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RESEARCH ARTICLE

EFFECT OF HIORA-GA GEL ON PERIODONTAL SURGICAL WOUND – A CLINICAL AND MICROBIOLOGICAL STUDY

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ABSTRACT

The days following periodontal flap procedures are usually associated with bleeding, pain, swelling and infection. Conventionally, analgesics, antibiotics, periodontal dressings, antimicrobial mouthwashes/gels are used to prevent plaque accumulation and promote wound healing at the surgical site. HIORA GA gel is a polyherbal formulation that derives its benefits from four main ingredients namely-oil of Myrstica fragrans, extracts of Terminalia arjuna, Pterocarpus marsupium & Triphala. Each of these components are found to have significant effect on wound healing. The present study evaluates the efficacy of this gel in preventing the recolonisation of periodontopathic bacteria and promoting wound healing as compared with a periodontal dressing. The results of this clinical study clearly shows that HIORA-GA gel is effective for post periodontal surgery use as an alternative to periodontal dressing. The overall effect was also found to be significant. There were no adverse reactions either reported or observed during the entire study period and overall compliance to the treatment was excellent.

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INTRODUCTION

Infection is a potential complication following periodontal surgery and is characterised by pain, swelling, suppuration and delayed wound healing. The continous presence of bacteria on wound surface has been found to enhance inflammation and granulation tissue formation ,besides retarding healing of the tissue (Burke, 1971) (Knowles *et al.,* 1979). The detrimental effects of bacterial colonization and maturation in a wound healing situation, such as following periodontal surgery, have been widely documented. Successful antimicrobial treatment following periodontal surgery is aimed at elimination and suppression of wound associated microorganisms. Highly effective antimicrobials should also prevent recolonization of periodontopathogens. Variety of debridement and/or anti-infective measures have been advocated to improve clinical outcomes following surgical intervention. These include meticulous professional mechanical debridement, application of antiseptics in dressings and/or rinses, and administration of systemic antibiotics. The value of mechanical debridement such as tooth brushing and flossing has been extensively documented. Only a few studies have addressed the role of meticulous mechanical plaque control by professional supervision following periodontal surgery (Carranza's clinical periodontology, 10th edition). This is likely because of pain and sensitivity at the surgical site. Extensive research has been performed to explore the beneficial clinical effects of chlorhexidine rinses in controlling supragingival plaque formation (Newman *et al.,* 1989).

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Of all oral rinsing products with antiplaque properties, chlorhexidine has long been considered as the gold standard. However, chlorhexine mouthwash has been reported to have a number of side effects like brown discoloration of teeth ,restorative materials and dorsum of tonge; taste perturbation, oral mucosal ulcerations, unilateral/bilateral parotid swelling, and enhanced supragingival calculus formation. Role of periodontal dressing after periodontal surgery remains controversial. The value of periodontal dressings has been questioned both in terms of healing response and patient preference. Stahl et al found that the use of dressing makes little difference to healing following gingivectomy procedures (Neil, 1975). Similarly no healing advantage was demonstrated when a pack was used following reverse bevel flap surgery or Modified Widman Flap procedures (Thomas M. Jones ,1979).

Leakage at the dressing/tissue interface may result in plaque accumulation and delayed healing. Some studies have reported greater pain and discomfort with a dressing but less sensitivity and fewer eating difficulties (Ibrahim *et al.,* 2011). The incorporation of bacteriostatic agents in dressing has been of limited clinical value. Bay and Langebaek (1978) (Olaleye *et al.,* 2006) showed no enhanced plaque inhibition with chlorhexidine impregnated dressings, in contrast Piuss (Udaysing Hai Patil and Dattatraya. K. Gaikwad, 2011) found a dressing impregenated with chlorhexidine reduced bacterial colonisation of teeth. The routine use of perioperative/postoperative antibiotics in anticipation and prevention of post operative infection appears for the most part to be based on emperism and is unsubstantiated.

Furthermore, with the increased use of bone grafts (Choudhary, 2011), guided tissue regeneration (Sabina and Rasool Analgesic, 2007) and implants (Sajith Abraham *et al.,* 2005), the use of antibiotics have further increased. This is all more significant in our current era of periodontal practice where concerns are continuously raised about the overuse and side effects, including antibiotic resistant strains. Also data from many studies suggests that there may be no benefit in using antibiotics for the sole purpose of preventing post surgical infections.

Herbal drugs (drug from medicinal plants) are now being widely used for treatment of a variety of diseases. Ayurvedic drugs are widely acclaimed for their for their minimal side effects and cost effectiveness (Ibrahim *et al.,* 2011). Hiora GA is a polyherbal formulation for spongy, painful, bleeding gums and sensitive teeth. It contains oils of Mytica fragrans,and extracts of Terminalia arjuna, Pterocarpus marsupium and Triphala, and these herbs have soothing, astringent, connective tissue healing properties along with antioxidant, antimicrobial and anti-inflammatory properties. The beneficial effects of Hiora GA can be attributed to the combined effect of the individual potent herbs. This study evaluates the efficacy of this gel in preventing the recolonisation of periodontopathic bacteria and promoting wound healing as compared with a periodontal dressing.

MATERIALS AND METHODS

Patient selection

The present study was conducted in the Department of Periodontology, JSS Dental College and Hospital, constituent college of JSS University. Ethical clearance was obtained from the Ethical review board, JSS University. Fifteen subjects (7 men and 8 women aged 25 to 62 years, mean 46.49) who came to the Department of Periodontology seeking periodontal therapy were recruited to participate in the study.

Inclusion criteria

- Patients with chronic generalized periodontitis with clinical attachment loss of >5mm in at least 5 teeth in a quadrant and radiographic evidence of boneloss.
- Periodontal pockets with >6mm probing depth
- Periodontal pockets in the contralateral quadrant with identical probing depth
- Patients willing to participate in the study

Exclusion criteria

- Lack of patients ability to maintain good plaque control
- Patients with angular defects that requires regenerative therapy.
- Patients on systemic antibiotics/anti-inflammatory drugs for the past 3 months.
- Patients who have undergone periodontal surgeries within the period of 1yr
- Systemically compromised patients
- Smokers
- Pregnant and lactating mothers

Sample size

By purposive sampling technique 15 patients satisfying the inclusion criteria were taken for the study.

Study design

This was a split mouth single blind trial to compare the effectiveness of HiOra GA gel and periodontal dressing in the post surgical healing. Randomisation was done using coin toss method.

Presurgical procedure

Prior to surgery the patients were subjected to thorough scaling and root planning using an ultrasonic scaler and hand instruments. Oral hygiene instructions included training in the Bass technique of brushing and the use of dental floss. Overhanging margins of fillings were reduced where necessary. The preparatory treatment was completed at least 3 weeks prior to surgery, after which the patients were subjected to a baseline examination calibrated by a trained examiner prior to the study. The contralateral quadrants that were scheduled for surgery were randomized as test site and control site using coin toss method.

Test site - Hiora GA gel was given to patient for local application. Patient was instructed to apply 2-3ml of gel with a cotton applicator on the surgical site for 4 weeks
Control site- Periodontal dressing was placed post flap surgery. The dressing was removed after one week.

Patients were evaluated for the following clinical parameters

- Plaque index by Silness P and Loe H (1964)
- Gingival index by Loe H and Silness J (1963)
- Probing depth and clinical attachment loss using pressure sensitive florida probe.
- Sulcus bleeding index(Muhleman and Son,1971)
- Pain based on Visual Analog Scale.

Following this subgingival and marginal plaque were collected from 2 interproximal sites (deepest pocket) in each quadrant using sterile curette for microbial assessment. Qualitative and quantitative estimation of the following bacteria were done using chairside BANA kit.

- Treponema denticola
- Porphyromonas gingivalis
- Tennerella forsythensis

Following this GCF sample from the same sites were collected using a micropipette. Smear was prepared and stained using H&E staining technique for determining thePMN and mononuclear cell percentages. Evaluation of all the above parameters was done at baseline, 1 month and 3months.

Procedure

After obtaining adequate anaesthesia modified Widman flap surgery was done in the test quadrant (Ramfjord and Nissle, 1974). Following surgery 4-0 black silk sutures were placed.

Patient were instructed to apply 2-3 ml of the gel dispensed from a dropper to be massaged on the surgical area using a cotton applicator for 4 weeks. They were also issued with 10 capsules of the analgesic aceclofenac and a form to record the degree of pain or swelling and the number of analgesic capsules taken. Pain was recorded as none, mild to moderate or severe and swelling as present or absent. The patient was recalled after 1 week for suture removal. The test quadrant was monitored for 4 weeks post surgically. This was followed by the surgery of contralateral site. Periodontal dressing was placed, which was removed after 1 week along with the sutures.

RESULTS

The Results are shown in Table 1 and Table 2.

Table 1. Intra and inter group comparison of clinical paramaters

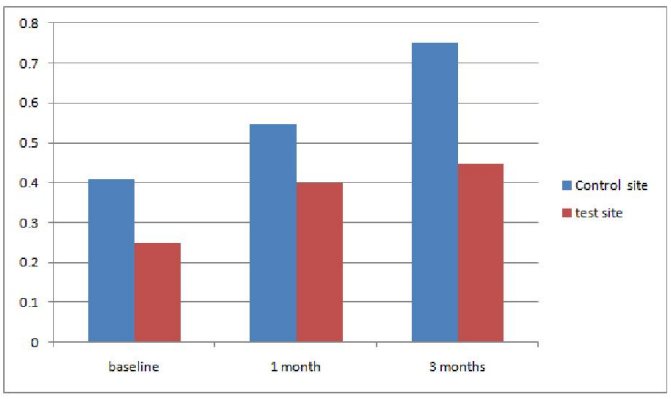
		Baseline	1 month	3 month
PI	Test	0.2500	0.400	0.4500
	Control	0.4167	0.5500	0.7567
	P value	0.013*	0.124	0.041*
GI	Test	0.5167	0.5833	0.6667
	Control	0.5167	0.5833	0.6667
	P value	1.000	1.000	1.000
PD	Test	5.0533	4.4467	4.2933
	Control	4.5533	4.0933	3.9733
	P value	1.965	1.628	1.544
CAL	Test	3.3667	3.1733	3.1067
	Control	3.0933	2.8667	2.8200
	P value	1.588	1.727	1.926
IFN	Test	63.333	15.2667	10.4667
	Control	64.800	18.1333	28.4000
	P value	0.674	0.120	0.000*
VAS		1 week	1 month	
	Test	2.6667	0.2000	
	Control	6.3333	0.5333	
	P value	0.000*	0.140	

Table 2. Inter group comparisons of BANA scores

		Test	Control
Baseline	P	4	4
		26.7 %	26.7 %
	WP	6	6
		40.0%	40.0%
	N	5	5
		33.3%	33.3%
	P value	1.000	
1 month	P	0	0
		0%	0 %
	WP	0	1
		0%	6.7%
	N	15	14
		100 %	93.3%
	P value	0.309	
3 month	P	0	0
		0 %	0%
	WP	1	7
		6.7%	46.7%
	N	14	8
		93.3%	53.3%
	P value	0.013	

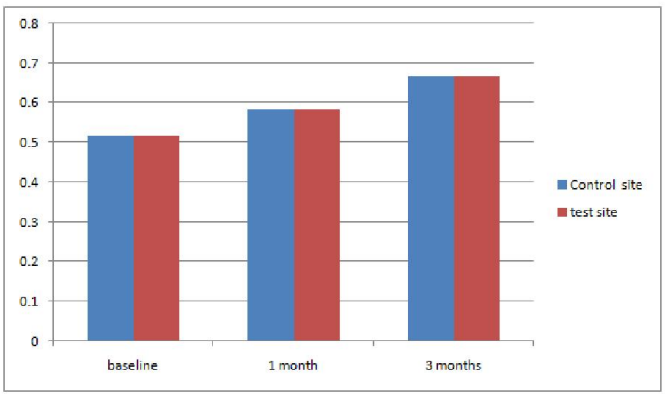
Clinical parameters

In the test group the plaque index increased from 0.25 ± 0.00 to 0.45 ± 0.23 at 3 months which was statistically significant (p value = 0.005) where as no significant difference in the PI in the control group was seen (Graph 1).



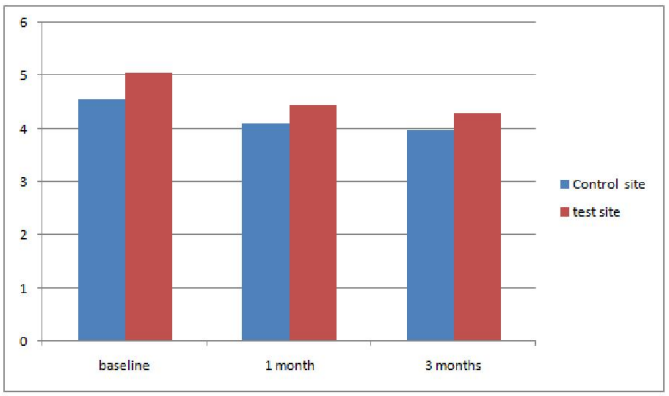
Graph 1. Comparision of Plaque index

There was no statistically significant differences seen in the changes in the GI in both the test and control groups (Graph 2).



Graph 2. Comparision of Gingival Index

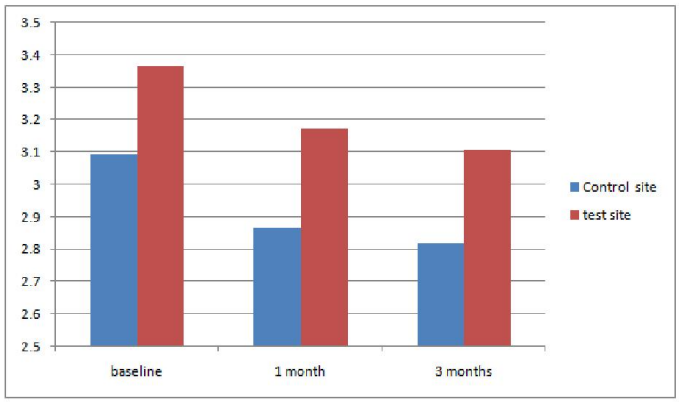
The probing depth decreased from 5.05 ± 0.79 to 4.429 ± 0.29 at 3 months in the test group and which was statistically significant (p value = 0.000) whereas in the control group it decreased from 4.55 ± 0.57 to 3.97 ± 0.57 at 3 months which was also statistically significant (p value = 0.000) (Graph 3).



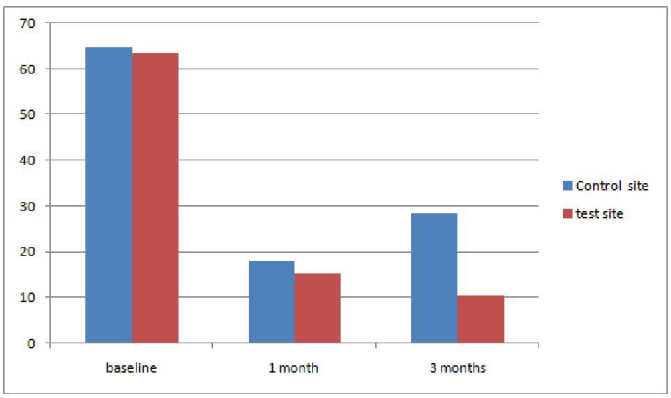
Graph 3.Comparision of probing depth

The inflammation at the test sites was 64.80 ± 10.42 at baseline which decreased to 15.26 ± 3.55 at 1 month to 10.46 ± 3.90 at 3 months and this difference was statistically significant (p value = 0.000). The inflammation at the control

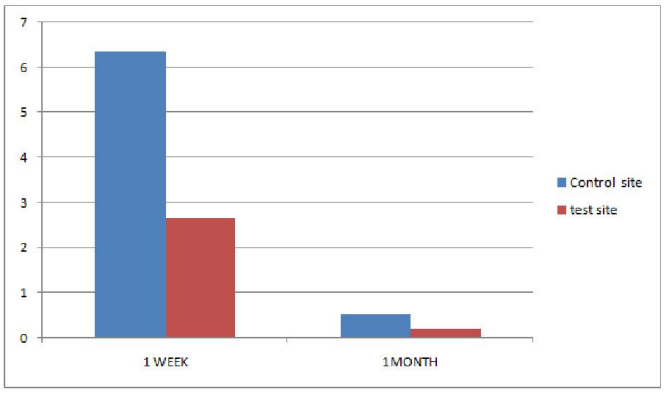
sites was 63.33 ± 8.39 at baseline which decreased to 18.13 ± 5.93 at 1 month to 28.40 ± 11.15 at 3 months and this difference was statistically significant (p value = 0.000). (Graph 5). On intra-group comparison of VAS values, there was less pain at the test sites at 1 week and this difference was statistically significant (p value = 0.000). The inflammation at the test sites at 3 months was less than that at the control sites which was statistically significant (p value = 0.000) (Graph 6)



Graph 4. Comparision of Clinical Attachment Level



Graph 5. Inflammation at control and test sites

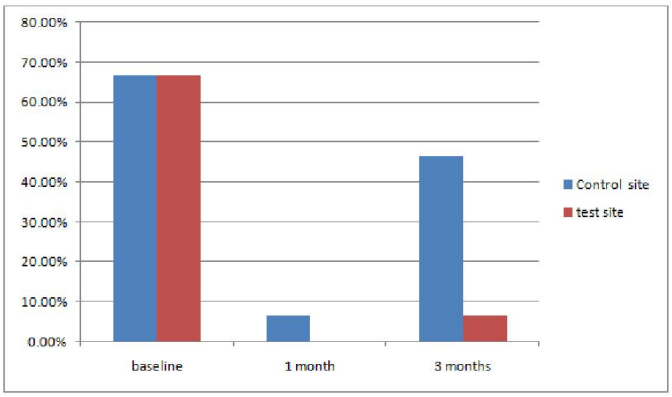


Graph 6. VAS scoring

Microbiological parameters

Comparison of the microbiological parameters of the treated sites was done at baseline, 1 month and 3 months using the BANA test. On baseline evaluation at both the control and test sites 66.7% of sites tested positive(P) and weakly positive(WP) for BANA test.

Amongst the control sites, 6.7% tested weakly positive for BANA at 1 month and 46.7% at 3 months. There was no statistically significant difference in the percentage of BANA positive sites from baseline to 3 months (p value = 0.092). Amongst the test sites, 0% tested positive for BANA at 1month and only 6.7% tested weakly positive at 3 months. There was a statistically highly significant difference between the BANA positive sites from baseline to 3months (p value = 0.003). On intra-group comparisons it was seen that 46.7% of the control sites tested positive and only 6.7% of the test sites tested positive at 3 months and this difference was statistically significant (p value = 0.013) (Graph 7).



Graph 7. BANA positive and weakly positive sites

DISCUSSION

This study was done to evaluate the effect of HiOra-GA Gel on post periodontal surgical healing. In this study, postoperative pain and inflammation was less in the test sites. Also fewer sites tested positive for BANA in the test group. Other clinical indices after treatment were also less in test group than the control group but it was not statistically significant. There is little doubt that adequate plaque control prevents the development of gingivitis and progression to periodontitis (Knowles *et al.,* 1979). In post surgical situation it is difficult to adequately control plaque formation and maturation due to sensitivity and fragility of healing sites. Chronic inflammation is characterized by increased amount of inflammatory exudates and cells. As the inflammation decreases the amount of exudates decreases with a subsequent decrease in the number of inflammatory cells (Carranza's clinical periodontology, 10th Edition). Bacterial plaque accumulation following periodontal surgery has been directly associated with delayed and altered surgical wound healing. Successful antimicrobial treatment following periodontal surgery should prevent recolonization of periodonto pathogens mainly Gram-positive facultative cocci, streptococci, Gram-positive facultative rods, primarily Actinomyces, Gram-negative anaerobic rods and black pigmented Bacteroides (Newman *et al.,* 1989).

Periodontal dressing can act as a physical barrier to salivary bacterial recolonisation and aid in an uneventful healing (Neil, 1975). Several authors demand wound protection by a dressing after primary periodontal surgery. Sachs (1984) and Pritchard

(1972) observed advantages of periodontal dressing in terms of preventing persistent bleeding at healing phase following the flap surgery. Addy *et al.* (1976) in a study on 21 patients requiring gingivectomies compared the effect of chlorhexidine mouthwash and periodontal dressing as post-operative treatments. They showed that the mean post-operative pocket depth for the dressing-treated segments was slightly greater than that for the mouthwash treated seg-ments, though the difference was not clinically important. (Sabina and Rasool Analgesic, 2007) Wikesjo *et al*. found out that periodontal dressing had effective role in pasting fibrin to root surface and inhib-ited penetration of epithelium to periodontal ligament space. (Sajith Abraham *et al.,* 2005) Ramfjord, Eaglstein and Plagmann men-tioned that following closed curettage using periodontal dressing could yield better adaptation of buccal and lingual papilla (Choudhary, 2011) Checchi *et al*. stated that patients had some difficulty in eating when periodontal dressing was in their mouths. In this study it was seen that the patients who did not receive the periodontal dressing experienced less pain when compared to those who received a dressing.

For the detection of periodontopathogens, microscopy, culture, immunoassays, enzyme tests, and DNA-based techniques have been introduced. Among these possibilities, the microbial-enzymatic BANA test is a quick, chair-side test with a very good sensibility, giving the clinician details about the microbial composition of the subgingival plaque and consequently about the clinical evolution of the periodontal disease. BANA test is also offering therapeutic orientation regarding the need for antimicrobial therapy. BANA test is a modern chair-side paraclinical method designed to detect the presence of one or more anaerobic bacteria commonly associated with periodontal disease, namely *Treponema denticola, Porphyromonas gingivalis and Bacteroides forsythus* in subgingival plaque samples taken from periodontally diseased teeth. So, in this study, BANA test was negative at 93% of the test sites at 3months, which suggests the absence of the three pathogenic species, or if present, in reduced numbers (less than 10,000 colony forming units) in each plaque sample. The contents of HiOra GA gel namely *Myrstica fragrans*, extracts of *Terminalia arjuna, Pterocarpus marsupium* & Triphala are found to be safe and effective in the treatment of gingivitis (Jeyaraj, 2010) Extract of *Myristica fragrans* has antibacterial action against multidrug resistant strains of bacteria from clinical origin . The specific activity and fast effectiveness of macelignan isolated from *Myristica fragrans* against oral bacteria *Steptococcus mutans* strongly suggests that it can be employed as a natural antibacterial agent[6]. The antioxidant properties of *Myristica fragrans* and its effect on selected organs was tested in albino rats[7] *Pterocarpus marsupium* an astringent, has wound healing, antibacterial and antioxidant properties. (Udaysing Hai Patil and Dattatraya. K. Gaikwad, 2011) The tannins in the ethanolic extract of the bark of *Terminalia arjuna* showed wound healing activity on topical application (Choudhary, 2011).The analgesic, antipyretic, ulceroprotective activity of Indian ayurvedic herbal formulation Triphala has been studied previously (Sabina and Rasool Analgesic, 2007). Triphala showed an inhibitory effect on PMN derived matrix metalloproteinase (MMP9) and complete healing of an infected full-thickness dermal wound (Sajith Abraham *et al.,* 2005). The beneficial effects of HiOra-GA can be attributed to the combined effects of the individual potential herbs with their antibacterial, wound healing, anti-inflammatory, antioxidant and analgesic properties. Also, patients were more comfortable and experienced less postoperative pain without a periodontal dressing which can further warrant the use of HiOra-GA as a postoperative medication.

Conclusion

The clinical study clearly shows that HiOra-GA gel is effective for post periodontal surgery use as an alternative to periodontal dressing. The overall effect was also found to be significant. There were no adverse reactions either reported or observed during the entire study period and overall compliance to the treatment was excellent. Therefore, it may be reported that HiOra-GA gum astringent is effective and safe for use in post periodontal surgery care.

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