

ORIGINAL RESEARCH

A Comparative Evaluation of Vasoconstrictor Efficiency Between Adrenaline and Triphala During Gingival Retraction in Tooth Preparation for Fixed Partial Denture - An Observational Study

Noorul Rizwana ^a, Geetha Priyha Jagadeeshan ^b, Suganya Srinivasan^c, Murugesan Krishnan^d

ABSTRACT

Background: Gingival retraction is essential for accurate impression-making during tooth preparation for fixed partial dentures. Effective hemostasis during this process ensures proper tissue displacement and a clear working field, which is crucial for precise restorative procedures. Traditionally, chemical vasoconstrictors like adrenaline are used to achieve hemostasis, but they may have systemic side effects, particularly in patients with cardiovascular concerns.

Herbal alternatives like **Triphala**, a polyherbal Ayurvedic formulation, are gaining interest in modern dentistry due to their natural astringent, anti-inflammatory, and hemostatic properties. Triphala, composed of three fruits—**Amalaki**, **Bibhitaki**, and **Haritaki**—is a well-known traditional medicine and offers a safer, potentially less invasive option for controlling gingival bleeding. This study aims to evaluate and compare the hemostatic efficiency of Triphala and adrenaline during gingival retraction.

Aim: To compare the efficiency of an herbal astringent (Triphala) with a chemical vasoconstrictor (adrenaline) in controlling hemostasis during gingival retraction for tooth preparation.

Materials and Method: Three groups were studied: Group A (Triphala Churanam-injected retraction cords), Group B (adrenaline-injected retraction cords), and Group C (plain retraction cords as control). Triphala (5.5-30% salt form) was mixed with polyol gel and injected into retraction cords, solidified, and used post-tooth preparation. Hemostasis was evaluated based on bleeding control, scored as: 0 (no bleeding), 1 (bleeding controlled within 1 minute), and 2 (bleeding uncontrolled). The groups were compared through double-blind randomization.

Results: Statistical analysis using one-way ANOVA and post-hoc tests revealed no significant differences between Groups A and B. Mean bleeding index values were compared with standard deviations and F-values.

Conclusion: Triphala demonstrated similar hemostatic efficiency to adrenaline, suggesting it can be a viable adjunct in gingival retraction cords for modern dental practice.

Key words: Bleeding Index, Gingival Retraction, Hemostasis, Herbal Astringent, Triphala

How to cite this article: Noorul Rizwana, Geetha Priyha Jagadeeshan, Suganya Srinivasan, Murugesan Krishnan. A Comparative Evaluation of Vasoconstrictor Efficiency Between Adrenaline and Triphala During Gingival Retraction in Tooth Preparation for Fixed Partial Denture-An Observational Study. *J Clin Prosth Impl* 2025;7(2):103-107. <https://doi.org/10.55995/j-cpi.2025017>

INTRODUCTION

Unlike other developing countries, India is one of the major countries that emphasize to a greater extent the use of Ayurveda and herbal treatment options in comparison to that of allopathic treatments. Owing to the development of various herbal and natural resources and their significant chemical byproducts, in various allopathic therapies, the use of new drugs with lesser host impact has

been established.^{1,2} There are numerous herbal replacements for chemical ingredients in dentistry as well. The use of herbs and their chemical composition in dentistry is a new trend and it sets a wide scope in research of these materials as well.

One such material used in our study is TRIPHALA. This material has been used in other dental products such as mouthwash, toothpaste etc.³ The ultimate purpose of using Triphala in retraction cords is to introduce an herbal substitute for chemical

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astringents used in retraction cords, thereby obtaining the same results as the chemical astringents. Thus, through this study, we intend to evaluate the vasoconstrictor activity of Triphala, compared to the chemical astringent, and the time taken to control bleeding in the gingival sulcus of a prepared tooth for some patients. A vascularized free fibular graft is the gold standard for replacing necrotized resected bone in such circumstances where healing is compromised.³ The use of virtual planning and rapid prototyping is increasingly popular in reconstructive surgery, particularly in complex anatomical reconstructions. Rapid prototyping facilitates the manufacture of three-dimensional (3D) models and templates that allow the surgeon to plan the procedure before surgery, thereby closing the gap between preoperative surgical planning and execution. Here is a case report of medication related osteonecrosis of the jaw patient who was prosthodontically rehabilitated.

AIM AND OBJECTIVES

To compare the astringent activity of Triphala to that of Adrenaline

- To estimate the duration of bleeding time on placement of retraction cords of the study groups (Group A and B)
- To compare the efficiency and potential of Triphala in controlling bleeding with Adrenaline.

MATERIAL AND METHODS

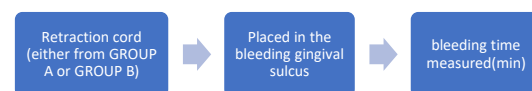
A commercially available form of TRIPHALA CHURANAM was purchased from Govt. Siddha Medical College (Chennai), and was subjected to the following steps to be used in the retraction cord. Thirty-six patients were selected and assigned randomly as twelve for each group. The study consisted of three groups, Group A as retraction cords impregnated with Triphala, Group B as retraction cords impregnated with adrenaline, and Group C as with plain retraction cards (control). Patients were randomly allocated in three groups by stratified randomization method.

The retraction cord used for this study was an OMNIPAK smart cut knitted retraction cord of size 000. Group A retraction cord infused with Triphala was done by the following method. The commercially available Triphala is available in salt form. This is dissolved and prepared such that 100 ml of saline consists of 5-30 percent Triphala and sorbitol (artificial sweetening agent) consisting of 67-90%. The mixture was mixed and stirred for 5 minutes and then residues were filtered. This solution was then introduced in the retraction cord box of 000 size and left for 48 hours for infusion into the retraction cords.

Group B consists of a retraction cord with adrenaline-infused into it with a percentage of 2% lignocaine and adrenaline of 1:80000 in the solution and infused in the retraction cord box consisting of cord size 000 and left for 48 hours before usage.

Group C consisted of a plain retraction cord with no impregnation and no addition of any other chemical reagent. By this, we can compare the efficiency of Triphala-infused cords an Adrenaline-infused cords with that of plain cords. Thus, making the process easy in comparing the two study groups with that of the control (plain cords).

Group name	No of participants N=36
GROUP A – retraction cord impregnated with Triphala (study group)	12
GROUP B- retraction cord impregnated with adrenaline	12
GROUP C –plain retraction cord (control)	12



The teeth that were to be converted into fixed partial dentures were taken into consideration in this study and the criteria to be included was a three-unit fixed partial denture with sub-gingival margin preparation. The cord box is then labeled as A and B by the examiner. The cord was randomly selected and placed around the prepared tooth of the patient and subjected to placement of the cord.

Criteria for evaluation:

- 0- No bleeding
- 1- Bleeding controlled within 1 minute
- 2- Bleeding controlled within 2 minutes

RESULTS

On the collection of data from the observer who was blinded from knowing the study group and the control, the results were subjected to statistical analysis. A total of 108 teeth were examined in 36 patients who were randomly allocated in either one of the groups. The values given in the table 3.1 was noted with a timer by the observer who was blinded from knowing the study and the control group. Refer Graph I for the same

By this way, the observer bias can be eliminated in this study. When the groups were compared with each other and within the groups, the statistical analyses followed by ANOVA, the following results were formulated. From the table 3.2, the f value from

ANOVA was found to be 8.052 and it is graphically represented in graph 2.

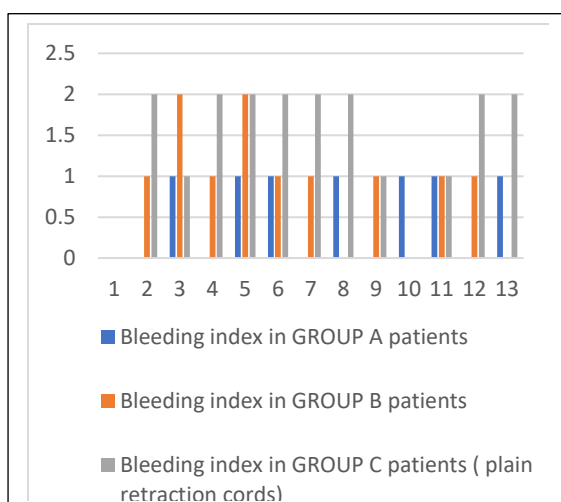
When comparing with other groups the results were found to be significant. For multiple comparison within the groups, POST HOC test was performed and the following results were elicited. The mean difference and standard error with comparison within the groups were calculated from table 3.3 and graphically presented in graph 3. When comparing within the groups, it was found that f value was 8.05 and p value was found to be 0.001.

Aallocation number	GROUP A (Triphala)	GROUP B (Adrenaline)	GROUP C (plain cord)
1	0	1	2
2	1	2	1
3	0	1	2
4	1	2	2
5	1	1	2
6	0	1	2
7	1	0	2
8	0	1	1
9	1	0	0
10	1	1	1
11	0	1	2
12	1	0	2

Table 3.1-bleeding index values in three groups

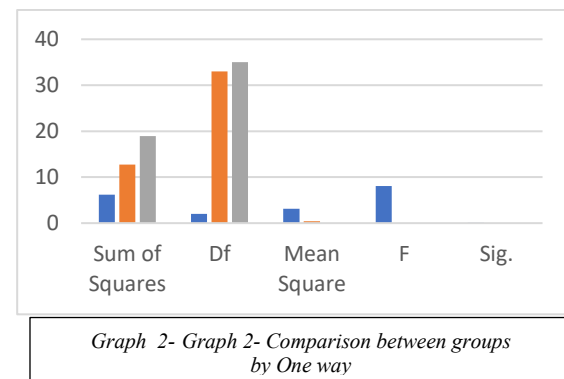
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6.222	2	3.111	8.052	.001
Within Groups	12.750	33	.386		
Total	18.972	35			

Table 3.2- Comparison between groups by One way



Graph 1 Bleeding index values in three groups

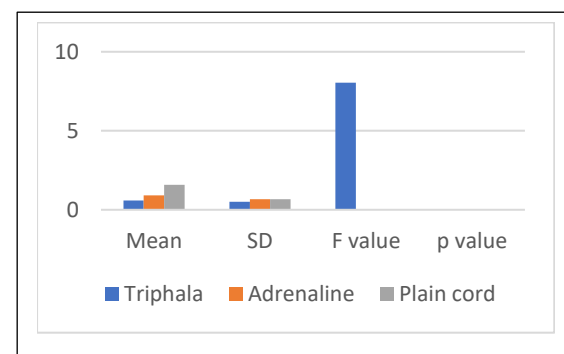
From the table 3.4, it was found that, p value was significant when comparing Group A and Group C and Group B and Group C respectively. The comparison between Group A and Group B was found to be insignificant from POST HOC test with 95% confidence interval and $p < 0.005$ that is represented in graph 4.



Graph 2- Graph 2- Comparison between groups by One way

Group	Mean	SD	F value	p value
Triphala	.58	.51	8.05	.001
Adrenaline	.92	.67		
Plain cord	1.58	.67		

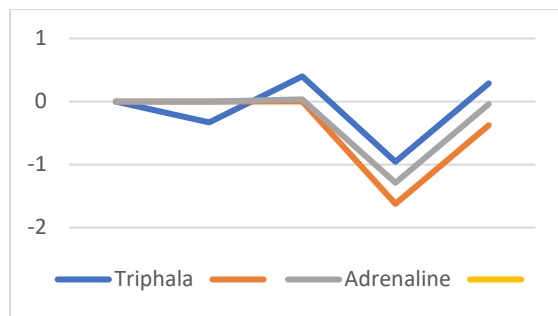
Table 3.3- F value and p value



Graph 3- - F value and p value

	(J) Grp	Mean Diff. (I-J)	p value	95% CI	
				Lower Bound	Upper Bound
Triphala	Adrenaline	-.333	.398	-.956	.289
	Plain cord	-1.0000*	.001	-1.623	-.377
Adrenaline	Plain cord	-.6667*	.034	-1.289	-.044

Table 3.3- F value and p value



Graph 4- Post hoc analysis between the groups and within the group

DISCUSSION

The use of retraction cords in dentistry is crucial for delineating the sub-gingival finish line and controlling bleeding in the gingival sulcus before taking impressions. Traditional chemical agents such as adrenaline and aluminum compounds have been widely utilized for these purposes. However, as the dental field increasingly embraces herbal and Ayurvedic solutions, Triphala emerges as a promising alternative due to its astringent properties.⁴⁻⁸

Triphala has gained recognition in dentistry for its therapeutic applications, particularly in the treatment of gingival lesions and periodontal issues. Its incorporation into retraction cords aims to provide an effective, herbal solution for controlling bleeding and facilitating gingival retraction during tooth preparation. In our study, we compared the efficacy of Triphala-impregnated retraction cords with those containing adrenaline. The statistical analysis revealed that both Triphala and adrenaline exhibited comparable effects on bleeding control, with significant differences noted when comparing plain cords to those impregnated with either agent. Notably, the p-values of 0.01 and 0.034 indicate significant differences in efficacy between the groups, while the comparison between Triphala and adrenaline ($p = 0.398$) suggests that they are statistically similar in their actions.

Despite the benefits of Triphala, it is essential to consider its potential side effects. Some individuals may experience gastrointestinal disturbances, such as diarrhea or stomach upset, particularly if Triphala is consumed in excessive amounts. Additionally, while rare, allergic reactions to herbal ingredients can occur, manifesting as rashes or itching in sensitive patients.

Triphala may also interact with certain medications, especially anticoagulants, which could potentially affect their efficacy.^{5,6} Furthermore, the effectiveness and safety of Triphala can vary

significantly depending on the source and preparation method, leading to inconsistencies in its therapeutic effects and also Triphala presents as a viable alternative to chemical astringents in dental applications although clinicians must be mindful of its potential side effects and interactions.

CONCLUSION

This in-vivo study was done to compare and evaluate the vasoconstrictor effect of Triphala and that of adrenaline during gingival retraction after tooth preparation. Within the limitation of the study, the following conclusions were made,

1. Group A (Triphala) and B (Adrenaline), both showed reduced or no bleeding in comparison with group C.
2. There were significant differences between Group C (Plain retraction cord) with that of Group A and B.
3. Group A and B on comparison showed insignificant results, which indicates that the effect of vasoconstriction by both the groups showed similar results, thus concluding that Triphala can be used as an adjunct to that of adrenaline in retraction cords.

CONFLICTS OF INTEREST

No conflicts of interest

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