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Comparative Evaluation of Gingival Healing Following Gingivectomy Using Grapeseed Extract Gel and Amla Gel: A Clinical Study

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ABSTRACT

Objective: To assess and compare the clinical efficacy of grapeseed extract gel and amla gel in promoting gingival healing post-gingivectomy

Methods: A randomized clinical trial was performed on a group of 20 patients scheduled for gingivectomy. Participants were assigned to two groups: Group A (10 patients) received topical grapeseed extract gel, and Group B (10 patients) received amla gel after ginigivectomy procedure. Clinical parameters including Gingival Index (GI), Wound Healing Index (WHI) were assessed at DAY 10, DAY 20 and DAY 30 postoperatively. Pain assessment was carried out using the Visual Analog Scale (VAS) at 24 and 72 hours, as well as on the 10th, 20th, and 30th day after the surgery.

Results: Both groups exhibited significant decreases in gingival inflammation over the follow-up period (Group A: GI from 2.00 to 0.43; Group B: 2.00 to 0.86; $p < 0.05$). Wound healing progressed in both groups, with Group A showing a higher mean WHI at Day 30 (3.60 vs. 3.20), though the difference was not statistically significant ($p = 0.075$). Pain levels declined significantly in both groups from 24 hours (mean VAS 4.50) to Day 30 (0.00), without significant differences between the groups at any evaluated time ($p > 0.05$).

Conclusion: Grape seed extract gel appears to enhance wound healing and reduce gingival inflammation more effectively than amla gel after gingivectomy, while both treatments provide comparable postoperative pain relief. These gels serve as effective adjuncts in improving clinical outcomes following gingival surgery.

Keywords: *Gingival enlargement, gingivectomy, grapeseed extract gel, amla gel*

1. INTRODUCTION

Aesthetic considerations in periodontology have become a key aspect of modern dental practice, aiming not only to improve the look of a patient's smile but also to maintain long-term oral health. While dental parameters such as tooth alignment, chromatic characteristics, dimensions, and morphology are critical, the esthetic and periodontal condition of the gingival tissues is equally vital in establishing an optimal and harmonious smile. Particularly in the anterior region, gingiva that are healthy, well-shaped, and free of inflammation are essential for achieving optimal aesthetics. Recent advances in cosmetic dentistry have led to increased attention on treating gum-related issues that can affect both the function and visual appeal of the smile[1]

Gingival enlargement, or gingival overgrowth, is defined as a pathological increase in the volume of the gingival tissues. This condition may be etiologically linked to a variety of factors, including chronic inflammatory responses, the use of orthodontic appliances, pharmacological agents such as anticonvulsants, immunosuppressants, and calcium channel blockers, as well as potential underlying neoplastic processes. Excessive gingival enlargement not only impedes proper oral hygiene maintenance but also diminishes the overall esthetic harmony of the smile.[2,4]

Gingivectomy is a frequently utilized surgical technique for treating gingival hyperplasia, involving the removal of surplus gingival tissue to reshape and restore the natural gingival contours. The primary objective is to reposition the gingival margin in an apical direction, thereby restoring a physiologically appropriate and esthetically favorable gingival outline, while simultaneously promoting optimal periodontal health.

Multiple surgical techniques can be utilized for gingivectomy and gingivoplasty, including the use of scalpel instruments, electrosurgical units, cryosurgical methods, laser systems etc.[7]Despite the availability of advanced technologies, scalpel surgery remains a preferred approach due to its ease of application, clinical reliability, and minimal collateral tissue trauma. These procedures are primarily intended to achieve a well-contoured, functionally stable, and aesthetically acceptable gingival form.

Postoperative healing after gingivectomy and gingivoplasty occurs via secondary intention, characterized by gradual tissue regeneration starting from the wound base upward. Epithelial cell activity at the wound margins reaches its maximum within 24 to 36 hours. Typically, epithelialization of the wound surface is completed between 7 and 14 days, while full recovery including the formation of keratinized epithelium is generally achieved by 30 days. However, the maturation phase of the underlying connective tissue can continue for up to seven weeks.[8]

Various supportive treatments have been studied to enhance and accelerate the healing process. These include low-level laser therapy, botanical extracts, agents that promote blood clotting, ozone therapy, antiseptic or antibacterial compounds containing active biological ingredients, and platelet-rich concentrates. These approaches aim to stimulate tissue repair, decrease healing duration, and achieve improved clinical results.[2,5,6]

2. MATERIALS AND METHODS

This is a randomized, parallel-group, controlled clinical trial aimed at evaluating and comparing the efficacy of grape seed extract (GSE) gel and amla (Emblica officinalis) gel in promoting gingival healing following gingivectomy procedures.

A total of 20 patients will be enrolled, with 10 patients in each group

INCLUSION CRITERIA:

- Adults aged 20 to 45 years.
- Systemically healthy individuals without any known medical conditions affecting wound healing.

EXCLUSION CRITERIA:

- Presence of any systemic disease (e.g., diabetes mellitus, immunodeficiencies) known to impair or delay wound healing.
- Pregnant or lactating women.
- Smokers, due to the negative impact of smoking on periodontal healing.
- History of periodontal therapy within the last 2 months prior to enrollment.
- Use of medications known to cause gingival enlargement (e.g., phenytoin, cyclosporine, calcium channel blockers) within the past 6 months.

3. MATERIALS

GRAPE SEED EXTRACT GEL:

Grape seed extract, obtained from the seeds of *Vitis vinifera*, contains a high concentration of proanthocyanidins, which are

potent antioxidants. In periodontal therapy, GSE gel is valued for its anti-inflammatory, antimicrobial, and tissue-repairing properties.[1] It helps neutralize oxidative stress, limits bacterial activity, and supports the regeneration of gingival tissues. When applied after procedures such as gingivectomy, GSE gel has been shown to enhance fibroblast proliferation, speed up epithelial healing, and improve overall soft tissue recovery.[9,10]

AMLA GEL:

Amla, or Indian gooseberry, is a medicinal botanical distinguished by its significant levels of vitamin C and antioxidant activity. In periodontics, amla gel exhibits anti-inflammatory, antibacterial, and wound-healing capabilities. It promotes collagen production, helps reduce inflammation of the gingiva, and supports faster healing of soft tissues. When used topically after periodontal procedures like gingivectomy, amla gel has been observed to aid in more effective and comfortable healing.[11,12]

4. METHODOLOGY

CLINICAL EXAMINATION & PREOPERATIVE PREPARATIONS:

Before performing any surgical procedures, a thorough medical and dental history was obtained from each patient. To ensure the gingival tissues were in a healthy state, all patients underwent initial oral prophylaxis, which included scaling, root planing, polishing, and were given oral hygiene instructions. These preparatory measures were carried out over a period of one to two weeks prior to surgery to effectively manage and reduce gingival inflammation.

Additionally, several preoperative records were collected for diagnostic and documentation purposes. These included study clinical photographs, and radiographic imaging, all of which contributed to comprehensive treatment planning and postoperative assessment.

CLINICAL PARAMETERS:

Pre operative clinical parameters were evaluated at defined intervals to monitor healing and treatment outcomes

- The Gingival Index[13] was recorded on Day 10, Day 20, and Day 30.
- Postoperative pain was assessed using the Visual Analogue Scale (VAS)[14] at 24 hours, 48 hours, Day 10, Day 20, and Day 30.
- The Wound Healing Index[15] was measured at Day 10, Day 20, and Day 30 to evaluate the progression of soft tissue healing.

5. SURGICAL PROCEDURE

Before the surgical procedure, all patients rinsed with a 0.12% chlorhexidine mouthwash to reduce microbial load. Local infiltration anesthesia was administered to ensure patient comfort during the procedure.

A 45-degree external bevel incision was made using a surgical scalpel and gingivectomy blade, beginning at the distal end of the surgical site. The interdental areas were carefully shaped using an Orban knife, and any remaining granulation tissue was thoroughly debrided with the help of curettes and surgical scissors.[2,3]

Following tissue removal, gingivoplasty was carried out using a Kirkland knife to refine the gingival contours and restore physiological shape. This method, known as conventional (scalpel) gingivectomy and gingivoplasty, was chosen for its practicality, cost-effectiveness, and relatively faster healing time, as supported by previous studies.[2,3]

After the surgical procedure is completed

GROUP A: Following gingivectomy and gingivoplasty then apply Grape seed extract gel (fig 1) on the incised margins by using clean instrument. Finally, the periopack was adapted on gingival wounds for10days, the patient was also prescribed 0.2 % chlorhexidine mouthwash

GROUP B: Following gingivectomy and gingivoplasty then apply Amla gel (fig 2) on the incised margins by using clean instrument. Finally, the periopack was adapted on gingival wounds for10days, the patient was also prescribed 0.2 % chlorhexidine mouthwash

Fig 1: Grape seed gel

Fig 2: Amla gel

POST SURGICAL CONSIDERATIONS:

We divided the visits into 3 visits

First visit: Patients were recalled 10th day after the gingivectomy for periodontal pack removal. The surgical area was carefully irrigated with saline to cleanse it of any debris. During this visit healing index, plaque index and VSA are evaluated. Application of respective gels (Grape seed extract gel and amla gel) in respective groups over the surgical wound area twice daily with clean cotton pellet twice daily for 10 days is recommended.

Second visit: Patients were recalled 0n 20thday after the gingivectomy for evaluation of healing index, plaque index and VAS and make sure that patients follow the oral hygiene instructions and apply the respective gels twice daily.

Third visit: After 30th day from the surgery for re-evaluation of plaque index , VAS ,healing index with taking digital photographs in all visits for the assessment of healing at day 10, day 20, day 30.

6. RESULTS

This study included a total of 20 patients, with 10 participants allocated to Group A and 10 to Group B. All patients presented with gingival enlargement and underwent gingivectomy. In Group A, the surgical site was treated with grape seed extract gel, followed by the application of a non-eugenol periodontal dressing. In Group B, amla gel was applied to the wound surface post-gingivectomy, which was similarly covered with a non-eugenol periodontal pack. Clinical parameters, including the Gingival Index (GI) and Wound Healing Index (WHI), were recorded on Day 10, Day20, and Day 30. Pain perception was evaluated using the Visual Analogue Scale (VAS) Bat 24 hours, 72 hours, and on Day10, Day20, and Day 30.

Gingival index:

Intragroup Comparison:

Both groups demonstrated a significant reduction in Gingival Index (GI) scores over the course of the study. In **Group A**, the mean GI decreased from **2.00 ± 0.13** on Day 10 to **1.37 ± 0.18** on Day 20, and further to **0.43 ± 0.13** on Day 30. Repeated measures ANOVA revealed that the reduction was statistically significant ($F = 11.01$, $p < 0.001$) (Table 1)

Similarly, **Group B** exhibited a decline in GI values from **2.00 ± 0.12** on Day 10 to **1.52 ± 0.10** on Day 20, reaching **0.86 ± 0.24** by Day 30, with the changes also being statistically significant (**$F = 351.00$, $p < 0.001$**).

Post hoc analysis (Table 1a) confirmed statistically significant differences between all evaluated time points within each group (**$p < 0.001$**), indicating continuous improvement in gingival health across the observation period.

Table 1: Comparison of mean GI levels across groups.

Group	Timeline	n	Mean	SD	F value	P value
Group A	Day 10	10	2.0000	0.13333	11.01.58	**<0.001***
	Day 20	10	1.3700	0.17670		
	Day 30	10	0.4300	0.13375		
Group B	Day 10	10	2.0000	0.12472	351.00	**<0.001***
	Day 20	10	1.5200	0.10328		
	Day 30	10	0.8600	0.23664		

Repeated Measures of ANOVA; P≤0.05 considered statistically significant

Table 1a: Pairwise comparison – Post hoc analysis

Comparison between		P value	
		Group A	Group B
Day 10	Day 20	**<0.001***	**<0.001***
	Day 30	**<0.001***	**<0.001***
Day 20	Day 30	**<0.001***	**<0.001***

Intergroup Comparison:

On **Day 10**, no significant difference was noted between Group A and Group B (**p = 1.000**), confirming comparable baseline GI levels post-treatment. (Table 2)

By **Day 20**, Group A demonstrated significantly lower GI values (**1.37 ± 0.18**) compared to Group B (**1.52 ± 0.10**), with a **t-value of -2.318** and a **p-value of 0.032**, reflecting a more rapid clinical improvement in Group A.

At **Day 30**, this difference was further accentuated, with Group A showing markedly lower GI scores (**0.43 ± 0.13**) compared to Group B (**0.86 ± 0.24**). The difference was highly significant (**t = -5.002, p < 0.001**), suggesting superior gingival healing in the grape seed extract group.

Table 2: Mean comparison of GI between the groups

Timeline	Group	n	Mean	SD	t value	P value
Day 10	Group A	10	2.0000	0.13333	0.000	1.000
	Group B	10	2.0000	0.12472		
Day 20	Group A	10	1.3700	0.17670	-2.318	**0.032***
	Group B	10	1.5200	0.10328		
Day 30	Group A	10	0.4300	0.13375	-5.002	**<0.001***
	Group B	10	0.8600	0.23664		

ANOVA Test; P≤0.05 considered statistically significant

Wound healing index:

Intragroup Evaluation:

A progressive improvement in wound healing was observed in both groups over the study period. In **Group A**, the mean WHI was **1.00 ± 0.00** on Day 10, increased to **2.00 ± 0.00** on Day 20, and further improved to **3.60 ± 0.52** by Day 30. Similarly, **Group B** showed an increase in WHI scores from **1.00 ± 0.00** at Day 10 to **2.00 ± 0.00** on Day 20, and **3.20 ± 0.42** at Day 30. The changes within both groups were statistically significant (**Friedman Test = 20.000, p < 0.001**), indicating effective healing progression. (Table 3)

Post hoc analysis (Table 3a) confirmed significant differences between all evaluated time points (Day 10 vs. Day 20, Day 10 vs. Day 30, and Day 20 vs. Day 30) in both groups, with **p-values < 0.05**, reflecting continuous and meaningful tissue repair over time.

Table 3: Mean comparison of wound healing within the groups

Group	Timeline	n	Mean	SD	Test value	P value
Group A	Day 10	10	1.0000	0.00000	20.000	**<0.001***
	Day 20	10	2.0000	0.00000		
	Day 30	10	3.6000	0.51640		
Group B	Day 10	10	1.0000	0.00000	20.000	**<0.001***
	Day 20	10	2.0000	0.00000		
	Day 30	10	3.2000	0.42164		

Friedman Two-Way ANOVA; P≤0.05 considered statistically significant

Table 3a: Pairwise comparison – Post hoc analysis

Comparison between		P value	
		Group A	Group B
Day 10	Day 20	**0.025***	**0.025***

	Day 30	**<0.001***	**<0.001***
Day 20	Day 30	**0.025***	**0.025***

Table 4: Mean comparison of wound healing between the groups

Timeline	Group	n	Mean	SD	Test value	P value
Day 10	Group A	10	1.0000	0.00000	0.000	1.000
	Group B	10	1.0000	0.00000		
Day 20	Group A	10	2.0000	0.00000	0.000	1.000
	Group B	10	2.0000	0.00000		
Day 30	Group A	10	3.6000	0.51640	1.897	0.075
	Group B	10	3.2000	0.42164		

Kruskal Wallis Test; P≤0.05 considered statistically significant

Intergroup Evaluation:(Table 4)

At **Day 10** and **Day 20**, no statistically significant differences in WHI were noted between the two groups (**p = 1.000**), suggesting similar initial healing responses.

By **Day 30**, although **Group A** presented with a higher mean WHI (**3.60 ± 0.52**) compared to **Group B** (**3.20 ± 0.42**) showing the better result.

Post operative pain index by VSA:

Intragroup Findings:

(Table 5) Both groups experienced a significant decline in pain over the study period. In **Group A**, the mean VAS score decreased from **4.50 ± 0.53** at 24 hours post-operation to **3.00 ± 0.67** at 72 hours, further dropping to **1.10 ± 0.32** by Day 10, **0.10 ± 0.32** on Day 20, and reaching **0.00** by Day 30. These reductions were statistically significant (**Friedman test = 39.812, p < 0.001**).

Similarly, **Group B** showed a decrease from **4.50 ± 0.53** at 24 hours to **2.90 ± 0.32** at 72 hours, then to **1.30 ± 0.48** on Day 10, **0.20 ± 0.42** on Day 20, and **0.00** at Day 30, with significant improvement confirmed statistically (**Friedman test = 39.667, p < 0.001**).

Post hoc analysis (Table 5a) highlighted statistically significant differences between most time intervals, especially between 24 hours and Day 10, and extending to Day 30 (**p < 0.05**). However, no significant differences were observed between 24 and 72 hours or between Day 20 and Day 30.

Table 5: Mean comparison of Pain Scores within the groups

Group	Timeline	n	Mean	SD	Test value	P value
Group A	24 hrs	10	4.5000	0.52705	39.812	**<0.001***
	72 hrs	10	3.0000	0.66667		
	Day 10	10	1.1000	0.31623		
	Day 20	10	0.1000	0.31623		
	Day 30	10	0.0000	0.00000		
Group B	24 hrs	10	4.5000	0.52705	39.667	**<0.001***
	72 hrs	10	2.9000	0.31623		
	Day 10	10	1.3000	0.48305		

	Day 20	10	0.2000	0.42164		
	Day 30	10	0.0000	0.00000		

Friedman Two-Way ANOVA; P≤0.05 considered statistically significant

Table 5a: Pairwise comparison – Post hoc analysis

Comparison between		P value	
		Group A	Group B
24 hrs	72 hrs	0.157	0.157
	Day 10	**0.005***	**0.005***
	Day 20	**<0.001***	**<0.001***
	Day 30	**<0.001***	**<0.001***
72 hrs	Day 10	0.157	0.157
	Day 20	**0.001***	**0.001***
	Day 30	**<0.001***	**<0.001***
Day 10	Day 20	**0.040***	**0.048***
	Day 30	**0.028***	**0.024***
Day 20	Day 30	0.888	0.777

Intergroup Findings:

Comparisons between the two groups(Table 6) at each time point revealed no statistically significant differences in pain scores. Both groups recorded identical mean pain scores of **4.50 ± 0.53** at 24 hours (**p = 1.000**). Likewise, at 72 hours (**p = 0.796**), Day 10 (**p = 0.481**), Day 20 (**p = 0.739**), and Day 30 (**p = 1.000**), pain levels did not differ significantly between Group A and Group B.

Table 6: Mean comparison of pain scores between the groups

Timeline	Group	n	Mean	SD	Test value	P value
24 hours	Group A	10	4.5000	0.52705	0.000	1.000
	Group B	10	4.5000	0.52705		
72 hours	Group A	10	3.0000	0.66667	-0.399	0.796
	Group B	10	2.9000	0.31623		
Day 10	Group A	10	1.1000	0.31623	-1.090	0.481
	Group B	10	1.3000	0.48305		
Day 20	Group A	10	0.1000	0.31623	-0.610	0.739
	Group B	10	0.2000	0.42164		
Day 30	Group A	10	0.0000	0.00000	0.000	1.000
	Group B	10	0.0000	0.00000		

Kruskal Wallis Test; P≤0.05 considered statistically significant

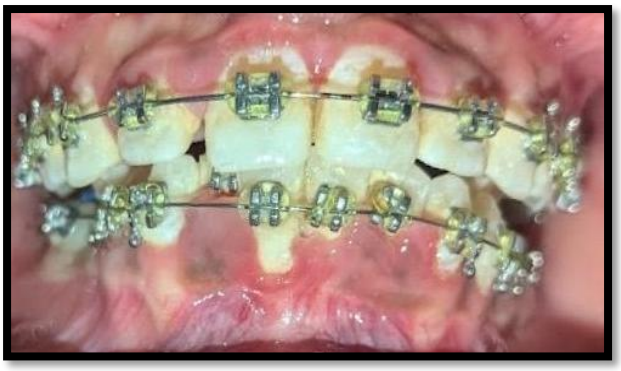

Fig 3: Pre op

Fig 4: Post op

7. DISCUSSION

The present clinical study was conducted to evaluate and compare the effectiveness of grapeseed extract (GSE) gel and amla (Emblica officinalis) gel in promoting gingival healing following gingivectomy. A total of 20 systemically healthy individuals requiring gingivectomy were divided into two equal groups. Group A (n = 10) underwent gingivectomy followed by application of GSE gel, and Group B (n = 10) underwent gingivectomy followed by application of amla gel.

Healing progression was assessed on the 10th, 20th, and 30th postoperative days, utilizing three primary clinical indices: Gingival Index (GI), Wound Healing Index and pain perception using the Visual Analog Scale (VAS) recorded at 24 hours, 72 hours, 10th, 20th, and 30th day.

Both groups demonstrated a progressive decline in GI scores, indicating a reduction in gingival inflammation during the healing phase. Notably, Group A (GSE) exhibited a more pronounced decrease in GI values by Day 20 and Day 30, suggesting a superior anti-inflammatory response This is in agreement with the study by **Rayyan et al. (2018)**, which showed a significant reduction in Gingival Index (GI) scores after the topical administration of grape seed extract (GSE) gel in individuals with chronic periodontitis.[10]

The potent anti-inflammatory activity of GSE is largely attributed to its high concentration of oligomeric proanthocyanidins, which inhibit pro-inflammatory cytokine production and downregulate pathways associated with oxidative stress and inflammation according to **Anusuya v et al. 2020**[17]

Although Group B (Amla) also exhibited improvement in GI scores, the reduction was more gradual, reaching statistical significance by Day 30. Amla's efficacy in controlling inflammation is attributed to its high levels of tannins, flavonoids, and vitamin C—components known for their antioxidant and anti-inflammatory effects according to **Grover et al. 2016**. These compounds facilitate resolution of inflammation through modulation of inflammatory mediators and free radical scavenging activity[11]

Assessment of healing using the Landry Wound Healing Index revealed that patients in Group A showed superior wound resolution by Day 20 and Day 30. Clinical characteristics observed included reduced erythema, absence of bleeding on probing, and well-formed epithelial coverage. These outcomes are supported by the work of **Ozden et al. (2017),**[18] who noted that GSE enhanced fibroblast proliferation and collagen synthesis, leading to faster and more organized tissue repair. Moreover, proanthocyanidins found in grape seed extract (GSE) have been reported to promote collagen fiber stabilization, which plays a vital role in the regeneration of soft tissues **(Anusuya V. et al., 2020).**[17]

Group B exhibited favorable early healing, with marked epithelialization by Day 10. Amla's ability to accelerate early-stage healing may stem from its stimulation of fibroblast activity and increased collagen production, as demonstrated in a randomized trial by **Tewari et al. (2016)**. Additionally, its antimicrobial properties play a critical role in maintaining a pathogen-free environment, reducing healing complications and supporting early wound closure.[11]

Pain scores assessed using the VAS revealed a dichotomous trend between the two groups. Group B (Amla) reported significantly lower pain levels at 24 and 72 hours postoperatively, suggesting superior short-term analgesic efficacy.

According to **Golechha et al. (2011),** amla extract exhibited strong anti-inflammatory properties in experimental rodent models of acute and chronic inflammation. The anti-inflammatory effects are attributed to the presence of bioactive compounds such as tannins, flavonoids, and vitamin C, which may also contribute to the observed analgesic effects[19]**. Gawish et al. (2024)** further reported similar early-phase comfort in patients treated with amla gel for periodontal therapy.[12]

Conversely, Group A (GSE) patients experienced moderate discomfort during the initial 72 hours. However, pain scores

significantly decreased by Day 10, coinciding with accelerated wound healing and inflammation control. Experimental studies have demonstrated the analgesic potential of GSE. **Li et al. (2024)** investigated the effects of grape seed-derived procyanidins on neuropathic pain in a rat model. Their findings indicated that GSE administration significantly reduced mechanical allodynia and thermal hyperalgesia, suggesting its potential as an analgesic agent in neuropathic pain models.

Additionally, **Lauren et al. (2020)** assessed the impact of dietary supplementation with GSE on trigeminal nociception in rats with induced temporomandibular disorder. The study found that GSE supplementation inhibited pain signaling and reduced nociceptive responses, highlighting its potential utility in managing orofacial pain conditions.

8. CONCLUSION

Grape seed extract and amla gel both contributed to improved gingival healing and pain control following gingivectomy. Grape seed extract showed greater effectiveness in reducing inflammation and enhancing tissue regeneration over time. Thus, both gels can be considered useful in promoting post-surgical recovery.

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