤0.001.*
**p value is significant at level ≤0.05.*

Statistical analysis reveals a significant decrease in PI mean value between baseline and six months in Group I (P = 0.002), with a percentage of change of 73.91%, and in Group II (P = 0.002), with a percentage of change of 72.72%. Statistical analysis shows no significant difference between groups I and II at baseline and after 6 months post-surgery (p = 0.999 each).

Statistical analysis revealed a significant decrease in GI mean value between baseline and six months post-surgery in Group I (P = 0.0156), with a percentage of change of 60%, and a highly significant decrease in the GI mean value between baseline and after six months post-surgery within group II (p=0.0039), with a percentage of change of 73.33%. Statistical analysis showed no significant difference in GI mean value between groups I & II at baseline and after 6 months post-surgery (p = 0.999 & 0.5, respectively).

Within group I, statistical analysis revealed a highly significant decrease in PPD mean value between baseline and six months post-surgery (P<0.0001), with a percentage of change of 56.8%, and within Group II (P<0.0001), with a percentage of change of 68.21%. Intergroup data analysis showed no significant difference in PPD mean value between groups I & II at baseline (p =0.8905 7) but show significant difference between the two groups after 6 months (p=0.034).

Additionally, statistical analysis showed a highly significant difference between CAL mean value between baseline and after six months post-surgery within group I (P = 0.0001), with a percentage of change of 47.97%, and within group II (P = 0.0001), with a percentage of change of 53.5%. Intergroup statistical analysis shows no significant difference between groups I and II at baseline and after 6 months post-surgery (p = 0.4462 & 0.583, respectively).

In group I, defect depth mean value was found to be highly significant decreased after 6 months post-surgical (P<0.0001), percentage of change 38.34%, and the bone gain mean value was 1.25. Additionally, it showed a highly significant difference between defect width mean values between baseline and after six months post-surgery (P < 0.0001), and percentage of change 31.27%. While in group II, intragroup analysis of the defect depth mean value was found to be highly significant decreased after 6 months post-surgical (P<0.0001), percentage of change 41.72% and bone gain mean value was 1.21. Also, it showed a highly significant difference of defect width mean value at baseline and after six months post-surgery (P < 0.0001) with percentage of change 31.48%. However, intergroup statistically analysis showed no significant difference of each of defect depth and width mean values between both groups I & II at each time period (baseline and after 6 months post-surgical) (p=0.2153 , 0.2299, p = 0.201 & 0.2668, respectively). Furthermore, it showed no significant difference of bone gain mean value between both groups I & II after 6 months post surgically (p=0.7022).

III. Discussion

Periodontitis is one of the most common chronic inflammatory diseases[4], and the sixth-most prevalent condition in the world, affecting about 50% of adults[27]. If left untreated, periodontitis leads to progressive destruction of the tooth attachment apparatus and eventual tooth loss, leading to nutritional compromise, altered speech, and affecting the overall quality of life. Thus, periodontitis poses a serious public health and socioeconomic problem.**(1)** Periodontal therapies for mild-moderate cases focused on plaque removal and local inflammation control by scaling and root planning in an attempt to minimize the symptoms and prevent the ongoing disease progression. While, for treatment of severe and unresponsive cases, additional surgical treatment became the choice, to gain access to the underlying diseased area for accurate bone defects debridement and elimination of the pocket[28,29]. However, these surgical techniques cannot restore either the attachment of periodontal tissues to teeth or the original periodontal tissues. Furthermore, the functions of teeth and dentition remain impaired after such treatments. Therefore, some regenerative materials, such as bone grafts and bone substitute materials were developed to achieve periodontal tissue regeneration and the maintenance of a healthy periodontium.[30]

Bone substitute materials such as Bioacive glass (BG) are characterized by good biocompatibility, osteoconductivity, antimicrobial activity and a porous structure promoting vascularization. Owing to the special chemical composition of BG upon exposure to body fluids during grafting, silicon ions can leach out and accumulate, forming a layer of hydroxyapatite on the surface of the material, which allows for the adherence of osteogenic progenitor cells[31,32]. The synthetic bone substitutes only possess osteoconductive properties where bone regeneration is restricted to its outer surface layer[33]. Therefore the use of biomaterials that are rich in growth factors is required to enhance bone regeneration in defects[34].

Platelet rich fibrin (PRF) provides osteoinductive properties to grafts as it represents a reservoir rich in nanosized fibrous structure, cytokines, and growth factors required for the cell-attachment. Among them, Transforming growth factor beta-1 (TGF-β1) which induces angiogenesis, chemotaxis of the immune cells, enhances osteoblast proliferation and bone deposition, together with the inhibition of osteoclasts formation and bone degeneration. Additionally, other PRF growth factors include Platelet-derived growth factor (PDGF), which is important as a regulator for the survival ,migration, and reproduction of mesenchymal cells; and Vascular endothelial growth factor (VEGF), which plays a key role in endothelial cell survival, proliferation and migration, with a resultant improvement of new blood supply in the damaged tissue[36].

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One major benefit of the split mouth design utilized in our study is that since each patient serves as his or her own control, a significant amount of the inter-subject tissue response variability is eliminated, increasing study power[36]. Patients with any medical conditions were excluded from our study. Since healing is a complex sequence of events including cellular and molecular interactions involving different subsets of cells, growth factors and cytokines, so any medical condition that may alter one of these components may impair and affect the healing process[37]. All pregnant and lactating women were excluded due to increased susceptibility to periodontal infection, owing to hormonal changes and alterations in the immune system[38]. Besides, there is a relationship between smoking and periodontitis. Smokers were also excluded, as smoking increased the proinflammatory circulating cytokine levels such as tumor necrosis factor-alpha (TNF-α), and altered the phagocytic functions of polymorphonuclear leukocytes, resulting in an increased the possibility of subgingival infection[39].

In the present study, intra-group comparison of the clinical parameters (PI and GI) in both study groups showed a significant decrease when comparing the baseline mean values to those after 6 months. This might be explained by the role of meticulous SRP performed by the operator in the pre-surgical period for all participants, together with its role in regular patients motivation about the maintenance of good oral hygiene during this follow-up period. This result was consistent with the studies conducted by **Froum et al.**[40] and **Thorat et al.** [41].

Comparing groups I & II at baseline and after 6 months, we showed a non-significant difference in clinical parameters (PI and GI). This result is in agreement with **Hazari et al.** [42]. They evaluated the effects of Novabone putty along with PRF in the treatment of intrabony defects[42]. While regarding group I the mean value of PPD, CAL after 6 months were found to be significantly decreased versus their level at baseline. This could be attributed to the immune-modulatory effect of BG on macrophages through the BG special chemical composition, pore structure and the release of active ions that have shown the impressive capability to regulate macrophage responses and create a microenvironment favourable for osteogenesis and angiogenesis. **Lovelace et al.**[43] were also in agreement with our results. They found that silver-doped BG controlled the release of ions from the material, enhancing its antibacterial properties against *Porphyromonas gingivalis (P.g)* and *Prevotella intermedia (P.i*)[43].

Additionally, **Esfahanizadeh et al.**[44] found that zinc-doped BG resulted in reduced biofilm formation for microbes associated with periodontal disease. **Bodhare et al.**[45] were also in agreement with our results, they showed probing depth and clinical attachment improvements appeared at 6 months post-surgery when BG was used as bone graft material in the treatment of periodontal intrabony defects[45].

Regarding group II, the results showed significant improvement in PPD and CAL at 6 months compared to baseline values. These could be attributed to the potential osteoconductive properties of the graft, in addition to the fact that the graft provided a mechanical support for PRF membrane, which enhances the soft tissue wound healing through the release of growth factors.

Saravanan et al. [46] conducted a clinic-radiographic study to assess the combined effect of bioactive glass and platelet-rich fibrin in treating human periodontal intrabony defects and found that there was a significant reduction in PPD and CAL at 6 months compared to baseline values. They concluded that using PRF as a scaffold along with synthetic bone graft material showed excellent biocompatibility and rapid wound healing properties in various bone defects[46].

Comparing group I & II after 6 months, we found that the PPD mean values were significantly higher in group I compared to that of group II. While CAL gain showed no significant difference between the two groups at 6 months. The deeper depth of pockets in group I could be considered residual pocket depth in comparison to group II. This residual pocket might be due to the lack of the accelerated healing provided by the PRF which was available in the second group. This result is in disagreement with **Ashawan and Zade**[47] who found changes in PPD were not quite statistically significant when compared between both groups[47].

Concerning bone defect reduction, the results showed a significant difference between baseline and after 6 months within each group. We concluded that the obtained bone could be attributed to the BG which acts as a space-making material, inhibiting apical migration of the junctional epithelium and its porous structure and promoting the new tissue vascularization, thus facilitating periodontal regeneration.

We noted that, there was a non-significant difference in radiographic bone reduction between both studied groups at the end of 6 months. This could be attributed to a lack of standardization of the defect topography, in addition to the limitation of 2D linear measurements used for evaluation of the regeneration outcomes.

Our results supported by **Ashawan and Zade** [47]. They compared the clinical and radiographic outcomes obtained by a combination of bioactive glass with PRF and bioactive glass alone in treatment of periodontal intrabony defects and reported no significant difference between the two groups at 6 months regarding bone fill.[25]

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This result is in disagreement with the results of **Bodhare et al.** [45]**.** They studied the effect of BG with and without autologous platelet-rich fibrin (PRF) in the treatment of intrabony defects and reported a significant difference between the two groups at 6 months regarding bone fill[45].

Furthermore**, Kaur et al.***[48]* agree with these study results, They tested bioactive glass with or without platelet-rich plasma. Their findings showed statistically significant PPD reduction at 3 months and CAL gain at 6 months in BG with PRP compared to BG alone, meanwhile a non- significant difference was observed in defect fill. They concluded that PRP sticky consistency, due to its high fibrin content, which works as a haemostatic and stabilizing agent for the blood clot and bone graft immobilization in the defect area[48.]

Concerning the present study, it was observed that after 6 months, the clinical periodontal indices and radiographic bone reduction had improved in both studied groups. While, there was still no statistically significant difference between the two groups. A small sample size, a short-term follow-up period and the dependence on the 2-D radiographic linear measurement, are among the limitations that was confronted our team work which may hinder the proof of the significant difference expected in this study.

IV. Conclusion

Based on the results of this study, it was concluded that PRF is an autologous, biocompatible, economic and easily prepared material when used with bone graft material help in promoting better clinical outcomes and wound healing.

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Mohamed M.Fathi, et.al. "Is the use of PRF combined with bioactive glass grafting material is a valid treatment option?
." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 21(08), 2022, pp. 33-41