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A Comparative Study to Evaluate the Efficacy of PRF and Curcumin in Healing of Extraction Socket- A Clinical Study

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ABSTRACT

Background: Platelet Rich Fibrin (PRF) consists of an autologous leukocyte-platelet-rich fibrin matrix composed of a tetra molecular structure, with cytokines, platelets, cytokines, and stem cells within it which acts as a biodegradable scaffold that favors the development of microvascularization and is able to guide epithelial cell migration to its surface. Recently, curcumin has been extensively studied for its application as an anticancer, antinociceptive, antiinflammatory, antiaging and wound-healing agent. The purpose of this study was to compare the efficacy of platelet-rich Fibrin (PRF) and curcumin for reduction of pain and swelling, absence of dry socket, soft tissue healing, and bone regeneration after mandibular third molar extraction in human patients. **Methods**: A total of 40 patients were included in the study and randomly distributed into 2 groups with 20 patients each. PRF gel prepared from 10 ml of patients own blood was placed into the extraction socket in 20 patients while curcumin paste prepared with distilled water was placed in other 20 patients. **Results**: Presence of inflammation was comparatively more in patients treated with curcumin (02%), followed by those treated with PRF (0%). Chi-square test was applied, and the results were found to be statistically significant. no infection was present in patients treated with PRF followed by those treated with curcumin (05%).**Conclusion**: PRF is a promising biomaterial for definite improvement and faster regeneration of bone after exodontia procedure

Keywords: PRP, Curcumin, Alveolitis, Dry Socket, Tooth extraction, Extraction socket healing.

INTRODUCTION

Extraction of teeth is a routine clinical procedure carried out prevalently both by an oral and maxillofacial surgeon and a general dental practitioner. Wound healing post extractions can be delayed by the presence of infection which, in turn, has been countered by antibiotics and their current trends.

There are several allografts, xenograft or alloplastic graft materials commonly used for bone regeneration procedures like freeze dried bone grafts, demineralised freeze dried bone grafts, hydroxyapatite, bioactive glass etc. which have shown to possess good osteoinductive and osteoconductive properties, but the risk of disease transmission and unpredictable outcome many a times, led to search of materials which can independently produce predictable regeneration or can improve properties of these graft materials.

platelet-rich fibrin (PRF) was developed by Choukroun et al in 2001. [1] Since then Chokroun's PRF has found clinical applications in bone reconstruction procedures (Mazor et al 2009), treating residual extraction sockets and for root coverage in case of gingival recession.[3]

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turmeric has been established as an effective modality for management by local delivery. Various authors have established their efficacy in relation to surgical wound healing and periodontal conditions. [2-7] Herbal extracts have been found to be effective when it comes to regenerative periodontal therapy.

MATERIALS AND METHODS

The present study was undertaken at the department Dentistry, Hind Institute of medical sciences Ataria, Sitapur (UP) after obtaining ethical clearance from the Institutional Ethics Committee. This study involved both male and female patients, who were referred to the department of Dentistry for extraction of tooth. Complete history of all the patients was taken and thorough clinical examination and

investigation was done to rule out any systemic problem. Patients in the age group 18 years and 40 years undergoing exodontia procedures included while patients with contraindication for local anaesthesia or surgery, periodontally compromised, with uncontrolled medical conditions, platelet disorders or patients with history of platelet disorders and those having deleterious habits (tobacco/kharra/khaini chewing and smokers) excluded from this study.

A total of 40 patients were included in the study and randomly distributed into 2 groups with 20 patients each.

Preparation of PRF & Curcumin paste:

10 ml of the venous blood was withdrawn from the peripheral veins of the upper limb and collected in a pre-sterilized test tube without an anticoagulant and centrifuged immediately at 4000 rpm (approx) for 10 minutes. The PRF clot so formed was retrieved from the test tube, and immediately placed in empty extraction socket. [Figure 1,2]. Primary closure was done with 3-0 silk suture.

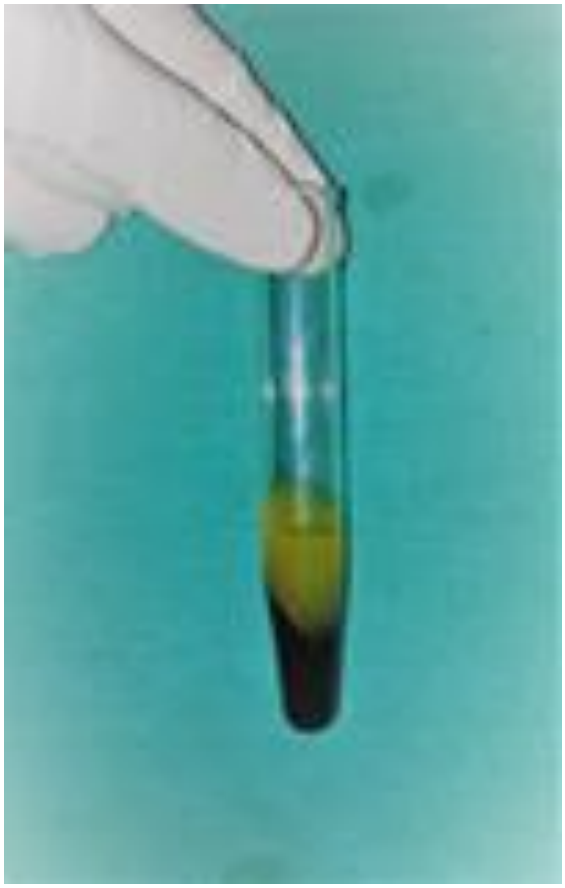

Figure 1: Centrifuged PRF in test-tube

Figure 2: PRF gel ready to place in extraction socket

A total of 100 g of turmeric block was acquired and ground using mortar and pestle and a paste was prepared with distilled water which was then introduced into the extraction socket.

RESULTS

Table 1: Individual values represent the mean of pain rating of visual analog scale on days 1, 3, and 7 postextraction

Pain (VAS)	PRF	Curcumin	Total
≤5.00	15(n=75)	10(n=50)	25(n=62.5)
5.01-6.00	4(n=20)	5(n=25)	9(n=22.5)
6.01-7.00	1(n=5)	4(n=20)	5(n=12.5)
>7	0(n=0)	1(n=5)	1(n=2.5)
Total	20	20	40

VAS= Visual analog Scale, n= (%)

The mean of pain severity for 3 days was averaged, and patients grouped as shown in [Table 1]. The average pain severity was found to be the high in curcumin followed by. This order of pain relief was also proved statistically using one-way ANOVA test obtaining a value of $P < 0.0001$.

Table 2: Assessment of inflammation

Inflammation	Frequency (%)	
	PRF	Curcumin
Absent	20 (100%)	18 (90%)
Present	00(0%)	02 (10%)
Total	20	20

Inflammation was assessed in the patients on the postoperative day 3 and the results are shown in [Table 2]. It was observed that presence of inflammation was comparatively more in patients treated with curcumin (02%), followed by those treated with PRF (0%). Chi-square test was applied, and the results were found to be statistically significant.

Table 3: Assessment of infection

Infection	Frequency (%)	
	PRF	Curcumin
Absent	20(100%)	19(95%)
Present	00(0%)	01(05%)
Total	20	20

Infection was also assessed in the patients on the postoperative day 3 and the results are shown in [Table 3]. It was observed that no infection was present in patients treated with PRF followed by those treated with curcumin (.05%). Chi-square test was applied, and the results were found to be statistically insignificant.

Table 4: Assessment of wound Dehiscence

Wound Dehiscence	Frequency (%)	
	PRF	Curcumin
Absent	20 (100%)	20 (100%)
Present	00 (0%)	00 (0%)
Total	20	20

Wound dehiscence was observed on the postoperative days 7, 14, and 21. No wound dehiscence was observed in patients treated with PRF and Curcumin.

DISCUSSION

Platelet rich fibrin was first described by Choukroun et al. in France. It has been referred as second generation platelet concentrate, PRP being the first. Dohan and Diss presented a report of clinical trials comparing the growth factor content of PRP and PRF at the Second International Symposium on growth factors in May 2006.[8] Combining the growth factors has been shown to accelerate bone repair and promote fibroblast proliferation, and increase tissue vascularity, rate of collagen formation, mitosis of mesenchymal stem cells and endothelial cells, as well as osteoblasts, playing key roles in the rate and extent of bone formation.[4]

PRF is in the form of a platelet gel and can be used in conjunction with bone grafts, which promotes wound healing, bone growth and maturation, graft stabilization, wound sealing and hemostasis and improves the handling properties of graft materials. PRF can also be used as a membrane. Choukroun J et al, 2006,[8] published an article describing the method of preparation of PRF without an anticoagulant. Because of the absence of an anticoagulant, blood begins to coagulate as soon as it comes in contact with the glass surface. Therefore, for successful preparation of PRF, speedy blood collection and immediate centrifugation, before the clotting cascade is initiated, is absolutely essential. In the present study, Choukroun's method was used for the fabrication of the PRF gel since this method was simple, less technique sensitive, without use of chemical additives and less time consuming. In a number of previous studies, PRF was used in combination with other bone substitute materials to realize its osteogenic effects,[9,10] but it has been uncommon to use it separately for tooth extraction site preservation. In the present study, PRF was used alone in the extraction socket as a biological material.

Curcumin is antimutagenic, anticarcinogenic, antioxidant, antibacterial and used in dental caries, oral lichen planus, gingivitis, halitosis, pit and fissure sealant, dental plaque detection. Turmeric is used widely – periodontal treatment, surgical wound healing, anti-cancer effect, and antioxidant effect. Habibolleha reported better efficacy in the healing of surgical wounds when curcumin compared with hyaluronic acid. It has been shown to regulate the release of interleukin 6 to control the resorption of bone, which has already been concluded in various studies.[2-7]

CONCLUSION

The study clearly indicates PRF to be a promising biomaterial for definite improvement and faster regeneration of bone after exodontia procedure. In accordance with the result of this study, it can be stated that PRF seems to be more effective than curcumin in osseous healing, though a larger sample size and a longer follow-up would yield a better picture which may further elucidate the present outcome.

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