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RESEARCH ARTICLE

GINGIVAL WOUND HEALING RESPONSE FOLLOWING PLACEMENT OF A LIGHT CURE DRESSING WITH AND WITHOUT BLUE M®GEL AFTER GINGIVAL DEPIGMENTATION. A RANDOMIZED SPLIT MOUTH STUDY

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Abstract

Background: In today's world pigmentation of gingiva not just has an impact on esthetics but also creates psychological negativity.Esthetic awareness of dental patients has extended to include requests of gingival color modification.Different treatment modalities which have been reported include bur abrasion, scraping, partial thickness flap, cryotherapy, electrosurgery. However, pain and healing are the two drawbacks associated with the post operative discomfort after the procedure which can be catered well with use of a newly developed oxygen releasing gel ie. Blue M® Gel and light cure periodontal dressing.

Method: A total of 10 patients randomly divided into two groups were selected for this randomized split mouth study. Gingival depigmentation using a scalpel were performed followed by Placement of a light cure dressing (Barricaid®) in10 anterior sextants after gingival depigmentation in Group Ⅰ and Application of an oxygen releasing oral gel (BlueM®) before placement of a light cure dressing (Barricaid®) in Group Ⅱ. Wound Healing Index at day 7, VAS Score (Pain) at day 3 and GI & PI at day 7 &14 after the gingival depigmentation were evaluated for both the groups.

Results:There was no significant difference in clinical parameters recorded at various time intervals between both the groups.

Conclusion: The use of Blue M® Gel underneath light cure periodontal dressing did not enhance the healing following Gingival depigmentation.

Introduction:-

In the present era where every field is concerned with esthetics, dentistry is not lagging behind. Many young Indian patients consider smile and gingival appearance as a key aspect and want to go for removal of gingival hyperpigmentation to achieve more pink color for smile aesthetics. Melanin pigmentation is more pronounced in Africans and Asians as compared to Caucasian population.[1]Excessive melanin accumulation in the basal and supra-basal cell layers of the epithelium results in gingival hyperpigmentation. It is usually presented as a scattered deep purplish discoloration or as lopsidedly shaped brown and light brown patches, threads or strands.[2]

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Different procedures are available for gingival depigmentation. **Roshna&Nandakumar[3] in 2005** broadly classified different gingival depigmentation methods into Surgical and Chemical methods. The only constraint associated with depigmentation procedure is post-operative discomfort that patient feel during healing as the wound heals by secondary intention. Owing to the slow wound healing, a materialBlue®M gel has recently been developed to itensify the concentration level of oxygen in wounds and it has been claimed to accelerate healing.

Dr Ward introduced periodontal dressing for the first time (1923) and insisted on using the dressing after periodontal surgery.[4]The main reason to close the surgical site post-periodontal surgery using periodontal dressing is to reduce the pain.[5] Visible light-cured periodontal dressing material, commercially available as Barricaid® (DENTSPLY International Inc., Milford, DE, USA) based on polyether urethane dimethacrylate resin is stated to be an advanced concept in the protection of periodontal wound sites. Its superior physical properties such as easy manipulation, better surface smoothness, interdental retention and translucent pink color have been claimed to favor its clinical application.[6]

So,to protect the wound after scalpel depigmentation it is preferable to protect wound using periodontal dressing. Also use of oxygen releasing gel might enhance the healing of the wound.Thus, aim of this study was to compare gingival tissue response following placement of a light cure periodontal dressing alone and light cure dressing alongside the placement of blue M® gel after gingival scalpel depigmentation procedure.

Materials and Methodology:-

The study was carried out on the subjects attending the outpatient clinic of the Department of Periodontology and Oral Implantology, I.T.S-Centre for Dental Studies and Research, Muradnagar, Ghaziabad, UP with the requirement of gingival depigmentation and willing to give informed consent for the procedure.

The individuals in the treatment group were enrolled using the following criteria: Systemically healthy subjects, Subjects with age between 18 - 60 years, Patients having mild to severe gingival/ melanin pigmentation (Score 1-3, Oral Pigment index- Dummet, 1996) and Subjects thatwere willing to comply with all the study related procedure and signed the informed consent form. Individuals who were medically compromised, or with mouth breathing habit and respiratory tract infections were excluded from the study. Also, Patients using anti-depressants, Pregnant and lactating females, drug abusers and heavy smokers were excluded from the study.

A detailed medical and dental case history of the patients along with clinical evaluation parameters were recorded which include-

1. Wound Healing Index (Landry et al 1988)[7]: The wound healing was assessed based on tissue color,bleeding, granulation tissue and degree of epitheilization after the surgical procedure and scoring was done from 1-5.
2. Vas Score (Pain) : Based on thedegree of pain, scoring was done from 1-5.
3. Plaque Index(Turesky et al, Modified Quigley Hein 1970)[8]: a plaque index that focussed on the gingival third of the tooth surface.
4. Gingival Index (Loe&Silness1963)[9]: for assessing the severity of gingivitis by examining qualitative changes in gingival tissues.

Depigmentation Procedure& Placement of Periodontal Dressings

The surgical procedure consisted of gingival depigmentation using a scalpel by scrapping method. In this technique, after achieving adequate local anesthesia, the pigmented gingival epithelium and a layer of the underlying connective tissue was surgically removed with B.P blade No: 15 & 11. Due care was taken, not to leave any pigmented remnants over the denuded area. In Group I after adequate hemostasis, the surgical site was dried and the light-cure dressing material(Barricaid®) was dispensed on the gingival margin and cervical third of the teeth through a syringe. Muscle molding and contouring of the material were done using finger pressure with lubricated gloved hands. The material was light cured for 10 seconds per tooth and if required, additional material was added and incrementally cured.

In Group II, Similar surgical procedure was carried out for gingival depigmentation on the opposite arch. After achieving homeostasis, application of an oxygen releasing oral gel (BlueM®) over the surgical wound was done before placement of a light cure dressing (Barricaid®).

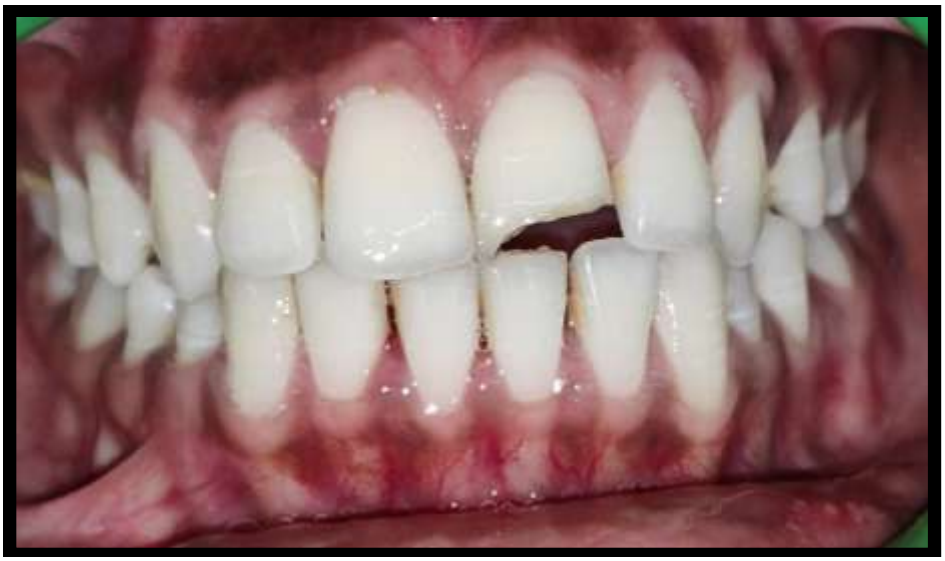

Figure 1:- Pre-Operative View of Gingival Pigmentation.

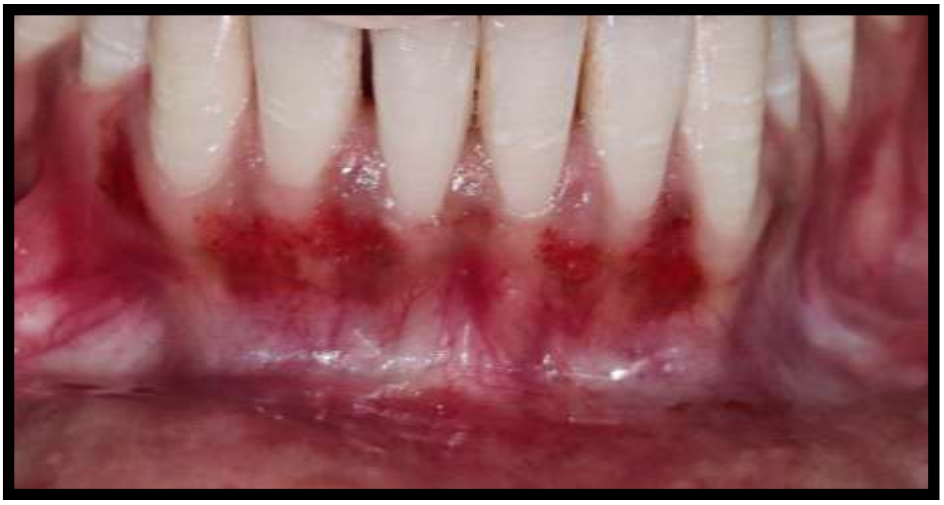

Figure 2:- Clinical Appearance Immediately afterDepigmentation Procedure (Group).

Figure 3:- Barricaid Periodontal Dressing over the Surgical Site (Group Ⅰ).

Figure 4:- Plaque Index Recorded at Day 7 (Group I).

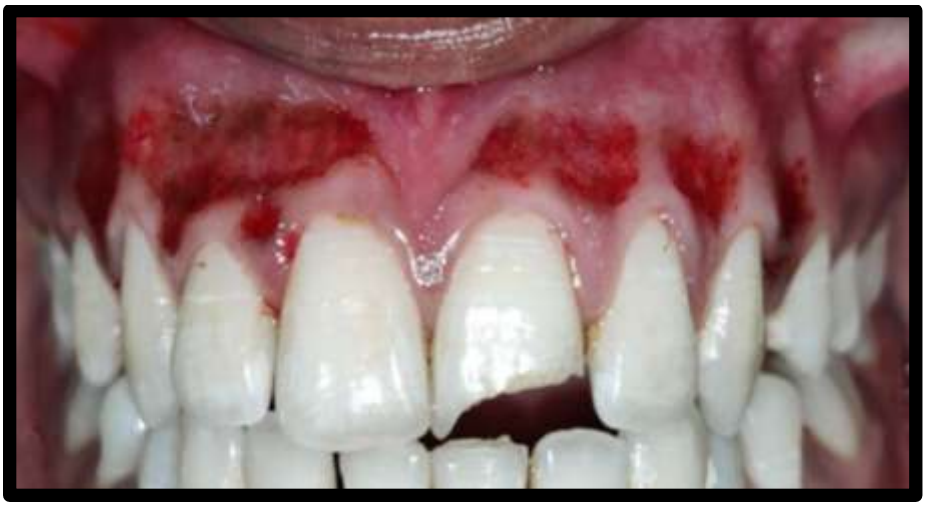

Figure 5:- Clinical Appearance Immediately after Depigmentation Procedure (Group Ⅱ).

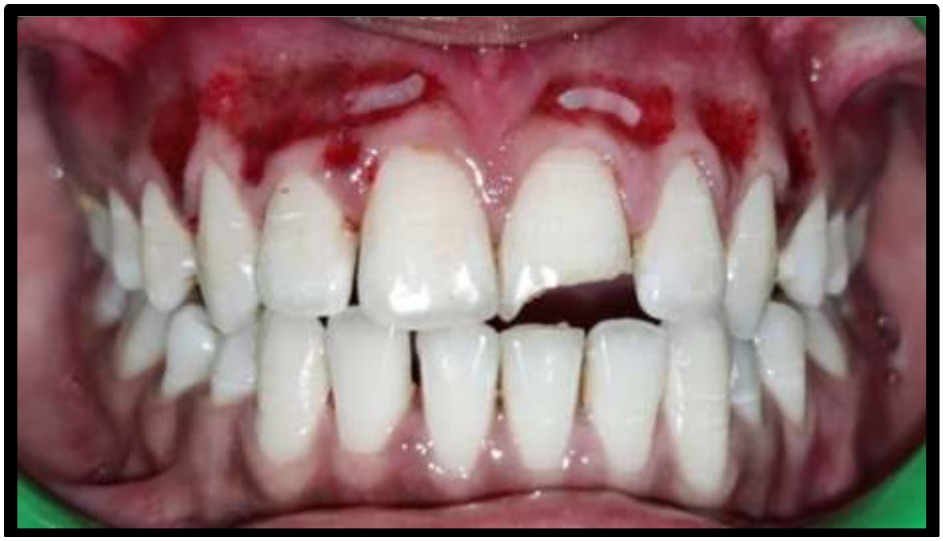

Figure 6:- Application of Blue M® Gel over Surgical Site (Group Ⅱ).

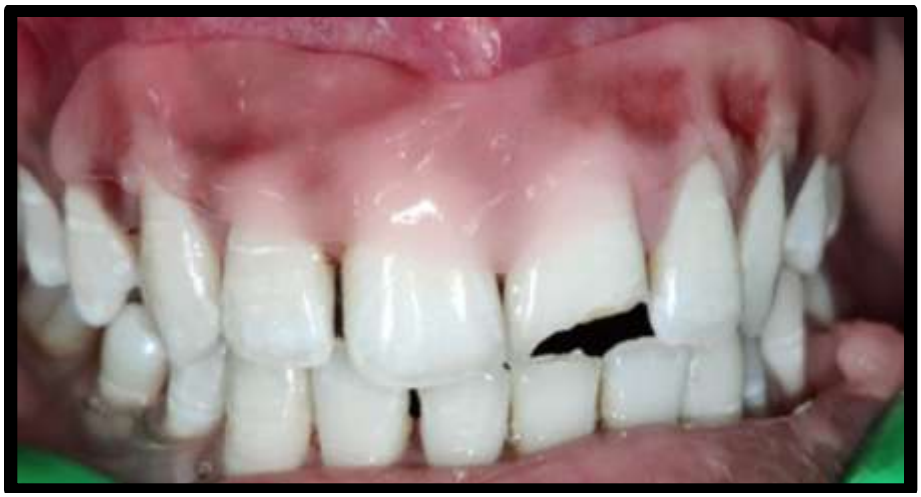

Figure 7:- Barricaid® Periodontal Dressing over the Surgical Site (Group Ⅱ).

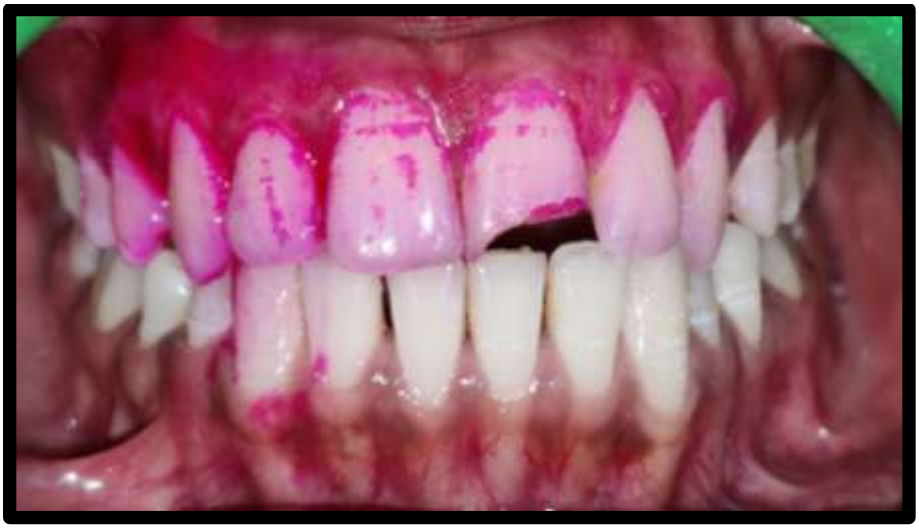

Figure 8:-Plaque Index Recorded at Day 7 (Group Ⅱ).

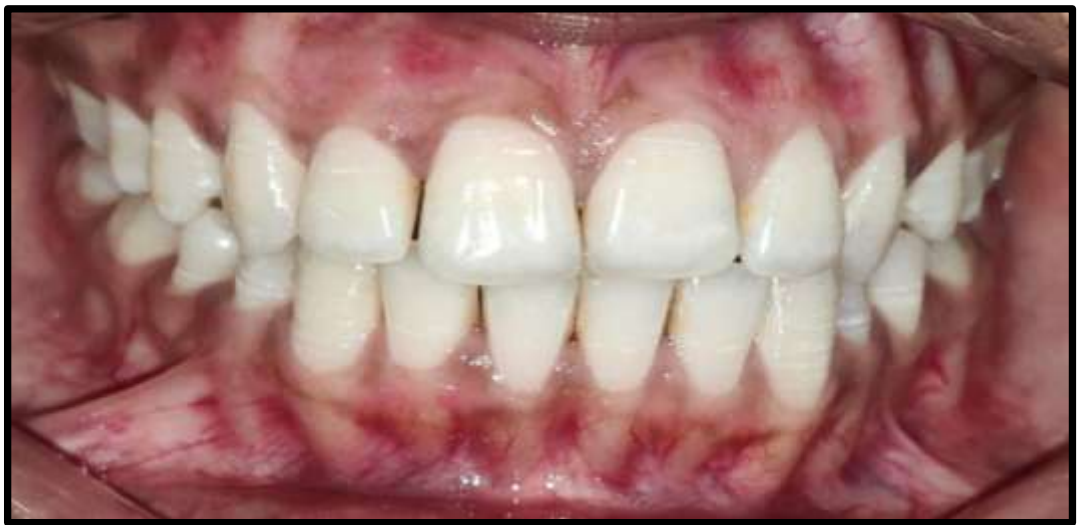

Figure 9:- Post Operative Appearance After 21 Days.
(Group I) And 14 Days (Group II)

Statistical Analysis

All the data collected was analysed using statistical software SPSS 16.0. The descriptive statistics like mean, median, standard deviation and frequency distribution of data was calculated. The normality of data was tested by Shapiro Wilks test.The Chi-square test was used to compare proportions and unpaired t-test was used to to evaluate the statistical significance of difference at different time intervals. The **p** value was taken statistically significant when < 0.05 (**p** < 0.05) and a confidence interval of 95% was taken.

Results:-

The present in vivo study included 10 patients having mild to severe gingival depigmentation with the mean age of 26±5.5 years. It was conducted as split mouth study, subjects were divided into two groups (I and II) and multiple sessions of depigmentation by scalpel were carried out where Group I received application of a periodontal dressing alone and in group Ⅱ application of Blue M® Gel was advocated before periodontal dressing was placed.

Clinical Parameters

Wound Healing Index (WHI)

The mean values of WHI at day 7for Group I and Group II were 4.20±0.63 and 4.30±0.67 respectively, which were statistically non significant (Table 1) (p<0.736)when compared using the unpaired t-test.

Visual Analogue Scale (VAS Score) For Assessing Pain

The mean values of VAS Score at day 3 for Group I and Group II were 1.60±0.70 and 1.50±0.53 respectively, which were statistically non significant (Table 1) (p<0.722)when compared using the unpaired t-test.

Plaque Index(PI)

Intergroup Comparison:

The mean Plaque index at 7 days, 14 days were 1.60±0.52 and 1.20±0.42 respectively and mean difference from 7 to 14 days which was 0.40±0.52 when compared between Group I and Group II using the unpaired t-test. There was no significant difference in mean Plaque index at 7 days, 14 days and difference from 7 to 14 days between Group Ⅰ and Group Ⅱ.(Table 2) (p<0.660).

Intragroup Comparison:

The mean Plaque index was compared between 7 days and 14 days using the paired t-test. The mean Plaque index decreased significantly from 7 days to 14 days for both the groups. (Table 3) (p<0.037)

Gingival Index (GI)

Intergroup Comparison:

The mean Gingival index at 7 days, 14 days were 0.70±0.20 and 0.20±0.42 respectively and mean difference from 7 to 14 days which was 0.50±0.53 when compared between Group Ⅰ and Group Ⅱ using the unpaired t-test. There was no significant difference in mean gingival index at 7 days, 14 days and difference from 7 to 14 days between Group Ⅰ and Group Ⅱ. (Table 2) (p<0.388).

Intragroup Comparison:

The mean Gingival index was compared between 7 days and 14 days using the paired t-test. The mean Gingival index decreased significantly from 7 days to 14 days for both the groups (Table 3) (p<0.028).

Table 1:- Intergroup comparison of Wound Healing Index (WHI) and VAS score between Group Ⅰ and Group Ⅱ.

	Group	Mean	Std. Deviation	Mean Difference	t-test value	p-value
WHI at day 7	Group Ⅰ	4.20	0.63	-0.10	-0.342	0.736
	Group Ⅱ	4.30	0.67			
VAS(Pain) Score at day 3	Group Ⅰ	1.60	0.70	0.10	0.361	0.722
	Group Ⅱ	1.50	0.53			

Table 2:- Intergroup comparison of Plaque Index (PI) and Gingival Index (GI) between Group Ⅰ (Barricaid) & Group Ⅱ (Barricaid + Blue M® Gel).

		Group Ⅰ		Group Ⅱ		Mean Difference	t-test value	p-value
		Mean	Std. Deviation	Mean	Std. Deviation			
Plaque Index	7 days	1.60	0.52	1.40	0.52	0.20	0.866	0.398
	14 days	1.20	0.42	1.10	0.32	0.10	0.600	0.556
	Difference from day 7 to 14	0.40	0.52	0.30	0.48	0.10	0.447	0.660
Gingival Index	7 days	0.70	0.48	0.50	0.53	0.20	0.885	0.388
	14 days	0.20	0.42	0.20	0.42	0.00	0.000	1.000
	Difference from day 7 to 14	0.50	0.53	0.30	0.483	0.20	0.885	0.388

Table 3:- Intragroup comparison of Plaque Index (PI) and Gingival Index (GI) between Group Ⅰ (Barricaid) and Group Ⅱ (Barricaid + Blue M® Gel).

			Mean	Std. Deviation	Mean Difference	t-test value	p-value
Plaque Index	Group Ⅰ	7 days	1.60	0.52	0.40	2.449	0.037*
		14 days	1.20	0.42			
	Group Ⅱ	7 days	1.40	0.52	0.30	2.964	0.028*
		14 days	1.10	0.32			
Gingival Index	Group Ⅰ	7 days	0.70	0.48	0.50	3.000	0.015*
		14 days	0.20	0.42			
	Group Ⅱ	7 days	0.50	0.53	0.30	2.964	0.028*
		14 days	0.20	0.42			

Discussion:-

Favourable healing of periodontal tissue subsequently after surgical treatment has long been a subject of study.Wound healing by secondary intention after depigmentation represent a post-operative challenge to the clinician. The wound healing process consists of four distinct but overlapping phases, hemostasis and coagulation, inflammation, cell proliferation and wound remodelling. All the processes involved in wound healing, such as oxidative killing of bacteria, collagen formation are highly energy dependent and cannot take place effectively in a hypoxic environment.[10]

BlueM® Oral Gel is one such biomaterial having anti-microbial and anti-inflammatory properties. It prevents formation of plaque biofilm as well improves the rate of wound healing.Topical oxygen therapy is potentially less toxic, less expensive and has fewer or no complications. In the present study we have used BlueM® Oral Gel as a source of topical oxygen releasing agent along with periodontal dressing. Developed by **Peter Blijdrop**itworks on the basic mechanism of controlled delivery of active oxygen i.e. hydrogen peroxide to the site of treatment for specific problems in the mouth. Professional phagocytes of our innate immune system increase their oxygen consumption through the inducible activity of NADPH oxidase (NOX) that generates oxygen and hydrogen peroxide. These oxygen-derived metabolites release Reactive Oxygen Species (ROS) that are potently antimicrobial.[11]

Its efficacy was proved in a studyby**Gaggl et a**l[12]as it was reported that in groups with adjunctive oxygen therapy, all patients showed a reduction of all microorganisms, resulting in more rapid improvements in clinical parameters with less periodontal destruction.

Factors that influence wound healing must be addressed in a noble fashion and a suitable environment must be provided for wound to heal which is readily provided by the use of periodontal dressing. This favourable environment is created by a surgical dressing which allows for an uninterrupted healing and enhances the adhesion of the soft tissue to the bone/root surface to avoid bacterial infiltration. **Freedman and Stassen**[13] explained benefits of periodontal dressing for minimizing the risk of postoperative complications such as bleeding and wound infection, increased tissue healing by preventing physical trauma during speech and mastication, and reducing the formation of granulation tissue. In the present study we have used Barricade® as a periodontal dressing which is based on polyether urethane dimethacrylate resin and its biocompatibility is supported by histological studies done by **Alparet al**[14]and **Gilbert etal.**[15]

In our study the Healing Index (HI) when assessed at day 7 post operatively showed no significant difference in both the groups and application of Blue M Gel before Barricaid placement had no added advantage over Barricaid alone. **Arunachalam et al**[16]in a study showed favourable results in healing index towards the use of Barricaid ® group compared to to periodontal dressing.Also**Mishra et al**[10]contrary to our findings, reviewed that blue-M® dressing increases resistance to microorganisms which helps in accelerating the healing process. The **VAS score** (for Pain) when assessed on day 3 was less in group 2 (Barricade® + Blue M® Gel) as compared to group 1 (Barricade® alone) but was not statistically significant. This shows that Barricaid® enhanced patient comfort; however addition of Blue M® Gel did not offer any further benefit over Barricaid®. In studies by **Madanet al**[17]&**Sanadi et al**[18]they compared pain and discomfort score between two different periodontal dressing i.e, Coe-pak® and Barricaid® in which lower pain scores and better acceptance was observed with Barricaid® periodontal dressing.

Since the rationale for the use of periodontal dressings has always been debatableand they are said to be associated with more plaque accumulation when compared to no dressing.To evaluate the effect of periodontal dressing on patient oral hygiene performance and plaque retention, P**laque Index** was recorded at 7th and 14th day after depigmentation in our study. On Inter-group comparison amongst both the groups, the absolute change from 7 to 14 days in plaque score was slightly less in group II as compared to group I, which was not statistically significant. On Intragroup comparison there was statistically significant decrease in the plaque index over a period of 1 week in both the groups. This could be due to an increase in plaque accumulation beneath the periodontal dressings, owing to the difficulty in maintaining oral hygiene post-surgically at 7th day and reduction on 14th day could be attributed to initiation of oral hygiene by patients after periodontal dressing removal. The results of the study were comparable to the study conducted by **Srivastavaet al**.[19], which showed that an increase in plaque score was due to increased plaque accumulation beneath the periodontal dressings.

The **Gingival Index** score were recorded to evaluate the normal inflammatory tissue response post-surgery within the tissue which leads to provoked gingival tissue reaction. On Intergroup comparison, change from 7 to 14 days in gingival Index score was slightly less in group II as compared to group I, which was not statistically significant. The results are in accordance with the studies done by **Lekneset al**[20]and**AbiRached et al.**[21]which suggested that the periodontal dressing leads to more inflammation immediately post-surgery.

The clinical parameters recorded were in favour of Group Ⅱ i.eBlue M® Gel compared to Group I however, were not statistically significant.This could be due to smaller size taken in this study. Also no micro biological analysis was done to evaluate antimicrobial efficacy of the gel used.

So, within the limitations of our study it can be concluded that surgical site covered with Barricaid® periodontal dressing showed evidence of profound wound healing and provided symptomatic relief to the patients. However, Blue M® Gel had minimalistic effect to improvise healing when placed alongside periodontal dressing. It emphasizes on the fact that further research with a larger sample sizeneeds to be done to assess the effect of oxygen delivering agents in periodontal wound healing in future.

Conclusion:-

Barricaid® can be used effectively as a periodontal dressing in gingival depigmentation wounds. However, application of BlueM® Oral Gel showed no added advantage in gingival wound healing & VAS Score (for pain).

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Nil.

Conflicts of interest
There are no conflicts of interest.

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