

**“COMPARATIVE EVALUATION OF GELATAMP (GELFOAM
WITH COLLOIDAL SILVER) VERSUS PLATELET RICH
FIBRIN ON POST OPERATIVE OUTCOMES AFTER INTRA-
ALVEOLAR DENTAL EXTRACTION OF MOLARS - A
RANDOMISED CONTROL TRIAL”**

By

REG.NO. – IF0220005

Dissertation

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**KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH,
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LIST OF ABBREVIATIONS

Pre-op	:	Preoperative
M	:	Male
F	:	Female
OPG	:	Orthopantomogram
VAS	:	Visual Analog Scale
Hb	:	Serum Hemoglobin
BT	:	Bleeding time
CT	:	Clotting time
RBS	:	Random Blood Sugar
IOPA	:	Intra-oral peri-apical radiograph
INR	:	International Normalized Ratio
IV	:	Intra-venous
PRF	:	Platelet Rich Fibrin

ABSTRACT

Background and Objectives: The secret of successful practice in exodontia always lies in proper diagnosis, successful anesthesia, surgical skills and the post-operative management. Improper post-operative care can lead to delayed wound healing which in turn can result in pain and dry socket. This study was designed to assess and compare the efficacy of Gelatamp and PRF on post-extraction outcomes following extraction of molar teeth.

Materials and Method: The study was conducted on 57 patients who reported to the Department of Oral and Maxillofacial Surgery, KLE VK Institute of Dental Sciences, K.A.H.E.R, Belagavi and fulfilled the inclusion criteria. The ethical clearance for conducting this study was obtained from institutional ethical board before commencement of the study. A total of 57 randomly selected patients requiring similar molar tooth extraction in were included. Following tooth extraction, in 19 extraction sockets Gelatamp was placed, in the remaining 19 extraction sockets PRF was placed, while the control sites were only prescribed with analgesics (paracetamol 650 mg). Patients were instructed to record the pain scores and number of analgesics consumed on day 1, day 3 and day 7 on the standard numerical scale (VAS) given to them after extraction. Wound healing was assessed on postoperative day 3 and day 7. Bleeding from extraction socket was assessed after the 1st hour and the 24th hour. Statistical analysis was performed using the Chi-square test, One way ANOVA, Kruskal Wallis ANOVA, Mann-Whitney U-test and Wilcoxon matched pairs test.

Results: Pain relief experienced by patients in PRF group was significantly better than control group on day 1, day 3 and day 7. Pain relief experienced by patients receiving Gelatamp was also significantly better than control on Day 7. Even though a difference was noted on Day 1 and Day 3, it wasn't significant statistically.

The results of pain control by PRF and Gelatamp group were comparable.

When assessing soft tissue healing, there was a significant difference between PRF and control group; Gelatamp and control group on both Day 3 and Day 7.

The results between Gelatamp and PRF were not significantly different.

Conclusion: Gelatamp's analgesic and anti-inflammatory properties can be used effective alternative to NSAIDs to avoid possible adverse effects associated with its use following atraumatic dental extraction. It can also be used as an alternative to PRF and we can avoid the process of withdrawing patients blood and centrifuging it as this procedure is cumbersome and tends to cause distress to the patient.

Keywords: Gelatamp, tooth extraction, wound healing, colloidal silver, Platelet-rich fibrin

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INTRODUCTION

Exodontia, also called as tooth removal has been defined by Geoffrey Howe as “painless removal of a whole tooth/tooth root, with minimal trauma to the investing tissue, so that the wound heals uneventfully and no postoperative prosthetic problem is created.”^[1] As the definition suggests in itself, the primary aim during removal of tooth is to retrieve the tooth and perform the procedure in a painless way with minimal trauma such that the soft tissue and the bone heals uneventfully and rapidly. This will promote a quick prosthetic rehabilitation.

Healing of extraction socket depends on method of extraction, degree of trauma to hard and soft tissues of the socket, infection, patient’s general condition and post-operative care. To facilitate the same, surgeon attempts to remove these obstacles in healing by opting for methods such as prescribing antibiotics, employing techniques of primary debridement and closure of wound, etc.

An extraction socket heals by secondary intention i.e., there is filling of the defect formed (extraction socket) with granulation tissue and connective tissue.^[2]

For easy understanding; the events in healing such as “coagulation, inflammation, re-epithelialization, granulation tissue, matrix and tissue remodelling” have been broken down by authors into three distinct but overlapping phases namely: “inflammatory phase, proliferative phase, and remodelling phase.”^[2]

The initial inflammatory phase lasts for approximately three to five days.^[2]

A platelet plug is formed in the form of a fibrin matrix in the very first 24-48 hours. The clot maintains haemostasis and offers a temporary matrix for migration of

cells during the healing process. The clot also acts as a storage site for cytokines as well as the growth factors which are produced after the degranulation of activated platelets. Once haemostasis is achieved, vasodilation replaces this period of vasoconstriction. This process is intermediated by factors such as “histamine, prostaglandins, kinins, and leukotrienes”.^[2]

This has comparable clinical signs such as pain, redness, heat, and swelling.^[2] These clinical symptoms cause patient discomfort in the initial 3-5 days post-extraction.^[2] To help the patient with these symptoms, doctors frequently prescribe antibiotics and analgesics.

However, since the past two decades not only there has been a shift in focus towards actively promoting healing than just attempting to remove obstacles that may impact healing, but also there has been a change of perspective and attempts have been made to minimize use of oral/IV antibiotics and analgesics as much as permissible.

To achieve this, focus has been shifted to meet the biomechanical and biological requirements of healing and the use of various biomaterials and medicaments have come into play. There is constant research going on to come up with materials that can be directly placed into the extraction socket which not only relieve the post-operative symptoms of inflammation of the patient but also accelerate the process of healing.

Platelet rich fibrin is one such material that has been extensively explored during the past 20 years. It is a second-generation platelet concentrate obtained by centrifuging patient’s blood.^[3-5] It is theoretically nothing but platelets trapped in a

fibrin mesh and is rich in factors such as “platelet-derived growth factors namely PDGF $\alpha\alpha$, PDGF $\beta\beta$, and PDGF $\alpha\beta$ ”, “transforming growth factors- β namely TGF β 1 and TGF β 2”, “vascular endothelial growth factor (VEGF)”, and “epithelial growth factor (EGF)”.^[3, 4, 6] Haemostasis is known to be regulated mainly by these factors. Additionally, placing this fibrin mesh in the extraction socket has shown to accelerate healing as well.^[6-9]

A systematic review conducted by Maawi et al. also yielded results supporting that PRF aids in reduction of pain post-operatively and accelerates healing of soft tissues.^[10] However, they found an increased risk of bias in relation to parameters such as blinding of participating patients and operating surgeon. Bias was found in the parameter of blinding the person assessing outcomes as well.^[10] Hence, we felt that there was a need for well-designed blinded randomised control trial for better understanding of the effect of PRF on healing and post-operative symptoms.

Another material that has been recently introduced in the market is Gelatamp (silver colloid gelfoam). Gelatamp is an aggregation of gelatin sponge present in 95% concentration and finely dispersed colloidal silver present in 5% concentration.^[11, 12]

Gelatin sponge/Gelfoam is a sterile dressing that is made of absorbent gelatin sponge. The gelfoam's mode of action is such that it forms a mechanical matrix that promotes clotting. This is because the sponge can hold blood up to several times its weight and hence it can provide a stable scaffold for formation of clot.^[11, 13] Physicians have been known to treat external infections with ointments and gels containing silver nanomaterials or silver sulfadiazine (Ag-SD) as an ingredient over several years now as silver is known to kill germs in external wounds in live

tissue. ^[11] The recent rise in antibiotic-resistant microorganisms has increased the need for wound dressings containing silver.

William made a suggestion that addition of an anti-microbial/anti-septic material to the gelatin sponge can be beneficial for intra-oral healing. ^[11] He found that topical antimicrobial agents and such biomaterials can drastically decrease the incidence of alveolar osteitis i.e., dry socket. This led to the formulation of silver infused gelatin sponge i.e. gelatamp.

Recent attempts have been made to evaluate the role of Gelatamp in wound healing, haemostasis and in reducing post-operative complications. The results obtained have been positive. ^[11, 12, 14, 15] However, the literature is sparse and there is a need for further clinical trials to study the material in depth.

Hence, this study was hypothesised so that we can evaluate as well as draw a comparison between the role of Gelatamp and PRF in haemostasis, post-operative pain and post-operative wound healing.

AIM OF THE STUDY:

To assess and compare the efficacy of Gelatamp, PRF and conventional method on post-extraction outcomes following intra-alveolar extraction of molars.

OBJECTIVES:

After the extraction of teeth:

- To assess and compare the efficacy of Gelatamp, PRF and control group in reducing post-operative pain and bleeding following extraction of molars.
- To assess and compare the efficacy of Gelatamp, PRF and control group in socket and soft tissue healing.

RESEARCH HYPOTHESIS

Null hypothesis: There is no reduction in post-operative pain, presence of bleeding and no improvement in socket and soft tissue healing in the study groups.

Alternate hypothesis: There is reduced post-operative pain, absence of bleeding and improvement in socket and soft tissue healing in the study groups.

REVIEW OF LITERATURE

In a study published in **2011, Omania Hassan et al.** compared the effects of colloidal silver in gelatamp with gelatin sponge (gelfoam) on postoperative sequelae (pain, trismus, edema, and postoperative infection) following surgical removal of an impacted lower third molar. In terms of edema and trismus, it was discovered that there was no statistically significant difference between the three groups; however, the Gelatamp group had the statistically significant lowest mean number of analgesic tablets ingested within the first 48 hours postoperatively. After surgical removal of an impacted mandibular third molar, it was found that Gelatamp, which contains colloidal silver, performs better than Gelfoam combined with systemic antibiotics, at minimizing postoperative infection and consequently, pain.

In a comparative study, **Tejesh Yelamali et al. (2014)** examined the effects of PRP and PRF in impacted third molar sockets. It was carried out as a split-mouth experiment. The data for healing of bone was recorded after 4 months with the help of digitalized orthopantomogram pictures created in Adobe Photoshop CS. The data for healing of soft tissue was recorded after 1 week with the help of the healing index given by Landry et al. They came to the conclusion that PRF exhibits greater soft tissue and hard tissue healing qualities than PRP, and PRF was linked to a more straightforward and superior source of platelet concentrate than PRP.

In a clinical trial published in **2015, Maani S. et al.** assessed the impact of Gelatamp in patients who were taking anticoagulants. Post-operative healing, pain, and bleeding were evaluated as parameters. Regarding any of the evaluated parameters, there wasn't any notable difference between the study and the control groups. The authors did note, however, that Gelatamp was discovered to be a useful

material as a local hemostatic agent for patients on anticoagulants following extraction without interfering with their medication (within the INR's therapeutic range).

A systematic review was carried out by **Faez Saleh Al-Hamed et al.** published in **2017**. The study's objective was to study the efficacy of PRF on the healing of extraction socket following the removal of the lower third molars. The review comprised of 6 studies. It reported inconsistent findings regarding the impact of PRF on post-mandibular third molar extraction pain, edema, trismus, and pocket depth. Additionally, it emphasized how PRF had no impact on bone repair. Only one study mentioned PRF's beneficial effects on soft tissue repair. However, a considerable risk of bias was found in the study. The authors recommended additional randomized control trials with substantial sample sizes to assess the function of PRF.

Rahul Sharma et al. conducted a research in **2019** to study the efficacy of PRF on osseous regeneration and soft tissue healing in individuals who had their impacted third molars surgically removed. Patients were monitored clinically and radiographically throughout the research. The VIXWIN PRO programme was utilized to assess the pain score, presence of infection, graft exudation, soft tissue healing and bone healing. The study found that there were unquestionable clinical benefits for soft tissue healing, however the increase in osseous quantity in the test group could only be seen during the second month.

In a study published in **2019**, **Hala R. Ragab et al.** examined the impact of Gelatamp and Chitosan on hemostasis, post-operative pain, and wound healing in patients taking anticoagulants. They came to the conclusion that Gelatamp and Chitosan both offered acceptable bleeding control in patients taking anticoagulants

without changing the dosage of the medication, with Gelatamp demonstrating a superior hemostatic effect in the immediate post-extraction phase. Regarding healing and postoperative pain, there wasn't any difference significant enough between the two groups.

In **2021**, **Noha Ahmed Mansour et al.** investigated the anti-hemorrhagic as well as healing abilities of Platelet rich fibrin, Gelatin sponge and Tranexamic acid after tooth extraction in patients who are on anticoagulant medications. At various follow-up intervals, pain, socket healing, and immediate and delayed postoperative bleeding were evaluated. According to the study's findings, PRF possessed strong anti-hemorrhagic properties. It reduced the chance of infection, improved tissue healing and wound closure, and reduced post-operative pain.

Sara Al-Maawi et al. carried out a comprehensive systematic review in **2021** with the goal of compiling the information on the application of PRF in extraction sockets. "What is the effectiveness of PRF in the prevention of pain and the regeneration of soft tissue and bone compared to the corresponding control without PRF treatment?" was the review questions. This systematic review, which included 20 articles in total, came to the conclusion that PRF is helpful in lowering pain post-operatively, healing of intra-oral soft tissues, and avoiding bone loss, particularly during first 2-3 months.

MATERIAL AND METHOD

The study was conducted in the Department of Oral and Maxillofacial Surgery, KLE VK Institute of Dental Sciences, K.A.H.E.R, Belagavi. The ethical clearance for conducting this study was obtained from institutional ethical board before commencement of the study.

STUDY DESIGN: Prospective Double Blind Randomized Controlled Clinical Trial.

DURATION OF STUDY: December 2020 - November 2022.

SAMPLE SIZE: Patients who met the inclusion criteria and reported to the department of Oral and Maxillofacial Surgery were included in the study.

SAMPLE SIZE ESTIMATION:

$$n = 2S^2/d^2 (Z_\alpha + Z_\beta)^2$$

$$S_1 = 0.7, S_2 = 0.5$$

$$d = x_1 - x_2 = \text{acceptable /margin of error}$$

$$n = 17 \text{ in each group} + 10\% \text{ extra}$$

$$= 19$$

where

$$Z_\alpha = 2.58 \text{ at } 1\% \alpha\text{- error (99\% confidence)}$$

$$Z_\beta = 1.682 \text{ at } 5\% \beta\text{- error (95\% power)}$$

SELECTION OF SUBJECTS: A total of 57 randomly selected patients requiring intra-alveolar teeth extraction of molars were included.

The patients requiring intra-alveolar extraction of molars were randomly divided into 3 groups by computer generated random allocation.

Group A- 19 extraction sites received Gelatamp post-operatively in the extraction socket.

Group B - 19 extraction sites received PRF post-operatively in the extraction socket.

Group C- 19 extraction sites did not receive any material.

INCLUSION CRITERIA:

- Patients between 18 to 65 years with molar teeth advised for extraction.
- Patients requiring intra-alveolar extraction of molars (excluding 3rd molar).
- Patients willing to give informed consent.

EXCLUSION CRITERIA:

- Medically compromised patients.
- Impacted teeth/ teeth requiring open extractions.
- Patients who had undergone antibiotic therapy or any other medication therapy in the preceding two weeks or patients with active infection requiring antibiotic therapy.
- Patients who have known history of allergy to the materials or medications used.
- Pregnant or lactating women.
- Smokers.
- Patients not willing to participate in the study or patients not willing to come for post-operative follow-up.

PROCUREMENT OF MATERIAL

1. GELATAMP- Obtained from Roeko Coltene Ltd.
2. PLATELET RICH FIBRIN- Prepared using Choukroun's method of preparation of PRF.[3]

METHOD OF PREPARATION OF PRF

Armamentarium used:

1. Blood collection kit including 26-gauge needle
2. 10 ml blood collecting tube
3. Centrifugation machine

Preparation of PRF[3]:

1. 10 ml of patients own blood was withdrawn into the collection tube without any anticoagulant in it. It was immediately centrifuged in the centrifugating machine at 3000 rpm for 10 min.
2. After which the blood was separated into the three layers named below:
 1. Topmost layer being acellular plasma, the middle fraction containing PRF, and the red-coloured lower half containing red blood cells (RBCs).
 2. The upper layer was removed and the middle layer of PRF was retrieved from 2 mm below the dividing line.
 3. The PRF obtained was divided into two halves. One was placed between two wet sterile gauze and made into a membrane and other was used as it is.

FIGURE 1: PREPARATION OF PLATLET RICH FIBRIN (PRF)

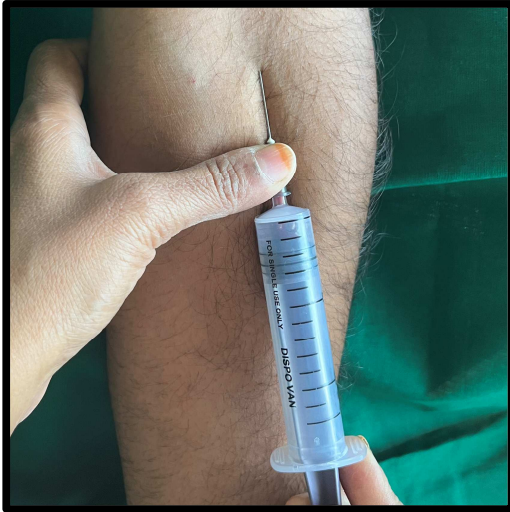


Figure 1a: Withdrawal of patient's blood



Figure 1b: Centrifuged blood showing three distinct layers, middle one being PRF

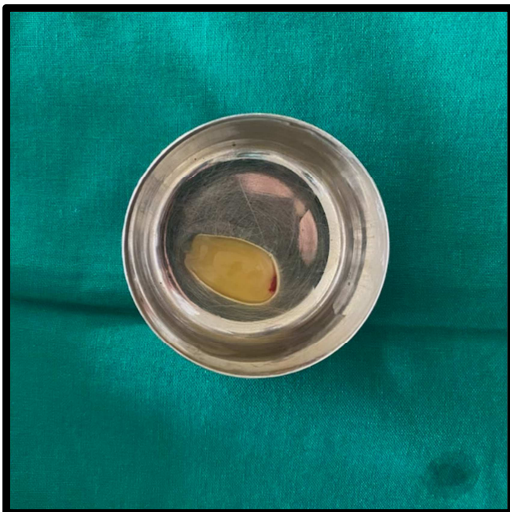


Figure 1c: Separated PRF

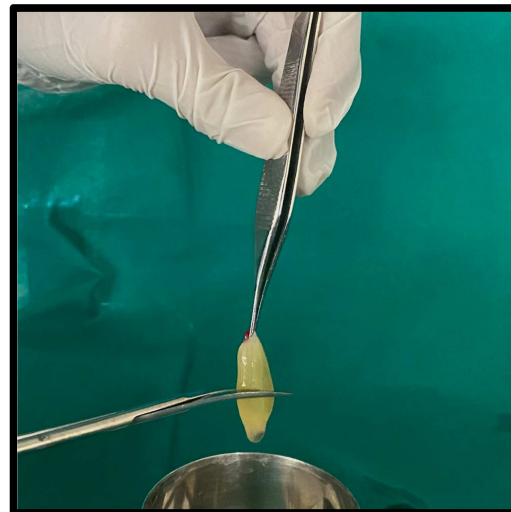


Figure 1d: PRF being divided into two equal halves



Figure 1e: PRF placed between two sterile wet gauze to make a PRF membrane

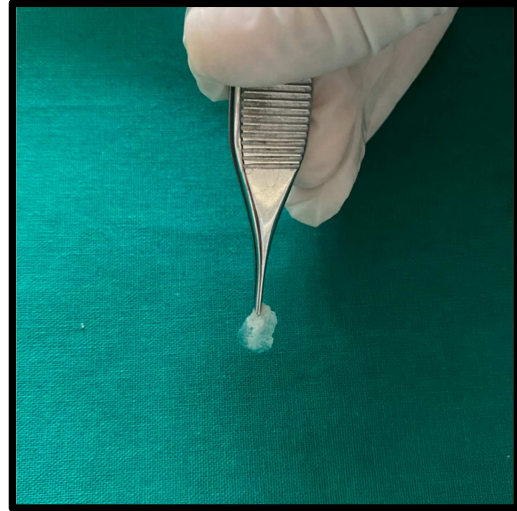


Figure 1f: PRF membrane

INSTRUMENTS AND MATERIALS:

- Surgical gloves
- Kidney tray
- Mouth mirror
- Probe
- 2ml disposable syringe
- Periosteal and straight elevators
- Upper and lower molar forceps and cowhorn forceps
- Bayonet forceps
- Curette
- Bone file
- Gauze
- 3-0 silk suture and suturing needle
- Needle holder
- Tissue forceps
- Suture cutting scissors
- Gelatamp and
- PRF

RANDOMISATION AND ALLOCATION OF SUBJECTS

Patients were allotted to each group by randomisation which was done by a computer generated allocation method. Blinding of patient as well as the evaluator of outcomes was done for each group to conduct a double blind randomized control trial. Assigned patients underwent the surgical procedure in our unit by the same surgeon.

FIGURE 2: INSTRUMENTS AND MATERIALS

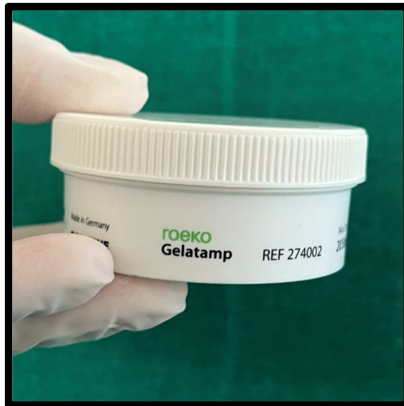


Figure 2a: GELATAMP

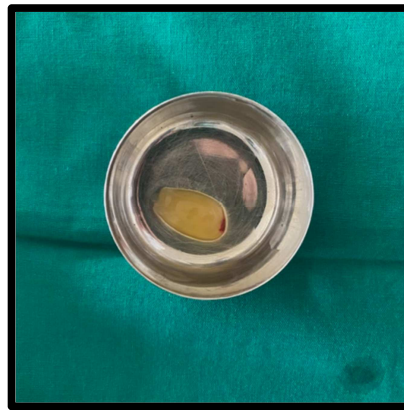


Figure 2b: PRF

PRE- OPERATIVE ASSESSMENT

A thorough case history, routine blood investigations and radiographic investigations were done for all the patients of all three groups.

INVESTIGATIONS DONE

- Random blood sugar level
- Hemoglobin level
- Bleeding time
- Clotting time
- X-rays: IOPAR or OPG

SURGICAL PROTOCOL

- Regional anaesthesia was given by infiltrating or blocking the nerve with 2% lignocaine plus adrenaline 1:80,000.
- Extraction of teeth was done by conventional method of intra-alveolar extraction. All asepsis protocols were followed.
- Gelatamp was placed in-case of patients in group A and PRF was placed in-case of patients in group B. No intervention was done for group C.
- Suturing was done with 3-0 silk sutures in all patients.
- A pressure pack was placed on the extraction site.
- All patients received usual post-extraction instructions and post-operative medications (Paracetamol 650mg, SOS).

Following parameters were assessed:

PARAMETER	DAY OF ASSESSMENT	SCALE BEING USED FOR ASSESSMENT
1. BLEEDING	After 1 hr, after 24 hrs	Bleeding scale[16]
2. PAIN	1 st day, 3 rd day, 7 th day	No. of analgesics taken[11], Visual analogue scale[17]
3. SOFT TISSUE HEALING	3 rd and 7 th day	Landry and Turnbull healing index[8]

PARAMETERS ASSESSED

1. Post-operative pain score: Self –reported pain score was measured with the help of a Visual analogue scale of 0-10. (ANNEXURE V)

Patients were also asked to record the number of analgesics consumed by them on the 1st, 3rd and the 7th day post-operatively. Patients were given a proforma to record their readings. (ANNEXURE V)

2. Healing of socket:

Healing of socket was assessed using the **Landry and Turnbull Index** on 3rd and 7th post-operative day.[8] (ANNEXURE V)

3. Bleeding:

After 1 hour of the procedure pressure pack was removed and the type of bleeding such as absence, presence, oozing, or aggressive bleeding in the socket was assessed and noted.

After 24 hrs, all the participants were asked to report to the centre if there was any uncontrolled bleeding.

Status of bleeding was asked by the evaluator over a telephonic conversation with the patient after 24 hrs.

A standard bleeding scale was used to assess post-operative bleeding.[16]
(ANNEXURE V)

STATISTICAL ANALYSIS

Statistical analysis of the study was done with the help of SPSS software. The statistical tests that were employed were:

1. Chi-square test
2. One way ANOVA
3. Kruskal Wallis ANOVA
4. Mann-Whitney U-test
5. Wilcoxon matched pairs test

Level of statistical significance was set at $P < 0.05$

FIGURE 3: PLACEMENT OF PRF IN EXTRACTION SOCKET

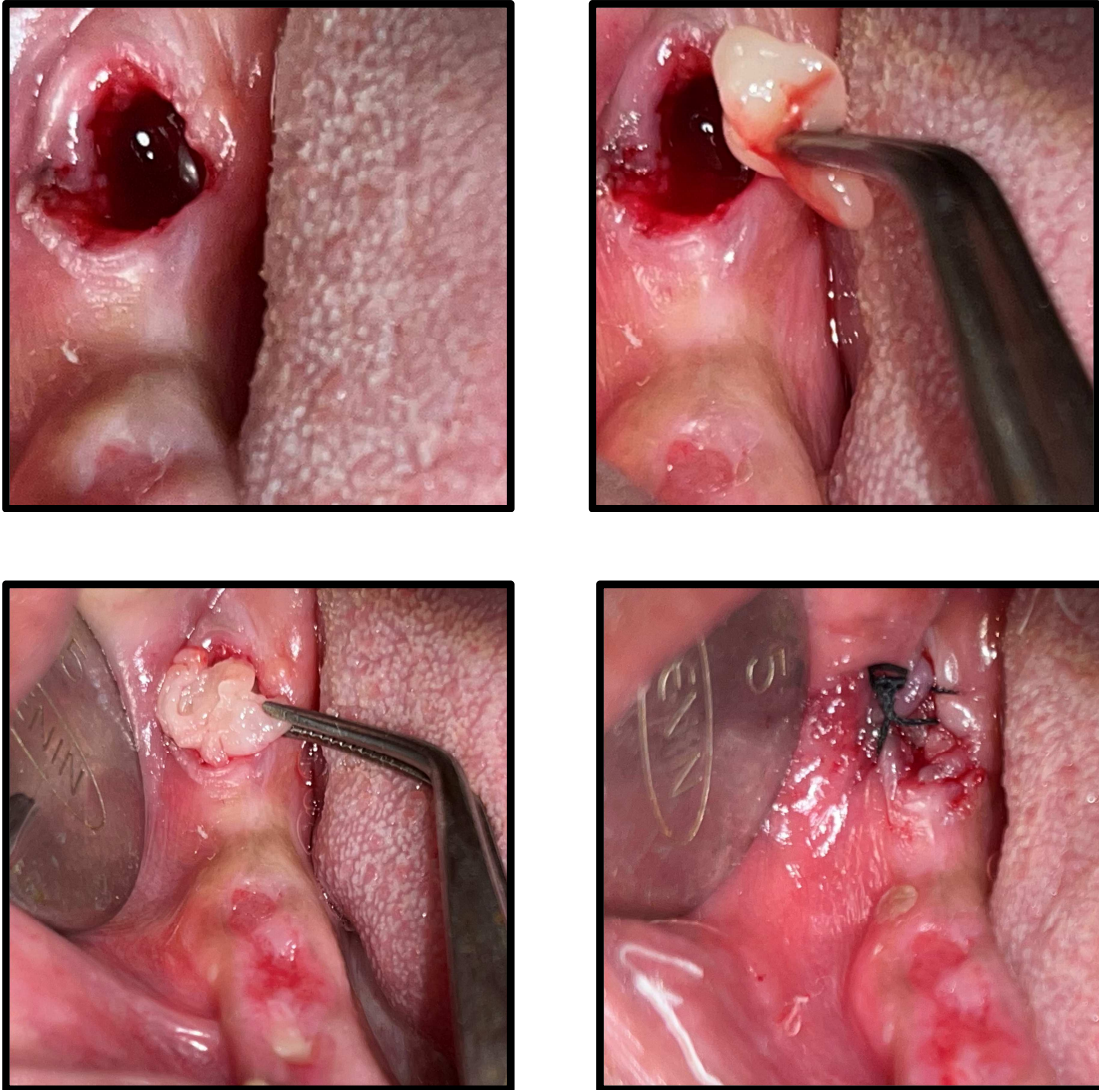


FIGURE 4: PLACEMENT OF GELATAMP IN EXTRACTION SOCKET

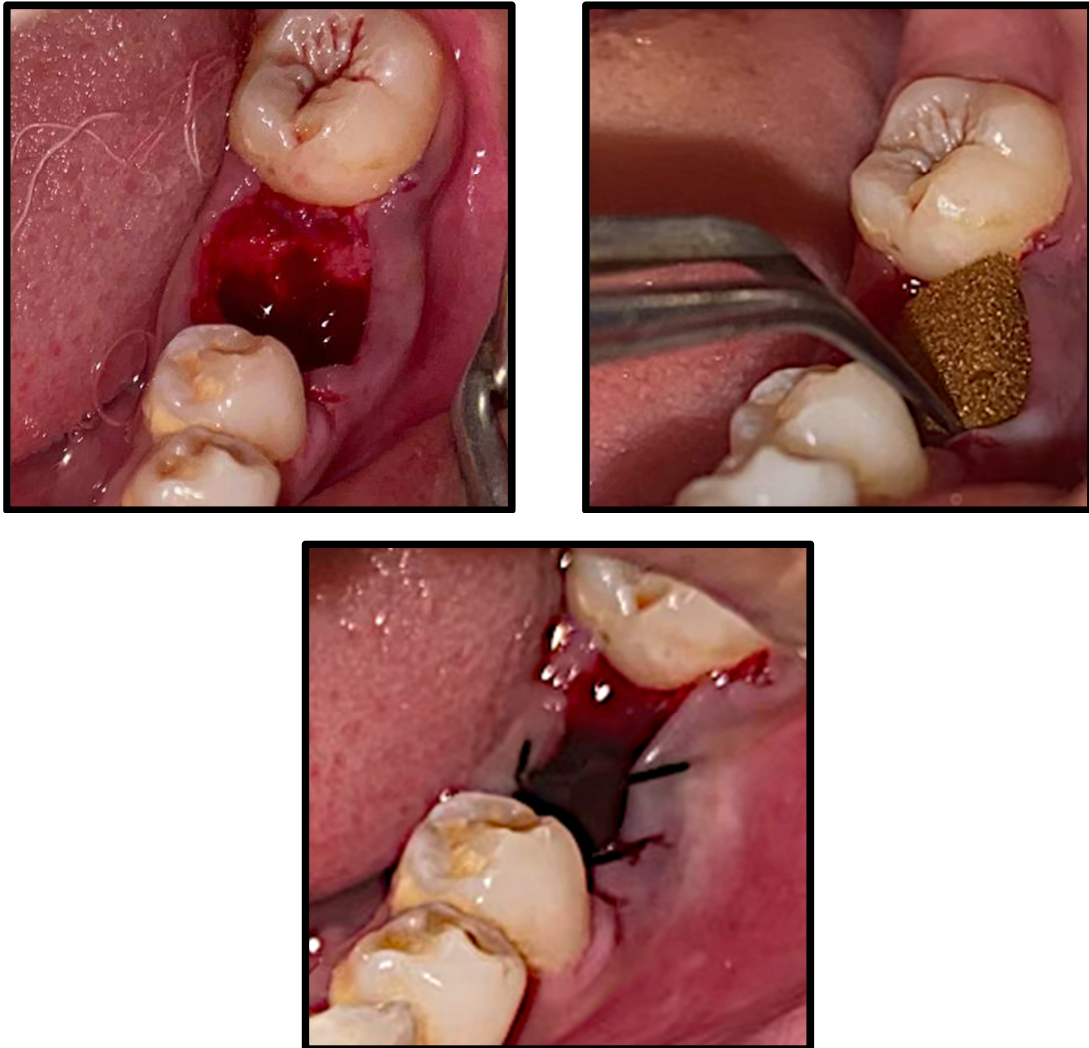


FIGURE 5 : GELATAMP GROUP



Figure 5a: Post-extraction socket with Gelatamp placed in the socket

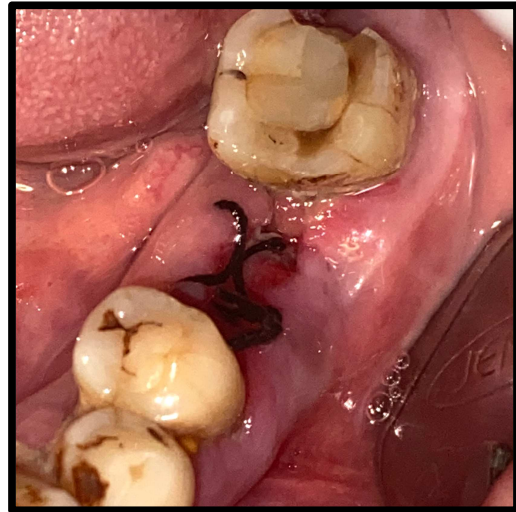


Figure 5b: Follow-up Day 3

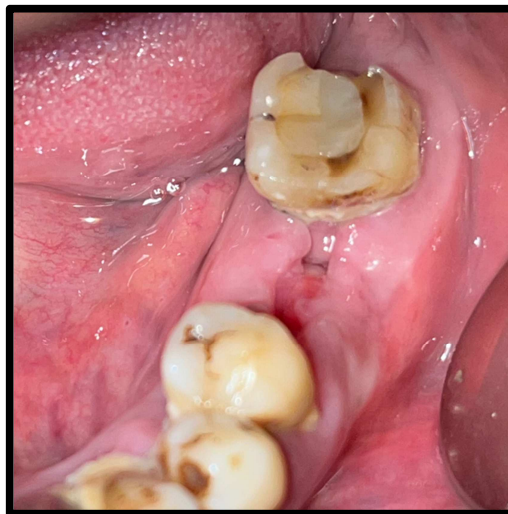


Figure 5c: Follow-up Day 7

FIGURE 6: PLATELET RICH FIBRIN GROUP

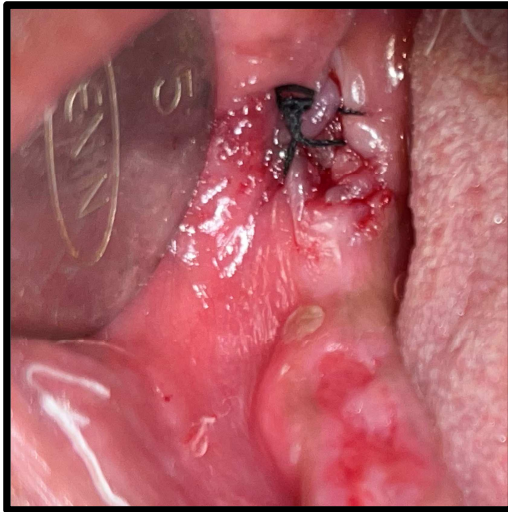


Figure 6a: Post-extraction socket with PRF placed in the socket



Figure 6b: Follow-up Day 3



Figure 6c: Follow-up Day 7

FIGURE 7: CONTROL GROUP

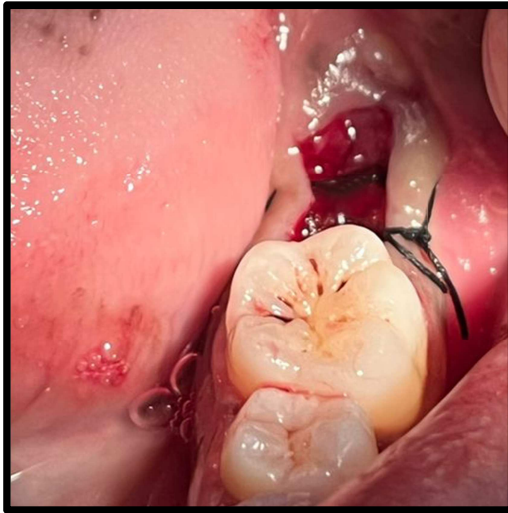


Figure 7a: Post-extraction socket with no material placed in the socket

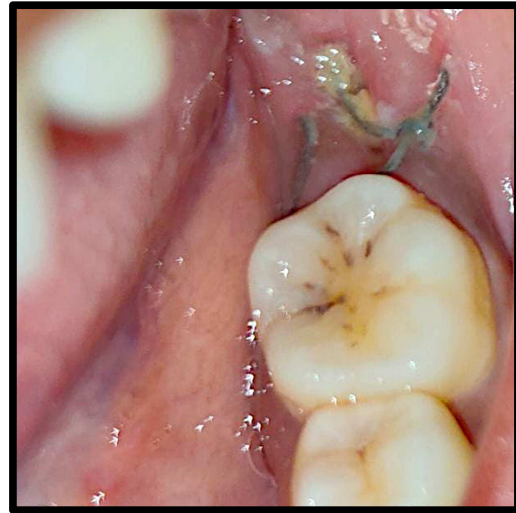


Figure 7b: Follow-up Day 3



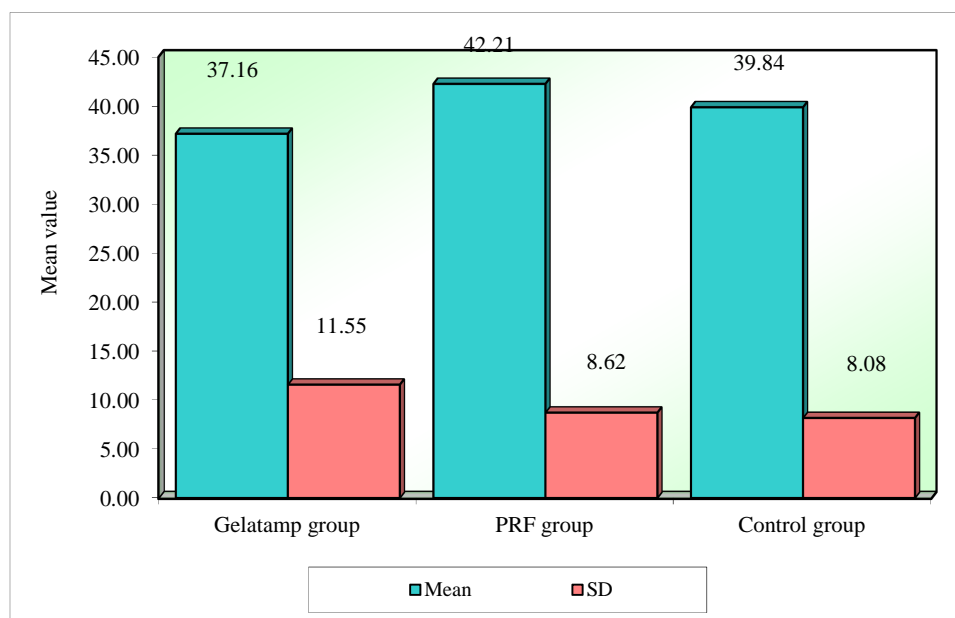
Figure 7c: Follow-up Day 7

RESULTS

Table 1: Distribution of patients by age group

Groups	Min	Max	Mean	SD	SE
Gelatamp group	20.00	58.00	37.16	11.55	2.65
PRF group	25.00	56.00	42.21	8.62	1.98
Control group	30.00	58.00	39.84	8.08	1.85
Total	20.00	58.00	39.74	9.60	1.27
F-value	1.3342				
P-value	0.2719				

Graph 1: Distribution of patients by age group



The mean age of the patients that were considered in the study was 39.74 ± 18.26 years. The p-value of 0.2719 indicated that there wasn't any difference statistically in both the groups when comparing the age of patients.

Table 2: Distribution according to gender

Group	Male	%	Female	%	Total
Gelatamp group	12	63.16	7	36.84	19
PRF group	11	57.89	8	42.11	19
Control group	9	47.37	10	52.63	19
Total	32	56.14	25	43.86	57

Chi-square=0.9980, p=0.6070

Graph 2: Distribution according to gender

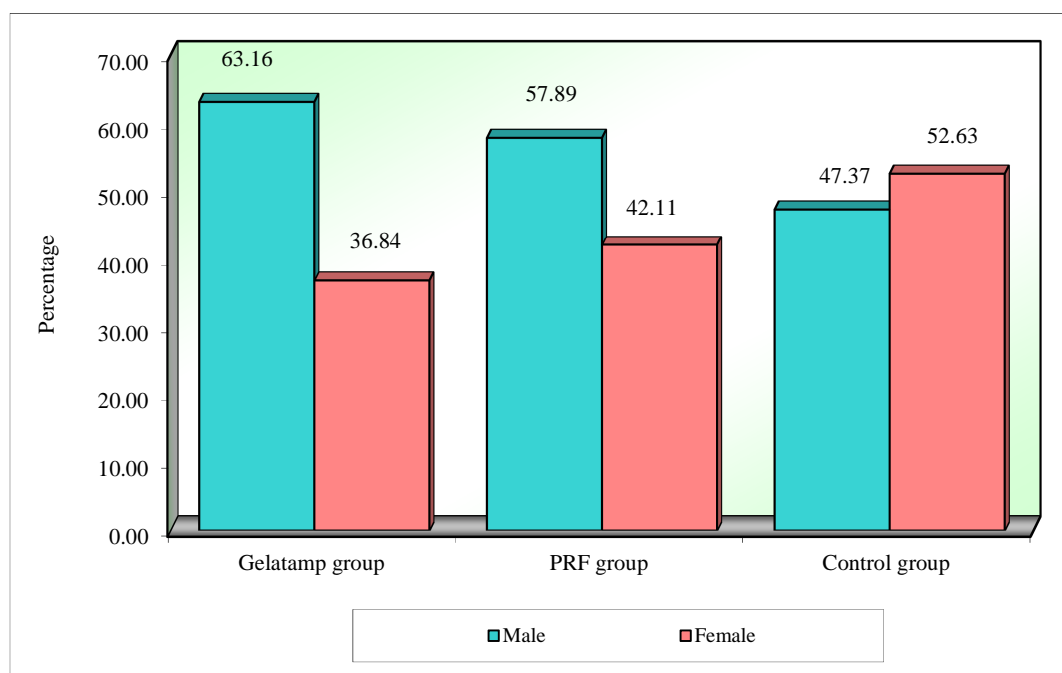
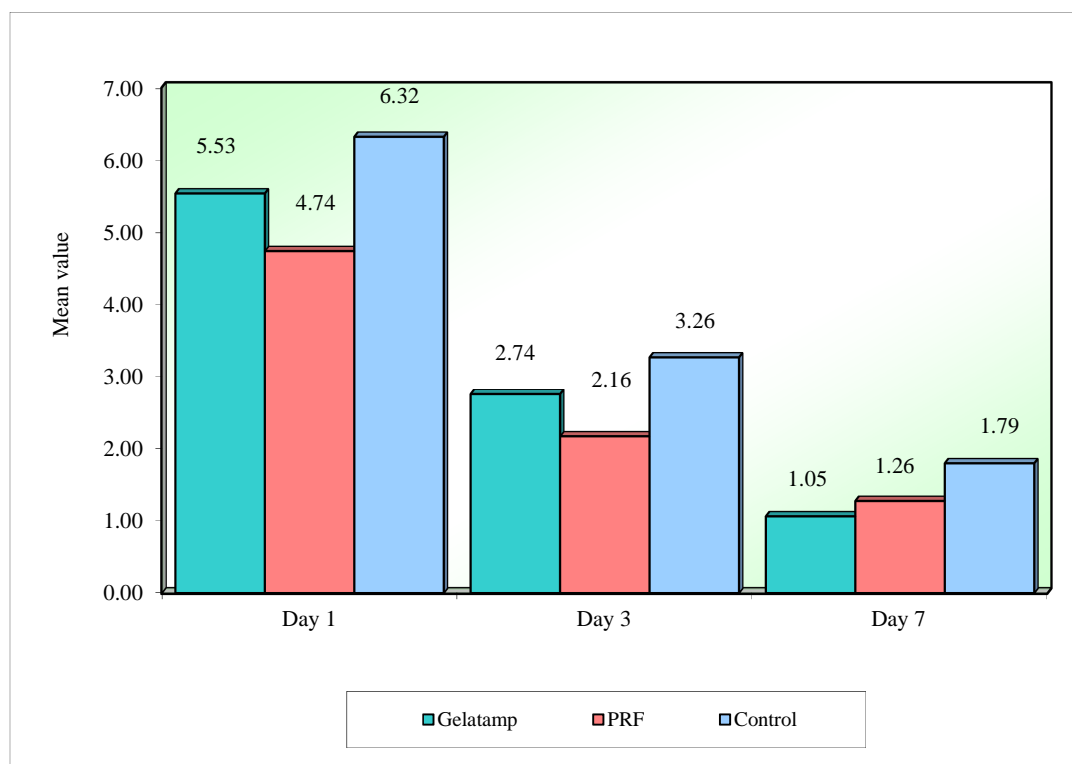


Table 2 shows the distribution of patients by gender. It was found that 32 (56.14%) were males and 25 (43.86%) were females. The p-value of 0.6070 indicated that there wasn't any difference statistically in both the groups when assessing the gender of patients included in the study hence, eliminating gender bias.

Table 3: Comparison of three groups with pain scores (VAS) at different time points by Kruskal Wallis ANOVA

Treatment times	Summary	Groups			H-value	p-value	Pair wise comparisons by Mann-Whitney U test		
		Gelatamp	PRF	Control			Gelatamp vs PRF	Gelatamp vs Control	PRF vs Control
Day 1	Mean	5.53	4.74	6.32	10.7570	0.0050*	p=0.0703	p=0.0877	p=0.0032*
	SD	1.02	1.33	1.38					
	Median	5.00	5.00	6.00					
Day 3	Mean	2.74	2.16	3.26	9.6150	0.0080*	p=0.3000	p=0.1404	p=0.0018*
	SD	1.37	0.69	0.99					
	Median	2.00	2.00	3.00					
Day 7	Mean	1.05	1.26	1.79	15.6960	0.0001*	p=0.4054	p=0.0022*	p=0.0307*
	SD	0.23	0.56	0.79					
	Median	1.00	1.00	2.00					
Day 1-Day 3	Mean	2.79	2.58	3.05	1.7870	0.4090	p=0.2549	p=0.8040	p=0.2933
	SD	1.47	0.90	1.31					
	Median	3.00	3.00	3.00					
Day 1-Day 7	Mean	4.47	3.47	4.53	7.4380	0.0240*	p=0.0237*	p=0.9651	p=0.0237*
	SD	1.07	1.17	1.22					
	Median	4.00	3.00	4.00					
Day 3-Day 7	Mean	1.68	0.89	1.47	4.7720	0.0920	p=0.0681	p=0.8267	p=0.0824
	SD	1.29	0.74	1.02					
	Median	1.00	1.00	2.00					

Graph 3: Comparison of three groups with pain scores (VAS) at different time points



OBSERVATION:

The analysis was done using Kruskal Wallis ANOVA between the three groups and it was

observed that there was significant difference in pain scores on 1st day(0.0050*), 3rd day(0.0080*) and 7th day(0.0001*) with the least score of PRF with it being of mean 4.74 on Day 1, 2.16 on Day 3 and 1.26 on Day 7. For an in-detailed analysis paired-wise comparison was done by Mann-Whitney U test. PRF vs control group showed significant results on 1st day(p=0.0032*), 3rd day(p=0.0018*) and 7th day(p=0.0307*). Gelatamp vs Control group showed a great difference in VAS pain score on the 3rd

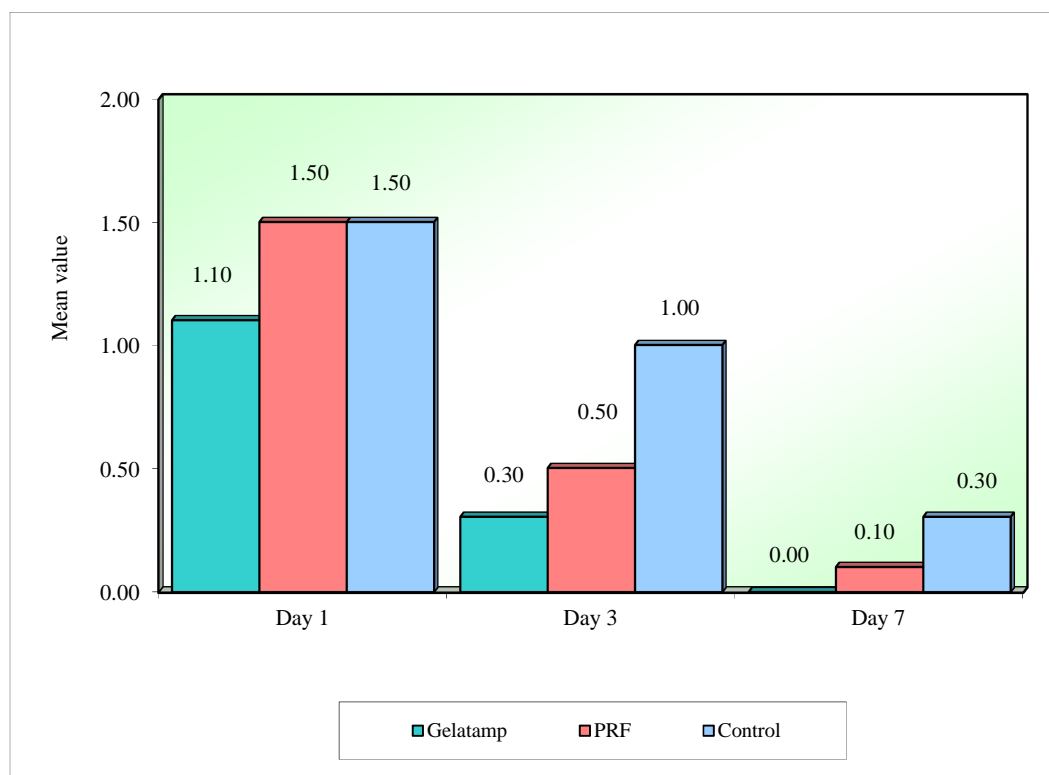
day, however it wasn't statistically significant. A significant result was observed only on Day 7($p=0.0022^*$).

It was seen that there wasn't any difference statistically in the observation of VAS score between PRF and Gelatamp groups. Within the groups, a significant decrease in the VAS pain score was seen from 1st day to the 7th day in both Gelatamp($p=0.0237^*$) and PRF($p=0.0237^*$) groups. Although not significantly, the pain score in the control group also decreased.

Table 4: Comparison of three groups with number of analgesics taken at different time points by Kruskal Wallis ANOVA

Treatment times	Summary	Groups			H-value	p-value	Pair wise comparisons by Mann-Whitney U test		
		Gelatamp	PRF	Control			Gelatamp vs PRF	Gelatamp vs Control	PRF vs Control
Day 1	Mean	1.1	1.5	1.5	4.8230	0.0900	p=0.0638	p=0.1149	p=0.7261
	SD	0.4	0.7	0.6					
	Median	1.0	2.0	1.0					
Day 3	Mean	0.3	0.5	1.0	12.4460	0.0020*	p=0.1939	p=0.0500*	p=0.0500*
	SD	0.6	0.6	0.7					
	Median	0.0	0.0	1.0					
Day 7	Mean	0.0	0.1	0.3	3.1060	0.2120	p=0.5891	p=0.4137	p=0.7481
	SD	0.0	0.3	0.7					
	Median	0.0	0.0	0.0					
Day 1-Day 3	Mean	0.9	1.0	0.5	8.1400	0.0170	p=0.5593	p=0.0471	p=0.0296
	SD	0.5	0.7	0.6					
	Median	1.0	1.0	0.0					
Day 1-Day 7	Mean	1.1	1.4	1.2	2.6700	0.2630	p=0.1218	p=0.7592	p=0.3502
	SD	0.4	0.6	0.8					
	Median	1.0	1.0	1.0					
Day 3-Day 7	Mean	0.3	0.4	0.7	6.6220	0.0360*	p=0.3281	p=0.0319*	p=0.1841
	SD	0.6	0.5	0.7					
	Median	0.0	0.0	1.0					

Graph 4: Comparison of three groups with number of analgesics taken at different time points



OBSERVATION:

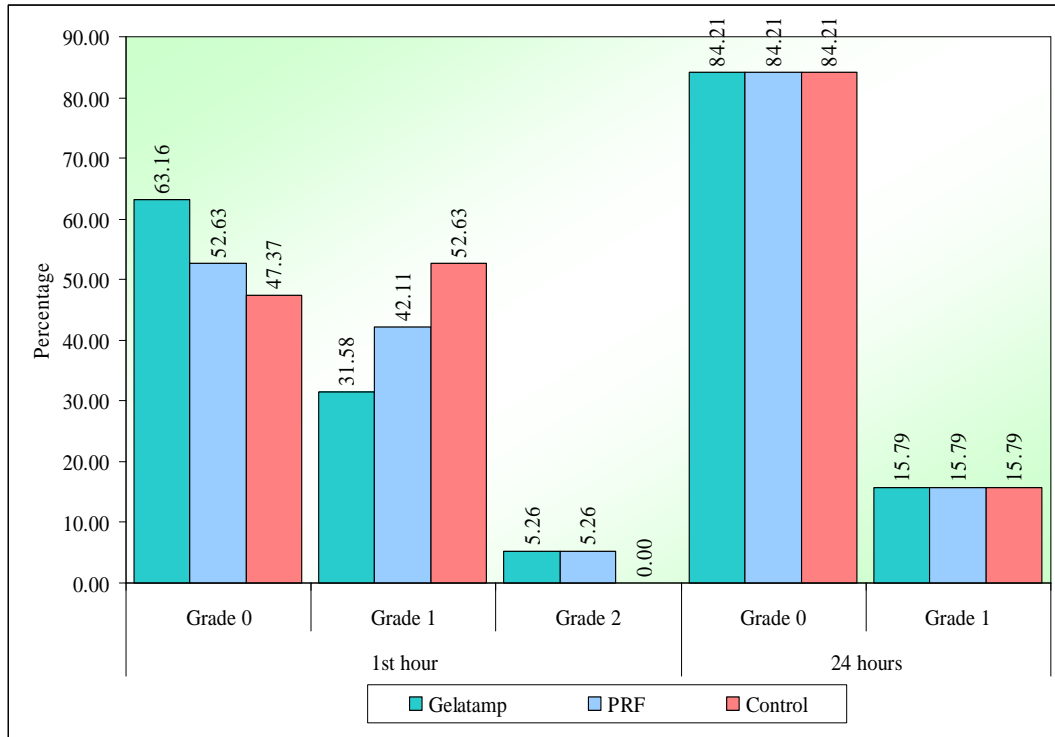
By comparing the data from the three groups using Kruskal Wallis ANOVA, it was shown that only the number of analgesics taken on Day 3 (0.0020*) was significantly different across the groups. Mann-Whitney U test was employed to draw a comparison in pairs of data in order to conduct a thorough analysis. On Day 3, it was determined that there was a notable statistical difference between the PRF and Conventional group ($p=0.0500^*$) as well as the Gelatamp and Conventional group ($p=0.0500^*$).

Table 5: Comparison of three groups with status of bleeding at different time points by Kruskal Wallis ANOVA

Bleeding	Gelatamp	%	PRF	%	Control	%	H-value	p-value
1st hour								
Grade 0	12	63.16	10	52.63	9	47.37	0.6720	0.7150
Grade 1	6	31.58	8	42.11	10	52.63		
Grade 2	1	5.26	1	5.26	0	0.00		
24 hours								
Grade 0	16	84.21	16	84.21	16	84.21	0.0000	1.0000
Grade 1	3	15.79	3	15.79	3	15.79		
Total	19	100.00	19	100.00	19	100.00		
B/w 1 st vs 24hrs	Wilcoxon matched pairs Z=1.5724, p=0.1159		Wilcoxon matched pairs Z=2.3664, p=0.0180*		Wilcoxon matched pairs Z=2.3664, p=0.0180*			

*p<0.05

Graph 5: Comparison of three groups with status of bleeding at different time points



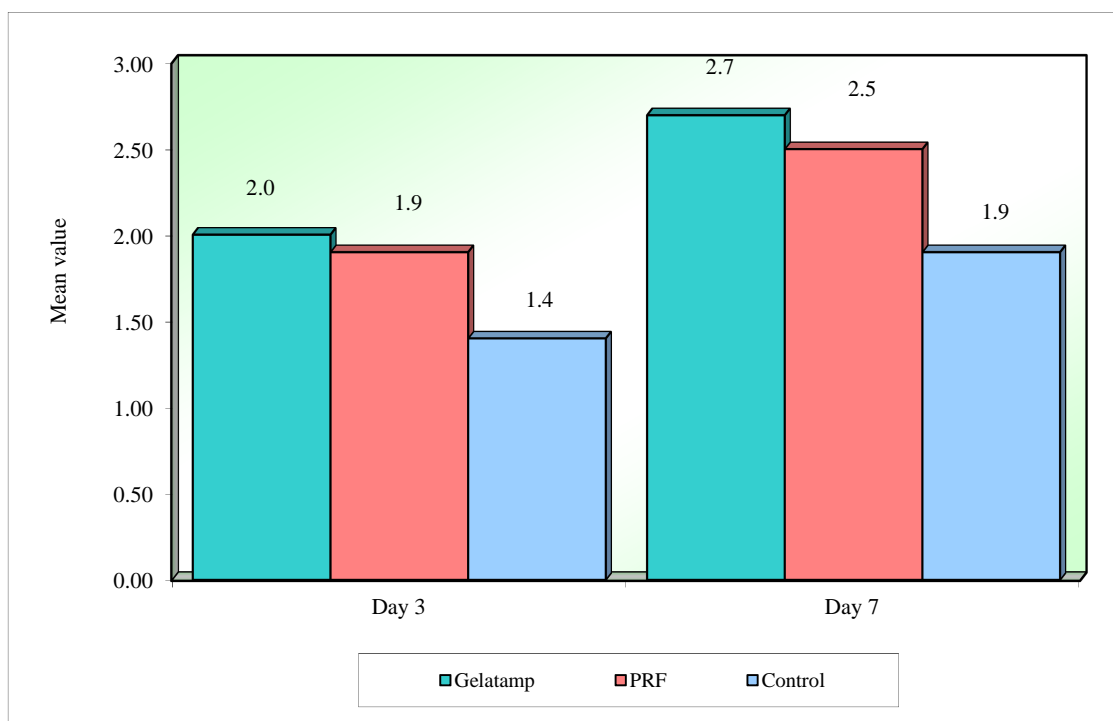
The Kruskal Wallis ANOVA was employed to compare the 3 groups, it was noted that after 1 hour and 24 hours following the extraction, there was no discernible difference between the groups.

Table 6: Comparison of three groups with status of healing at different time points by Kruskal Wallis ANOVA

Treatment times	Summary	Groups			H-value	p-value	Pair wise comparisons by Mann-Whitney U test		
		Gelatamp	PRF	Control			Gelatamp vs PRF	Gelatamp vs Control	PRF vs Control
Day 3	Mean	2.0	1.9	1.4	20.1680	0.0001*	p=0.5891	p=0.0024*	p=0.0131*
	SD	0.0	0.3	0.5					
	Median	2.0	2.0	1.0					
Day 7	Mean	2.7	2.5	1.9	10.9910	0.0040*	p=0.4744	p=0.0058*	p=0.0237*
	SD	0.8	0.7	0.7					
	Median	3.0	2.0	2.0					
Day 3-Day 7	Mean	0.7	0.6	0.5	1.0400	0.5940	p=0.7815	p=0.3891	p=0.5302
	SD	0.8	0.7	0.6					
	Median	1.0	1.0	0.0					

*p<0.05

Graph 6: Comparison of three groups with status of healing at different time points



OBSERVATION:

Comparison of status of healing at different time points was done using Kruskal Wallis ANOVA.

A significant difference was seen on both Day 3(0.0001*) and Day 7(0.0040*) when the three groups were compared.

Paired-wise comparison was conducted with the help of Mann-Whitney U test where in the result was significant in Gelatamp vs control group on 3rd day(p=0.0024*) and 7th day(p=0.0058*) with Gelatamp showing superior healing properties.

Between the PRF vs control group as well, a statistically notable result was seen on 3rd day (p=0.0131*)and 7th day(p=0.0237*). However there wasn't much difference between the healing score of Gelatamp and PRF group.

Table 7: Comparison of healing at different time point's in three groups by Wilcoxon matched pairs test

Groups	Changes from	Mean Diff.	Median Diff.	% of changes	Z-value	p-value
Gelatamp	Day 3-Day 7	0.7	1.0	36.84	2.8031	0.0051*
PRF	Day 3-Day 7	0.6	1.0	33.33	2.8028	0.0051*
Control	Day 3-Day 7	0.5	0.0	33.33	2.5205	0.0117*

*p<0.05

Graph 7: Comparison of healing at different time points in three groups

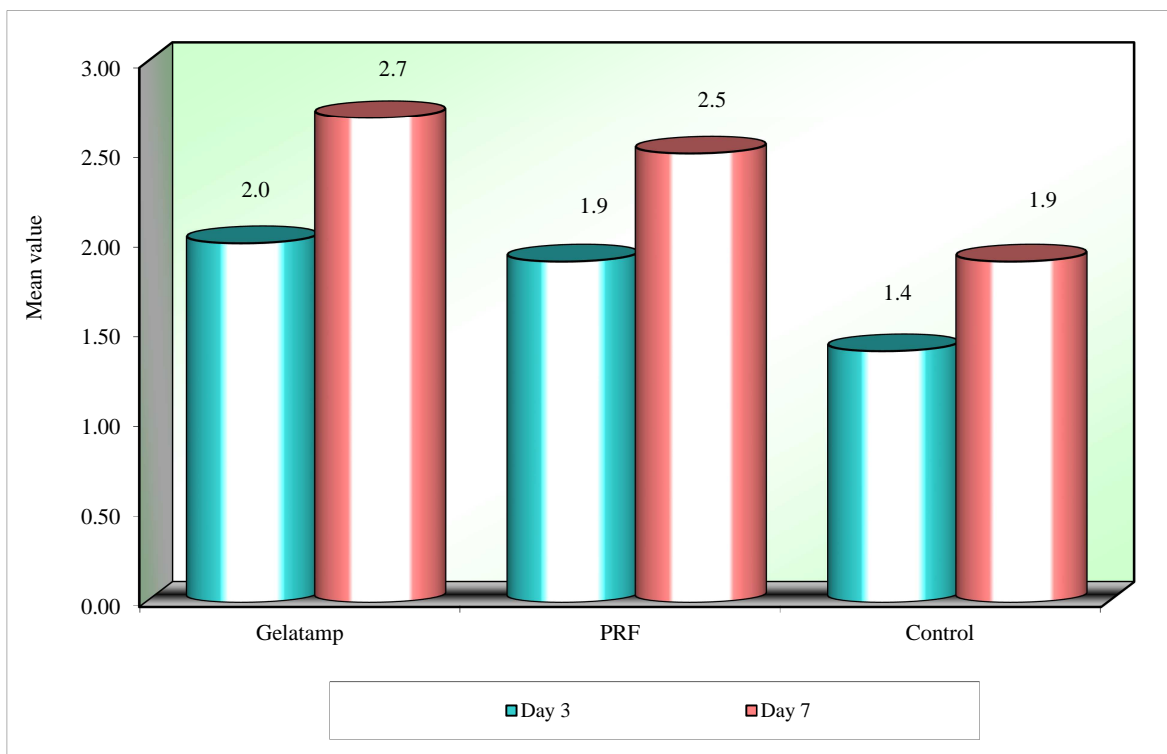


Table 7 shows that in all the three groups there was significant improvement in the healing of extraction socket over Day 3 to Day 7.

DISCUSSION

The surgeon's responsibility extends beyond ensuring the patient's comfort during surgery through early post-operative recovery and wellbeing.

Depending on the patient's health and overall physical status, a simple extraction may also result in a number of difficulties. These issues can arise due to problematic post-operative healing, prolonged post-operative pain, immediate or delayed post-operative bleeding, etc. A surgeon uses a variety of techniques, such as executing a minimally traumatic procedure, administering post-operative analgesics and antibiotics, etc., to reduce these consequences and improve patient comfort during the recovery period.

Surgeons have worked to develop materials that actively enhance healing and improve other post-operative outcomes during the past few decades.[18] After the tooth has been extracted, these materials can be placed right into the socket. In order to lessen the need for oral/IV analgesics and antibiotics post-operatively, materials with haemostatic, antiseptic, and analgesic qualities are being researched. One such material is Platelet rich Fibrin i.e., PRF.

A systematic review was conducted by Sarah-Al Maawi et al. with the goal of compiling the information on the application of PRF in extraction sockets. "What is the effectiveness of PRF in the prevention of pain and the regeneration of soft tissue and bone compared to the corresponding control without PRF treatment?" was the review question.[10]

For measuring pain, the study included six trials that compared socket therapy with PRF to spontaneous healing(control) and which employed the visual analogue scale

(VAS) for assessing the pain experienced by the patient. In 66.6% of the studies, the PRF group experienced statistically significant less pain than the control group.[10]

Of the papers that were included, Ustaoglu et al.'s study indicated that the pain score was considerably lower on Day 1 in PRF group when it's comparison was done with the control group. On Day 2, the difference was not significant statistically, despite the fact that pain score had decreased in both groups. [10, 19] A study by Mourao et al. revealed that the PRF group had a lesser pain score on the seventh day than the control group.[10, 20] The pain of the patients was assessed by Tammerman et al. on the 3rd day, and they found that Leucocyte-rich PRF lowered the pain compared to control group significantly. [10, 21]

In our study as well we compared the pain experienced by patients using the VAS scale. The VAS score was checked between the PRF group and the control group on the 1st day, 3rd day and the 7th day. The results of our study were in accordance to the above mentioned studies.

It was seen that there was significantly lesser pain score recorded in patients who received PRF in comparison to the patients who underwent spontaneous healing on 1st day($p=0.0032^*$), 3rd day($p=0.0018^*$) and 7th day($p=0.0307^*$). The PRF group outperformed the control group in terms of pain reduction from Day 1 to Day 7 ($p=0.0237^*$).

In our study number of analgesics was another method that was used to assess the pain experienced by the patients. This was to evaluate if the use of NSAIDS can be reduced by using such intra-socket biomaterials.

It was observed that there was an overall decrease in the number of analgesics consumed by the patients from Day 1-Day 7 in all groups. It was observed that the amount of analgesics consumed by the patients between Days 1 and 7 did not alter noticeably where-in the number of analgesics consumed on Day 7 were nearly zero in all the groups. On Day 3, however, the difference was noted to be significant when comparison was done between the PRF group and the control group ($p=0.0500^*$).

This signifies that even though the pain score indicated that the pain which patients experienced was lesser in-case they received PRF in comparison to patients who were left to heal conventionally, the patients felt a need to take an analgesic on Day 1 in the PRF group as well. But over a period of next 3 days the requirement of analgesics came down.

In a review conducted by Al-Maawi et al., 8 studies were included to assess the soft tissue healing post-placement of PRF in the extraction socket.

It was observed in six studies (i.e., 75% of the studies analysed) that patients receiving PRF showed evidence of improved healing process in contrast to the rate of healing of the extraction socket without any material placed in it, particularly at the one-week point.[10]

The results obtained in our study were in accordance with this systematic review and the 6 studies which showed that healing of extraction socket with PRF is better. On the 3rd day($p=0.0131$) and the 7th day($p=0.0237$), there was a significant difference observed between the PRF group and the control group. The healing between days 3 and 7 in the control and PRF groups, however, did not differ significantly from one another.

Another innovative material evaluated in our study was Gelatamp, which is merely a gelatin sponge impregnated with silver colloid. [11]

Mechanism of action of this material is such that the finely dispersed colloidal silver in Gelatamp transforms to silver ions in the moist condition when inserted into the extraction socket. [11] This silver cannot be washed out since it does not dissolve easily and hence, silver ions gradually dissipates into the extraction socket as the sponge resorbs. Over the course of four weeks, sponge resorbs entirely. [11]

This material has not been studied as widely as that of PRF. Hence, the aim of this clinical trial was not just to do the assessment of the efficacy of PRF but also to see if Gelatamp is better or equivalent to that of PRF in terms of control of pain, healing of intra-oral soft tissue and haemostasis.

A study was performed by Maani et al. wherein they assessed the role of gelatamp in patients taking anticoagulants following tooth extraction. Post-operative healing, pain, and bleeding were evaluated as parameters. In this study the authors evaluated the post-operative pain with the help of VAS and there wasn't any significant difference observed when comparing the study group and control groups on the 1st, 3rd and 7th day post-operatively. Post-operative healing was assessed just in terms of presence or absence of dry socket. It was found that there was no signs and symptoms of infection and no formation of dry socket.[16]

The results in this trial were in accordance with this research paper. On Day 1 and Day 3, it was observed that the pain experienced by patients in the gelatamp group was less than the pain experienced by patients in control group, even though the

differences were not statistically significant. Patients in the Gelatamp group took considerably fewer analgesics on Day 3 ($p=0.0023^*$) than those in the control group.

This signifies that even though the results of Gelatamp were not as promising as that of PRF in terms of pain control (even though comparable), they were better than the results observed in patients with extraction sockets that were left for spontaneous healing.

In-case of soft-tissue healing, there was an evident difference between the Gelatamp group and the control group on 3rd day ($p=0.0024^*$) as well as 7th day ($p=0.0058^*$). However, there wasn't much variation in the healing on the 3rd day and the 7th day within the group in both control and Gelatamp groups.

The healing in both Gelatamp group and PRF group were comparable with no statistical difference.

With this result we can easily say that in terms of soft tissue healing Gelatamp meets then standards of the so-called "gold-standard" PRF.

The haemostatic characteristics of PRF and Gelatamp was another criterion assessed in our research. The results showed that on the day of extraction and on the day after the extraction there was excellent haemostatic control in all three groups. Between the three groups, there was no discernible difference. These findings were in line with research done in 2014 by R.M. Eldibany et al. who investigated the haemostatic characteristics of PRF and Chitosan and discovered that complete haemostasis was obtained in every case without any bleeding delay. [22] They came to the conclusion that PRF exhibited remarkable anti-haemorrhagic qualities. Ragab et al. did a trial to compare the effectiveness of Gelatamp and Chitosan in reducing bleeding after tooth

extraction. At 5 minutes, 30 minutes, and 2 hours following extraction, it was discovered that there was an evident difference when the Gelatamp and Chitosan groups were evaluated and result was in favour of Gelatamp, whereas at 24 hours following extraction, there wasn't any evident difference between the 2 groups. [23] Although, a study comparing effect of PRF and gelatin sponge on haemostasis exists, done by Mansour et al. but a study that compares the haemostatic, analgesic, and wound-healing characteristics of Gelatamp and PRF could not be found by us.[24]

CONCLUSION & SUMMARY

The current randomized controlled trial compared and assessed the efficacy of the PRF and Gelatamp in achieving haemostasis, reducing pain and promoting the wound healing in patients who underwent molar teeth extractions.

The subjects in whom PRF and Gelatamp were used, experienced no post-operative bleeding, less post extraction pain and faster healing compared to the control group. Hence, analgesic and anti-inflammatory effects of these materials can be utilized as an effective alternative to antibiotics and analgesics prescribed to avoid possible adverse effects associated with the use of these medications following atraumatic dental extraction.

It was also noted that Gelatamp's results were comparable to that of PRF. Hence, this novel biomaterial can be used as an alternative to PRF and we can avoid the process of withdrawing patients blood and centrifuging it as this procedure is cumbersome and tends to cause distress to the patient.

However, further research with larger sample size can be undertaken to validate the findings of our study and explore the long-term effect of Gelatamp as an analgesic, and anti-septic material in post extraction care.

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ANNEXURE I- CONSENT FORMS

**K.L.E.'s V.K. Institute of Dental Sciences
Department of Oral and Maxillofacial Surgery, Belagavi
CONSENT TO SURGERY & ANAESTHETICS**

**“COMPARATIVE EVALUATION OF GELATAMP VERSUS PLATELET
RICH FIBRIN ON POST OPERATIVE OUTCOMES AFTER INTRA-
ALVEOLAR DENTAL EXTRACTION OF MOLARS - A RANDOMISED
CONTROLLED TRIAL”**

Date: _____ Time: _____ am/pm

1. I, _____ aged _____ years have been informed about my involvement in the study.
2. I agree to give my personal details like Name Age, Sex, Address, Past dental and any other details required for the study to the best of my knowledge.
3. I will cooperate with the surgeon for examination and also for various investigations.
4. I permit the operator to utilize the information given by me and the results obtained from this study for presentation and publication.
5. I permit the surgeon to take my photographs to utilize it for the study and presentation purpose.
6. I am participating in this study with my own wish and will and the surgeon has explained the nature and the effect of procedure including extraction in my vernacular language.
7. The nature and purpose of the operation and the materials being used, possible alternative methods of treatment, the risk involved and the possibility of complications have been fully explained to me in my mother tongue. No guarantee or assurance has been given by anyone as to the results that may be obtained.
8. I have read and understood the above information given by surgeon about the study and willingly agree to participate in the study.

Patients / Witness Signature:

Date:

Surgeon's name: Dr.

Surgeon's signature:

Doctor's contact:

Hospital contact:

ANNEXURE II- PROFORMA

**KAHER's KLE VK Institute of Dental Sciences
Department of Oral and Maxillofacial Surgery
Belagavi**

**“COMPARATIVE EVALUATION OF GELATAMP VERSUS PLATELET
RICH FIBRIN ON POST OPERATIVE OUTCOMES AFTER INTRA-
ALVEOLAR DENTAL EXTRACTION OF MOLARS - A RANDOMISED
CONTROLLED TRIAL”**

NAME:

AGE: SEX:

OCCUPATION:

O.P.NO.:

ADDRESS:

DATE:

CONTACT NO:

CHIEF COMPLAINT:

HISTORY OF PRESENTING ILLNESS:

PAST DENTAL HISTORY:

PAST MEDICAL HISTORY:

DRUG ALLERGY:

INTRA-ORAL FINDINGS:

PROVISIONAL DIAGNOSIS:

INVESTIGATIONS:

IOPA:

OPG:

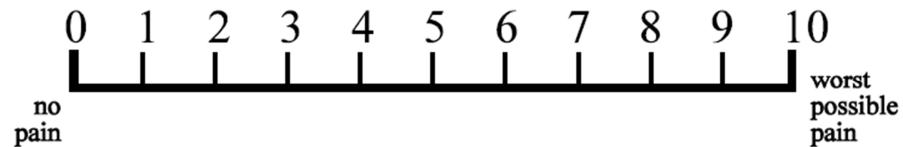
Routine Blood Investigation:

RADIOGRAPH AND CLINICAL CORRELATION:

DIAGNOSIS:

TREATMENT PLAN:

MEDICATION:

FOLLOW-UP:**1. PAIN- Visual Analog Scale (VAS)****Visual Analog Scale (VAS)**

DAY 1	DAY 3	DAY 7

2.WOUND HEALING (Landry et al. index)

Healing index 1: very poor	Tissue colour: \geq 50% of gingiva red Response to palpation: bleeding Granulation tissue: present Incision margin: not epithelialized with loss of epithelium beyond incision margin. Suppuration: present.
Healing index 2: poor	Tissue colour: \geq 50% of gingiva red Response to palpation: bleeding Granulation tissue: present Incision margin: not epithelialized with connective tissue exposed.
Healing index 3: good	Tissue colour: \geq 25% and $<$ 50% of gingiva red Response to palpation: no bleeding Granulation tissue: none Incision margin: no connective tissue exposed.

Healing index 4: very good	Tissue colour: <25% of gingiva red Response to palpation: no bleeding Granulation tissue: none Incision margin: no connective tissue exposed.
Healing index 5: excellent	Tissue colour: all tissues pink Response to palpation: no bleeding Granulation tissue: none Incision margin: no connective tissue exposed.

DAY 3	DAY 7

3. BLEEDING SCORE:

Grade 0: Very low (almost no bleeding).

Grade 1: Low (slight oozing of blood from the socket which usually stops by its self or after pressure is applied).

Grade 2: Normal. (Clinically significant).

Grade 3: High. (Bleeding occurs after clot has significantly formed).

Grade 4: Very high (excessive bleeding that could not be controlled by local hemostatic agents or stitches).

1 st HOUR	24 th HOUR

ANNEXURE III- ETHICAL CLEARANCE LETTER



Research and Ethics Committee
KLE V K INSTITUTE OF DENTAL SCIENCES
KLE University



Accredited 'A' Grade by NAAC Placed in Category 'A' by MHRD (Govt)
Nehru Nagar, Belagavi - 590 010, Karnataka State
☎: 0831-2470362 Web: http://www.kledental-bgm.edu.in
FAX: 0831-2470640 E-mail: principal@kledental-bgm.edu.in

Sl. No. : 1469

CERTIFICATE

This is to Certify that the synopsis titled

Comparative Evaluation of Gelatamp (Gelfoam with Colloidal Silver) versus platelet rich fibrin on Post operative outcomes after intraalveolar dental extraction of molars - a Submitted by randomised control trial

Dr. _____ P. G. Student /

Staff, Guided by _____ from Department of

Oral & Maxillofacial Surgery has been critically evaluated by committee members and granted ethical clearance to conduct the above mentioned study

Date : 5/5/21

[Signature]
Member Secretary
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

[Signature]
Chairman
Research and Ethical Committee-
KLEVK Institute of Dental Sciences
Belagavi

SECRETARY
RESEARCH AND ETHICAL COMMITTEE
KLEVK INSTITUTE OF DENTAL SCIENCES
BELAGAVI.

CHAIRMAN
RESEARCH AND ETHICAL COMMITTEE-
KLEVK INSTITUTE OF DENTAL SCIENCES
BELAGAVI

ANNEXURE IV- BIostatISTICS CLEARANCE LETTER



KLE V.K. Institute of Dental Sciences

(A Constituent unit of KLE Academy of Higher Education & Research
Deemed-to-be-University u/s 3 of the UGC Act, 1956)
Nehru Nagar, Belagavi-590 010 INDIA

Re-Accredited 'A' grade by NAAC (2nd Cycle) & Placed in Category 'A' by MHRD (GoI)

Phone : 0831-2470362
FAX:0831-2470640

Web: <http://www.kledental-bgm.edu.in>
E-mail:principal@kledental-bgm.edu.in



Biostatistics Clearance Certificate

This is to certify that the Biostatistics aspect of the Dissertation / Research work
Post Graduate Student, under the guidance of **Dr.**
M.D.S., Reader, Department of Oral and
Maxillofacial Surgery entitled "Comparative evaluation of Gelatamp (gelfoam with
colloidal silver) versus Platelet Rich Fibrin on post operative outcomes after intra-
alveolar dental extraction of molars - arandomised control trial" has been done under
my guidance and considered satisfactory.

Place: Belagavi




Date: 25.11.2022

Name & Signature of Biostatistician

(Dr. S.B. Javali)

*Sr. Asso. prof. in statistics
USM KLE IMP, Belagavi*

ANNEXURE V- PLAGIARISM CHECK REPORT

Scientific Correspondence and Review Committee	
 <p>KLE VK Institute of Dental Sciences A Constituent Unit of KLE Academy of Higher Education and Research (Deemed-to-be-University u/s 3 of the UGC Act, 1956) Nehru Nagar, Belagavi - 590 010, Karnataka State</p> <p>Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)</p> <p>☎: 0831-2470362 Web: http://www.kledental-bgm.edu.in FAX: 0831-2470640 E-mail: principal@kledental-bgm.edu.in</p>	
Date : 26/12/2022	Serial No. : 144
PLAGIARISM CHECK REPORT	
Name of the Applicant : I UG / PG / Ph.D / Staff : Post graduate student Batch & Year : 2020 - 2023 Department : Oral and Maxillofacial Surgery	
The soft copy of <u>Research Work / Manuscript</u> by entitled “Comparative evaluation of gelatamp (Gel foam with colloidal silver) versus platelet rich fibrin on post operative outcomes after Intra alveolar dental extraction of molars” - A Randomised control trial under the guidance of has been submitted for Anti-Plagiarism check to the Scientific Correspondence & Review Committee of KLE VK Institute of Dental Sciences using “Turn-it-in” software.	
The scan has been carried out and the scanned output reveals a Similarity Index of6.....%, which is <u>within</u> / not within the acceptable limits of 10% as per the UGC guidelines.	
 Member Secretary Scientific Correspondence and Review Committee KLEVK Institute of Dental Sciences KAHER-Belagavi	 Chairman Scientific Correspondence and Review Committee KLEVK Institute of Dental Sciences KAHER - Belagavi

ANNEXURE VI- MASTER CHART

No	Group	AGE	SEX	PAIN			No of analgesic			Bleeding		Healing	
				Day 1	Day 3	Day 7	Day 1	Day 3	Day 7	1sy hr	24th hr	Day 3	Day 7
1	Gelatamp	22	2	5	2	1	1	0	0	1	0	2	2
2	Gelatamp	27	1	5	2	1	1	0	0	2	0	2	4
3	Gelatamp	45	2	7	3	1	1	0	0	0	0	2	2
5	Gelatamp	46	1	7	2	1	1	0	0	0	1	2	3
8	Gelatamp	26	1	5	5	1	2	2	0	0	0	2	2
9	Gelatamp	48	1	5	1	1	1	0	0	0	0	2	3
10	Gelatamp	36	1	5	2	1	1	0	0	0	0	2	2
11	Gelatamp	20	1	6	5	1	1	1	0	1	1	2	3
12	Gelatamp	48	2	4	1	1	1	0	0	0	0	2	2
13	Gelatamp	22	2	5	2	1	1	0	0	0	0	2	3
14	Gelatamp	46	1	5	2	1	1	0	0	0	0	2	4
15	Gelatamp	45	2	7	3	1	1	0	0	0	0	2	3
16	Gelatamp	22	1	5	5	2	2	1	0	1	0	2	4
17	Gelatamp	46	1	5	5	1	1	1	0	1	0	2	4
18	Gelatamp	45	2	5	2	1	1	0	0	1	0	2	2
19	Gelatamp	30	2	6	3	1	1	0	0	0	0	2	2
20	PRF	46	1	4	2	1	1	0	0	1	0	2	3
21	PRF	43	1	6	3	1	1	1	0	0	0	2	2
22	PRF	45	2	5	2	1	2	1	0	2	1	1	2
23	PRF	48	1	4	1	1	1	0	0	1	0	2	3
24	PRF	48	2	3	2	1	0	0	0	0	0	2	4
25	PRF	33	2	5	2	2	1	1	0	0	0	2	2
26	PRF	45	1	7	3	2	2	2	1	1	0	2	3

27	PRF	40	1	6	2	1	2	1	0	0	0	2	2
28	PRF	46	2	4	2	2	2	0	0	1	1	2	2
29	PRF	48	1	3	1	1	1	0	0	1	0	2	3
30	PRF	44	2	7	3	3	3	1	1	1	0	2	4
31	PRF	30	1	5	2	1	2	1	0	0	0	2	3
32	PRF	51	1	4	2	1	1	0	0	0	0	1	2
33	PRF	54	1	6	3	1	2	1	0	0	0	2	2
34	PRF	32	2	3	1	1	1	0	0	0	0	2	2
35	PRF	25	2	4	2	1	1	0	0	1	1	2	2
36	PRF	56	1	6	3	1	2	0	0	0	0	2	2
37	PRF	36	2	5	3	1	2	1	0	1	0	2	2
38	PRF	32	1	3	2	1	2	0	0	0	0	2	3
39	Control	45	1	5	4	1	2	2	0	1	0	1	2
40	Control	45	2	5	4	2	1	1	0	1	0	2	2
41	Control	30	2	9	5	4	2	2	2	1	0	1	1
42	Control	34	2	5	3	1	2	1	0	0	0	1	3
43	Control	47	1	5	2	2	1	0	0	0	0	1	2
44	Control	39	1	9	5	3	2	2	2	1	0	1	2
45	Control	52	1	5	3	2	1	0	0	1	1	2	3
46	Control	42	2	6	4	1	2	2	0	0	0	1	1
47	Control	38	2	5	2	2	1	1	0	0	0	2	2
48	Control	40	1	6	3	2	1	1	0	0	0	1	2
49	Control	32	2	5	3	1	2	1	0	1	1	2	3
50	Control	58	1	6	4	2	1	1	0	1	0	1	1
51	Control	30	2	7	2	1	1	0	0	0	0	1	1
52	Control	34	2	8	3	2	3	1	0	0	0	2	2
53	Control	45	1	6	4	2	1	1	1	0	0	1	1

54	Control	48	1	7	3	1	2	1	0	1	1	2	2
55	Control	35	1	8	4	1	1	1	0	1	0	1	2
56	Control	33	2	6	2	2	1	1	0	0	0	2	2
57	Control	30	2	7	2	2	1	0	0	1	0	2	2