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**Research Article**

# COMPARATIVE EVALUATION OF DEPIGMENTATION USING CERAMIC SOFT TISSUE TRIMMING BUR VERSUS SCALPEL FOR TREATMENT OF PHYSIOLOGICAL GINGIVAL MELANIN HYPERPIGMENTATION: A RANDOMIZED CONTROLLED TRIAL

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**ABSTRACT**

**Aims:** The present trial aimed to comparatively evaluate depigmentation using ceramic soft tissue trimming bur versus scalpel for treatment of physiological gingival melanin hyper pigmentation. **Materials and Methods:** Subjects within the age range of 20-45 years of either sex, reporting to the Out Patient Department with chief complaint of blackish appearance of gums (physiological gingival melanin hyper pigmentation) were selected for the study. A total of sixty-two sites with physiological gingival melanin hyper pigmentation were selected by convenience sampling technique. **Statistical analysis used:** The results of the trial were analysed for statistical significance. **Results:** It was observed that this minimally invasive surgical technique with ceramic soft tissue trimming bur resulted in reduction of the gingival melanin hyper pigmentation with minimal bleeding, rapid wound healing and less post-operative pain and discomfort. **Conclusions:** It was concluded thatceramic soft tissue trimming bur was effective in the treatment of gingival melanin hyper pigmentation.



## INTRODUCTION

A smile expresses a feeling of joy & success and can reflect self-confidence and kindness. Gingival health and appearance are essential components of an attractive smile, and removal of unsightly-pigmented gingiva is a necessity for a pleasant and confident smile.[1]

The gingiva color is described as coral pink. It is determined by several factors such as epithelial thickness, degree of keratinization, pigments within the gingival epithelium & the size and number of blood vessels.[2] Melanin, carotene, reduced haemoglobin, and oxyhemoglobin are the main pigments which contributes to the normal colour of the oral mucosa.[3]

Gingival pigmentation is the deposition of coloring matter, coloration or discoloration by a pigment pertaining to the gingiva .[4] Melanin, melanoid, carotene, reduced hemoglobin, soft keratin and oxyhemoglobin were identified as pigments.[5] Melanin, an aturally occurring brown pigment, contributes to the endogenous pigmentation of skin, gingiva and remainder of the oral mucous membrane.[6] Gingival melanin pigmentation may be multifactorial, physiological or pathological and it occurs in all humanraces.[7]Gingivalmelaninhyperpigmentation is caused due to excessive melanin deposition by the melanocytes that are primarily located in the basal and supra-basal layers of the epithelium.[8] Gingival melanin hyper pigmentation is one of the issues which determine the smile of an individual. Especially when it is associated with a gummy smile, it not only becomes an esthetic concern, but also a psychological concern for anindividual.[9]

Melanin hyperpigmentation can be attributed to both endogenous and exogenous factors. Endogenous factors include medical conditions such as Addison's disease, Peutz-Jegher's syndrome, Von Recklinghausen's disease (neurofibromatosis) etc.[10] The exogenous factors are heavy metals such as copper, mercury, silver, bismuth, arsenic, lead, and gold or some kind of tattoos like intentional amalgam or graphite.[11] Gingival depigmentation is a periodontal plastic surgical procedure whereby the gingival hyperpigmentation is removed or reduced by various techniques.[12] It can be carried out by various methods such as scalpel surgical technique, bur abrasion method, Electrosurgery, Cryosurgery, Lasers, Radiosurgery, chemical methods and methods aimed at masking the pigmented gingiva. (Free gingival graft, Acellular dermal matrix allograft).[13] Although various treatment modalities have been reported for depigmentation, the selection of the appropriate technique should be based on clinical experience and the individual operator's preferences. Most of the surgical modalities have disadvantages such as poor wound healing, post-operative pain, not acceptable to the clinicians or the patients, expensive, requires more clinical expertise and difficulty in controlling penetration depth. To overcome this, a

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new modality such as ceramic soft tissue trimming bur had thus been introduced.

Ceramic soft tissue trimming bur can often replace laser, electro-surgery and surgical blades. It is a flame shaped biocompatible hard oxide zirconia point bur with head size 15mm, head length 8mm and total length 25mm. This minimally invasive surgical technique with ceramic soft tissue trimming bur leads to minimal bleeding, less post-operative pain and discomfort, rapid wound healing. Ceramic soft tissue trimming bur culminates final refinement to the post-operative deepithelialized area.

The literature on the use of Ceramic soft tissue trimming burs in the treatment of gingival hyperpigmentation is very limited. Hence, the present study was conducted to comparatively evaluate gingival depigmentation using ceramic soft tissue trimming bur versus scalpel for treatment of physiological gingival melanin hyperpigmentation.

***Aim of the Study***

To comparatively evaluate depigmentation using ceramic soft tissue trimming bur versus scalpel for treatment of physiological gingival melanin hyperpigmentation.

***Objectives of the Study***

1. To evaluate depigmentation using ceramic soft tissue trimming bur for treatment of physiological gingival melanin hyperpigmentation.
2. To evaluate depigmentation using scalpel for treatment of physiological gingival melanin hyperpigmentation.
3. To comparedepigmentation using ceramic soft tissue trimming bur and scalpel for treatment of physiological gingival melanin hyperpigmentation.

## MATERIALS AND METHODS

Study design was a Parallel arm, Randomized clinical trial. Subjects within the age range of 20-45 years of either sex, reporting to the Out Patient Department of Periodontology of a recognized dental college with chief complaint of blackish appearance of gums (physiological gingival melanin hyperpigmentation) were recruited for the study. A total of sixty-two sites with physiological gingival melanin hyperpigmentation were selected by convenience sampling technique. Approximately 26 sites per group completed the trial at the endpoint follow up, considering the attrition samples which lost on follow-up. Ethical clearance was obtained from the ethical committee of the institute. Subjects were explained aboutthenatureofthestudyindetailandinalanguagebestunderstood bythem. An informed signed consent was obtained from the subjects who were willing to participate in the study. A detailed case history was recorded. Subjects were randomly grouped as:

1. **Group A** (n=31, ceramic soft tissue trimmer used for depigmentation)
2. **Group B** (n=31, scalpel depigmentation technique)

Subjects of either sex between the age group of 20-45 years were included in the study. Systemically healthy and co-operative subjects with physiological gingival melanin hyperpigmentation (DOPI score 2 and 3) and with esthetic concern were included. Subjects with autoimmune or endocrine disorders were excluded from the study. Smokers, Pregnant and lactating mothers and subjects taking medications which may cause gingival melanin hyperpigmentation were also excluded.

***Assessment of clinical parameters***

The gingival melanin pigmentation was assessed by the Dummett-Gupta Oral Pigmentation Index (Dummett CO, Gupta OP, 1964)[19] from left first premolar to the right first premolar. The wound healing was assessed by Healing Index (Landry RG, Turnbull RS, Howley T 1988)[20] from left first premolar to the right first premolar region. The intensity of pain or discomfort was assessed by the Visual Analogue Scale (Matthews DC, McCulloch CAG 1993)[73] ranging from 0 (no pain) to 10 (severe pain).

**METHODOLOGY**

All the selected subjects received thorough scaling and root planing and were motivated to maintain good oral hygiene. Modified Bass technique of brushing were explained and demonstrated tothem. Photographs were taken for all subjects in the same dental set up with the same position with fixed magnification and distance (at base line,7$^{th}$ day, 1 month and 6 months).

***Surgical protocol***

The surgical procedure for Group A (Ceramic soft tissue trimming bur) performed was as follows:

1. Presurgical rinse and perioral scrubbing was performed.
2. Adequate local anaesthesia was obtained using 2% Lignocaine HCl with 1:80000 Adrenaline.
3. Ceramic soft tissue trimming bur was used in the high-speed revolutions per minute without water coolant spray to excise the pigmented layer of gingival epithelium.
4. Afterremovingtheentirepigmentedepitheliumwithcera micsofttissuetrimmer, the exposed surface was irrigated with saline and any remnant of pigmented tissue left over was removed.
5. The solution of Evion 400mg capsule was then applied to the post-operative surgical area.
6. Post-surgical instructions were given to all the subjects.
7. Subjects were advised to rinse with 0.2% chlorhexidine gluconate mouthwash twice daily for 15 days.
8. Ibuprofen 400 mg twice daily for three days was prescribed post operatively.
9. Subjects were recalled after 1week and post-surgical evaluation.
10. Post-surgical assessment of clinical parameters was done at 1week, 1month and 6months.

The surgical procedure for Group B (Scalpel Depigmentation Technique) performed was as follows:

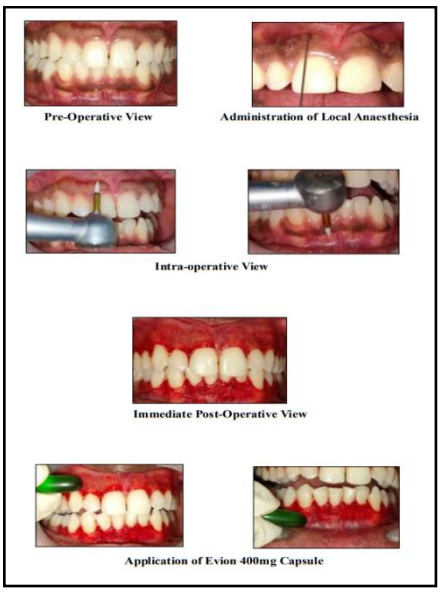
1. Presurgical rinse and perioral scrubbing was performed.
2. Adequate local anaesthesia was obtained using 2% Lignocaine HCl with 1:80000 Adrenaline.
3. A Bard Parker handle with a No.15 blade was used to remove the pigmented layer.
4. The exposed surface was irrigated with saline and any remnant of pigmented tissue left over was removed.

5. The surgical area was then covered with a periodontal dressing.
6. Post-surgical instructions were given to all the subjects.
7. Subjects were advised to rinse with 0.2% chlorhexidine gluconate mouthwash twice daily for 15 days.
8. Ibuprofen 400 mg twice daily for three days was prescribed post operatively.
9. Subjects were recalled after 1week and post-surgical evaluation.
10. Post-surgical assessment of clinical parameters was done at 1 week, 1 month and 6 months.

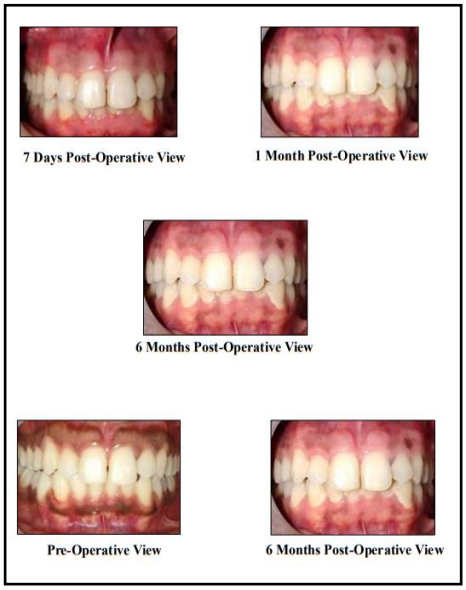
## RESULTS

Subjects were recalled post-surgery at 7th day, 1 month and 6 months for follow-up. All of them were compliant and there were no dropouts from the study. Healing was uneventful in both the groups (Group A and Group B). The changes in the clinical parameters over 6 months were recorded. The data obtained was tabulated and subjected to statistical analysis.

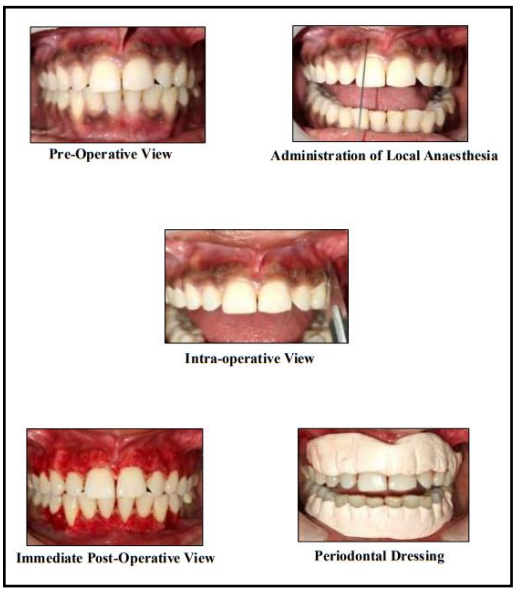
**Group A**



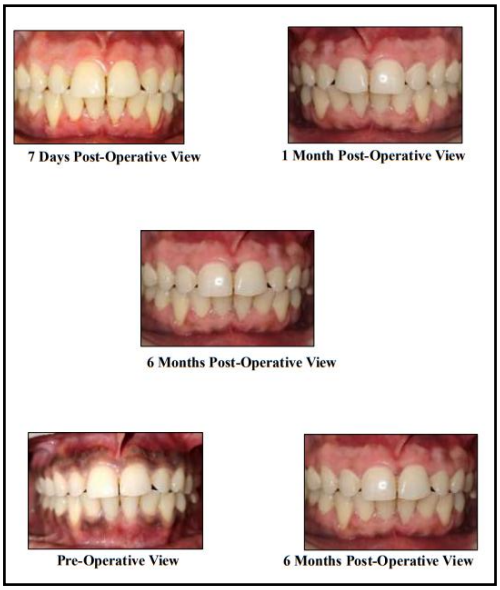

**Group A (cont.)**




**Group B**




**Group B (cont.)**




***Statistical analysis***

All data were entered into a computer by giving coding system, proofed for entry errors. Data obtained was compiled on a MS Office Excel Sheet (v 2019, Microsoft Redmond Campus, Redmond, Washington, United States). Data was subjected to statistical analysis using Statistical package for social sciences (SPSS v 26.0, IBM). Descriptive statistics like frequencies and percentage for categorical data, Mean & SD for numerical data has been depicted.

Normality of numerical data was checked using Shapiro- Wilk test & was found that the data did not follow a normal curve; hence non-parametric tests have been used for comparisons. Inter group comparison (2 groups) was done using Mann Whitney U test. Intra group comparison was done using Friedman's (for >2 observations) followed by pair wise comparison using Wilcoxon Signed rank test. Comparison of frequencies of categories of variables with groups was done using chi square test.

For all the statistical tests, $p<0.05$ was considered to be statistically significant, keeping $\alpha$ error at 5% and $\beta$ error at 20%, thus giving a power to the study as 80%.

* = statistically significant difference (p<0.05)
** = statistically highly significant difference (p<0.01)
# = non-significant difference (p>0.05) … **for all tables**

***Dummett-Gupta Oral Pigmentation Index (Dummett CO, Gupta OP, 1964)*** [23, 24]

The gingival melanin pigmentation was assessed using Dummett-Gupta Oral Pigmentation Index (Dummett CO, Gupta OP, 1964) [23, 24] at baseline, 7th day, 1 month and 6 months. On intragroup comparison, there was a statistically highly significant difference seen between the time intervals in both the groups (p<0.01) with higher values at baseline.

The mean DOPI values for Group A were: baseline (2.54 ± 0.508), 7th day (0.00 ± 0.000), 1 months (0.15 ± 0.368) and 6 months (0.15 ± 0.368) respectively. (Table-1, Graph-1) The mean DOPI values for Group B were: baseline (2.23 ± 0.430 mm), 7th day (0.00 ± 0.000), 1 months (0.00 ± 0.000) and 6 months (0.08 ± 0.272) respectively. (Table-1, Graph-1)

On intra group comparison the DOPI in Group A from baseline to 6 months was (2.38 ± 0.637) and in Group B was (2.15 ± 0.368) (Table-2, Graph-2a).

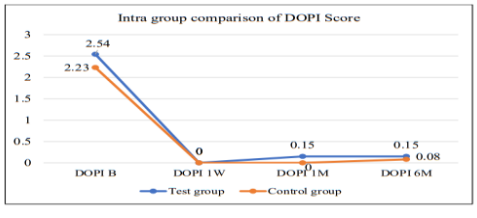
On intergroup comparison over a period of 6 months, the mean DOPI in Group A from baseline to 7th day was (2.57 ± 0.508) in Group A while (2.23 ± 0.430) in Group B. This difference between the groups was statistically significant (p=0.024) (Table-2, Graph-2a). The DOPI in Group A from baseline to 1 month was (2.38 ± 0.637) while (2.23 ± 0.430) in Group B. This difference between the groups was not statistically significant (p=0.213) (Table-2, Graph-2a). The DOPI in Group A from baseline to 6 months was (2.38 ± 0.637) while (2.15 ± 0.368) in Group B. This difference between the groups was not statistically significant (p=0.071) (Table-2, Graph-2a).

The DOPI in Group A from 7th day to 1 month was (0.15 ± 0.368) while (0.00 ± 0.000) in Group B. This difference between the groups was statistically significant (p=0.039) (Table-2, Graph-2b). The DOPI in Group A from 7th day to 6 months was (0.15 ± 0.368) while (0.08 ± 0.272) in Group B. This difference between the groups was not statistically significant (p=0.390) (Table-2, Graph-2b). The DOPI in Group A from 1 month to 6 months was (0.00 ± 0.000) while (0.08 ± 0.272) in Group B. This difference between the groups was not statistically significant (p=0.153). (Table-2, Graph-2b)

**Table 1- Intragroup comparison of changes in DOPI Score over a period of 6 months**

| DOPI Score at Test Group | Baseline | 7th day | 1 month | 6 months | P value |
|---|---|---|---|---|---|
| Mean | 2.54 | 0.00 | 0.15 | 0.15 | 0.000* |
| SD | 0.508 | 0.000 | 0.368 | 0.368 | |
| **DOPI Score at Control Group** | **Baseline** | **7th day** | **1 month** | **6 months** | **P value** |
| Mean | 2.23 | 0.00 | 0.00 | 0.08 | 0.000* |
| SD | 0.430 | 0.000 | 0.000 | 0.272 | |

**Graph 1 - Intragroup comparison of changes in DOPI Score over a period of 6 months**




***Healing Index (Landry RG, Turnbull RS, Howley T 1988)*** [11]

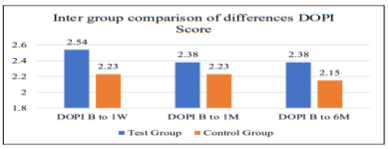
The woundhealing was assessed using Healing Index (Landry RG, Turnbull RS, Howley T 1988) at baseline, 7th day, 1 month and 6 months.

On intragroup comparison there was a statistically highly significant difference seen between the time intervals in both the groups (p<0.01) with higher values at 6 months. The mean woundhealing values for Group A were: 7th day (3.46 ± 0.508), 1 month (5.00 ± 0.000) and 6 months (5.00 ± 0.000) respectively. (Table-3, Graph-3) The mean wound healing values for Group B were 7th day (2.96 ± 0.871), 1 month (4.77 ± 0.430) and 6 months (5.00 ± 0.000) respectively (Table-3, Graph-3). On intragroup comparison the mean woundhealing values for Group A from 7th day to 6 months was (1.54 ± 0.508) and in Group B was (2.04 ± 0.871). (Table-4, Graph-4)

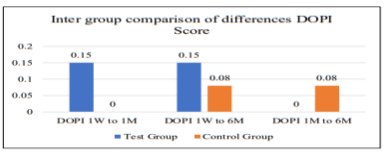
**Table 2- Intergroup comparison of changes in DOPI Score over a period of 6 months**

| DOPI Score | Test Group | | Control Group | | P value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| B to 1W | 2.54 | 0.508 | 2.23 | 0.430 | 0.024* |
| B to 1M | 2.38 | 0.637 | 2.23 | 0.430 | 0.213# |
| B to 6M | 2.38 | 0.637 | 2.15 | 0.368 | 0.071# |
| 1W to 1M | 0.15 | 0.368 | 0.00 | 0.000 | 0.039* |
| 1W to 6M | 0.15 | 0.368 | 0.08 | 0.272 | 0.390# |
| 1M to 6M | 0.00 | 0.000 | 0.08 | 0.272 | 0.153# |

**Graph 2a- Intergroup comparison of changes in DOPI Score over a period of 6 months**




**Graph 2b- Intergroup comparison of changes in DOPI Score over a period of 6 months**

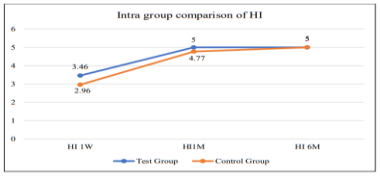



n intergroup comparison over a period of 6 months, the mean woundhealing values from 7th day to 1 month was (1.54 ± 0.508) in Group A while (1.88 ± 0.766) in Group B. This difference between the groups was not statistically significant (p=0.102) (Table-4, Graph-4). The mean woundhealing values from 7th day to 6 months was (1.54 ± 0.508) in Group A while (2.04 ± 0.871) in Group B. This difference between the groups was statistically significant (p=0.016) (Table-4, Graph-4). The mean woundhealing values from 1 month to 6 months was (0.00 ± 0.000) in Group A while (0.23 ± 0.430) in Group B. This difference between the groups was statistically significant. (p=0.010). (Table-4, Graph-4)

**Table 3 - Intragroup comparison of changes in Healing Index Score over a period of 6 months**

| Healing Index Score at Test Group | 7th day | 1 month | 6 months | P value |
|---|---|---|---|---|
| Mean | 3.46 | 5.00 | 5.00 | 0.000* |
| SD | 0.508 | 0.000 | 0.000 | |
| **Healing Index Score at Control Group** | **7th day** | **1 month** | **6 months** | **P value** |
| Mean | 2.96 | 4.77 | 5.00 | 0.000* |
| SD | 0.871 | 0.430 | 0.000 | |

**Graph 3 - Intragroup comparison of changes in Healing Index Score over a period of 6 months**



***Visual Analogue Scale (Matthews DC, McCulloch CAG 1993)***[73]

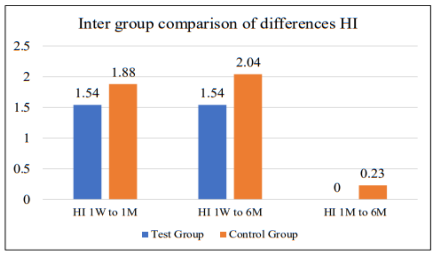
The intensity of pain or discomfort was assessed using Visual Analogue Scale (Matthews DC, McCulloch CAG 1993) at baseline, 7th day, 1 month and 6 months.

On intragroup comparison there was a statistically highly significant difference seen between the time intervals in both the groups (p<0.01) with higher values at baseline. The mean intensity of pain or discomfort for Group A were: baseline (0.15 ± 0.368), 7th day (0.00 ± 0.000), 1 month (0.00 ± 0.000) and 6 months (0.00 ± 0.000) respectively. (Table-5, Graph-3) The mean intensity of pain or discomfort for Group B were: baseline (5.46 ± 1.303), 7th day (1.69 ± 1.087), 1 month (0.27 ± 0.452) and 6 months (0.00 ± 0.000) respectively (Table-5, Graph-5). On intragroup comparison mean intensity of pain or discomfort in Group A from baseline to 6 months was (0.04 ± 0.196) and in Group B was (1.69 ± 1.087) (Table-6, Graph-6a)

**Table 4- Intergroup comparison of changes in Healing Index Score over a period of 6 months**

| Healing Index Score | Test Group | | Control Group | | P value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| 1W to 1M | 1.54 | 0.508 | 1.88 | 0.766 | 0.102# |
| 1W to 6M | 1.54 | 0.508 | 2.04 | 0.871 | 0.016* |
| 1M to 6M | 0.00 | 0.000 | 0.23 | 0.430 | 0.010* |

**Graph 4- Intergroup comparison of changes in Healing Index Score over a period of 6 months**




On intergroup comparison over a period of 6 months, the mean intensity of pain or discomfort from baseline to 7th day was (0.04 ± 0.196) in Group A while (1.65 ± 0.977) in Group B. This difference between the groups was statistically significant (p=0.000) (Table-6, Graph-6a). The mean intensity of pain or discomfort from baseline to 1 month was (0.04 ± 0.196) in Group A while (1.65 ± 0.977) in Group B. This difference between the groups was statistically significant (p=0.000) (Table-6, Graph-6a). The mean intensity of pain or discomfort from baseline to 6 months was (0.04 ± 0.196) in Group A while (1.69 ± 1.087) in Group B. This difference between the groups was statistically significant (p=0.000) (Table-6, Graph-6a). The mean intensity of pain or discomfort from 7th day to 1 month was (0.00 ± 0.000) in Group A while (0.00 ± 0.000) in Group B. This difference between the groups was not statistically significant (p=1.000) (Table-6, Graph-6b). The mean intensity of pain or discomfort from 7th day to 6 months was (.00 ± 0.000) in Group A while (0.27 ± 0.452) in Group B. This difference between the groups was highly statistically significant (p=0.005) (Table-6, Graph-6b). The mean intensity of pain or discomfort from 1 month to 6 months was (0.00 ± 0.000) in Group A while (0.27 ± 0.452) in Group B. This difference between the groups was highly statistically significant (p=0.005) (Table-6, Graph-6b).

**Table 5- Intragroup comparison of changes in VAS Score over a period of 6 months**

| VAS Score at Test Group | Baseline | 7th day | 1 month | 6 months | P value |
|---|---|---|---|---|---|
| Mean | 0.15 | 0.00 | 0.00 | 0.00 | 0.000* |
| SD | 0.368 | 0.000 | 0.000 | 0.000 | |
| VAS Score at Control Group | Baseline | 7th day | 1 month | 6 months | P value |
| Mean | 5.46 | 1.69 | 0.27 | 0.00 | 0.000* |
| SD | 1.303 | 1.087 | 0.452 | 0.000 | |

**Graph 5 - Intragroup comparison of changes in VAS Score over a period of 6 months**

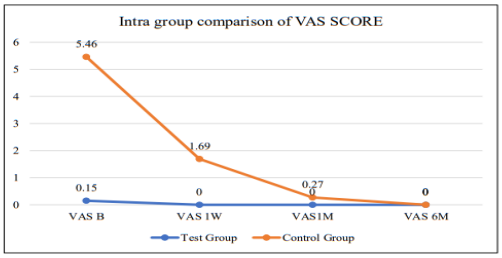
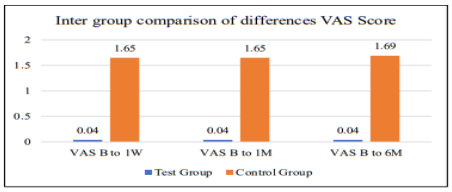


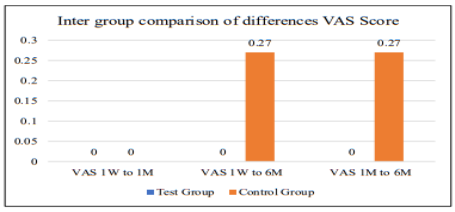

**Table 6- Intergroup comparison of changes in VAS Score over a period of 6 months**

| VAS Score | Test Group | | Control Group | | P value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| B to 1W | 0.04 | 0.196 | 1.65 | 0.977 | 0.000** |
| B to 1M | 0.04 | 0.196 | 1.65 | 0.977 | 0.000** |
| B to 6M | 0.04 | 0.196 | 1.69 | 1.087 | 0.000** |
| 1W to 1M | 0.00 | 0.000 | 0.00 | 0.000 | 1.000# |
| 1W to 6M | 0.00 | 0.000 | 0.27 | 0.452 | 0.005** |
| 1M to 6M | 0.00 | 0.000 | 0.27 | 0.452 | 0.005** |

**Graph 6a- Intergroup comparison of changes in VAS Score over a period of 6 months**




**Graph 6b- Intergroup comparison of changes in VAS Score over a period of 6 months**




## DISCUSSION

Gingival health and it's appearance are pivotal components of a good smile. Gingival melanin hyperpigmentation is an aesthetic concern amongst many individuals with a high lip line and a gummy smile. Although, this does not pose a medical problem, demands for cosmetic correction of gingival melanin hyperpigmentation have become increasingly common in today's aesthetically driven world of dentistry.[74, 75]

Melanin pigmentation appear in the gingiva as early as 3 hours after birth.[76] Physiologic pigmentation is probably genetically determined, but Dummet CO (1971)[76] suggested the degree of pigmentation is related to mechanical, physical and chemical stimulation. Melanin hyperpigmentation may be associated with conditions like endocrine disturbances, Albright's syndrome, malignant melanoma, Peutz-Jegher's syndrome, Addison's disease and Von Recklinghausen's disease.

Gingival depigmentation is a periodontal plastic surgical procedure aimed at removing or reducing the hyperpigmentation. Since gingival depigmentation is a cosmetic procedure, the technique should be simple, less technique sensitive and minimally invasive.[77] Various depigmentation techniques include chemical exfoliation of the pigmented tissue, bur abrasion, scalpel surgery, cryosurgery, electrosurgery, gingival grafts, and laser[78] Most of these techniques involve removal of the full thickness of the epithelium and part of the papillary connective tissue layer. These techniques may result in harmful effects such as chemical burn, delayed healing, excessive pain and discomfort, bone necrosis and difficulty to control the depth of penetration.[70]

The selection of a particular technique for depigmentation should be based on experience of clinician, affordability of patient's and preferences. Hence, there is a need for a minimally invasive surgical gingival depigmentation technique. Therefore, the present study was conducted to comparatively evaluate depigmentation using ceramic soft tissue trimming bur versus scalpel for treatment of physiological gingival melanin hyperpigmentation.

In this study, sixty-two sites with physiological gingival melanin hyperpigmentation, having a DOPI score of 2 or 3 (Dummett CO and Gupta OP 1964) [23, 24] were selected. Twenty-six selected sites underwent depigmentation using Ceramic soft tissue trimming bur, whereas the remaining twenty-six sites underwent depigmentation using scalpel surgical technique. The surgical procedure was performed under aseptic precautions and subjects were recalled at 7th day, 1 month and 6 months postoperatively for follow up examination and assessment of clinical parameters.

Scalpel depigmentation technique, which was first illustrated by Dummet and Bolden (1963)[79]. Surgical bur abrasion method was first reported by Ginwalla et al (1966)[80] which involves de-epithelisation of pigmented areas of the gingiva by using high speed rotary instruments.

Ceramic soft tissue trimming bur is a rotating bur. It is a rotating scalpel for soft tissue which promotes coagulation with minimal bleeding. Ceramic soft tissue trimming bur point is made from a very hard and durable bio-compatible oxide material. They are made up of mixed ceramic composed of Zircon-dioxide partly stabilized by Yttrium and Aluminium ceramic. They are used at 300,000 rpm - 450,000 rpm without cooling. Here, the kinetic energy is converted to heat. It secures a nice and gentle cut.

The gingival melanin pigmentation index (DOPI) score was assessed using Dummett-Gupta Oral Pigmentation Index (Dummett CO, Gupta OP, 1964)[23,24] at baseline, 7th day, 1 month and 6 months. In the present study, on intragroup comparison there was a statistically highly significant difference seen for DOPI score at baseline as compared to 7th day, 1 month and 6 months ($p<0.01$) follow up. However, on intergroup comparison there was a statistically highly significant difference seen at baseline and 1 month in the Group A($p<0.01$). Test sites treated with ceramic soft tissue trimming bur showed slight or no pigmentation as compared to control sites treated with scalpel depigmentation technique over a period of 6 months. The findings of this study were similar to those reported by Goldar K et al (2020)[42]and Negi R et al (2019)[41]. Goldar K et al (2020)[42]stated thatceramic soft tissue trimmer showed delayed re-pigmentation index than rest all other procedures. Negi R et al (2019)[41] stated that DOPI scores were significantly reduced from baseline in sites treated with ceramic soft tissue trimmer bur and LASER.

The woundhealing was assesse dusing Healing Index (LandryRG, TurnbullRS, HowleyT 1988)[11]at baseline, 7th day, 1 month and6 months. In the present study, on intragroup comparison there was a statistically highly significant difference seen for wound healing index score at baseline as compared to 7th day, 1 month and 6 months ($p<0.01$) follow up. However, on intergroup comparison there was a statistically highly significant difference seen at 1 week and 1 month in the Group A($p<0.01$). In this study, sites treated with ceramic soft tissue trimming bur resulted in rapid wound healing as compared to scalpel depigmentation technique over a period of 6 months. The finding of this study was similar to those reported by Goldar K et al (2020)[42]and Negi R et al (2019)[41]. Goldar K et al (2020)[42]stated thatceramic soft tissue trimmer has a better healing index compared to other procedures. Negi R et al (2019)[41] showed ceramic soft tissue trimmer bur treated areas healed faster compared to LASER treated areas.

The intensity of pain or discomfort was assessed using Visual Analogue Scale (Matthews DC, McCulloch CAG 1993)[73] at baseline, 7th day, 1 month and 6 months. In the present study, on intragroup comparison there was a statistically highly significant difference seen for VAS score at baseline as compared to 7th day, 1 month and 6 months ($p<0.01$) follow up. However, on intergroup comparison there was a statistically highly significant difference seen at baseline, 1week and 1month in the Group B($p<0.01$). In this study, sites treated with ceramic soft tissue trimming bur resulted in minimal or no pain as compared to scalpel depigmentation technique over a period of 6 months. The finding of this study was similar to the study conducted by Goldar K et al (2020)[42]. Goldar K et al (2020)[42] showed ceramic soft tissue trimmer has a low pain index compared to other procedures. However, Negi R et al (2019)[41] stated that ceramic soft tissue trimming bur treated patients reported slight to moderate pain as compared to LASER.

The reappearance of melanin pigment after a period of clinical depigmentation is called as repigmentation. Repigmentation may be related to the technique used in depigmentation procedure and the race of the patient. The mechanism of re-pigmentation is explained by migration theory, according to this theory active melanocytes from the adjacent pigmented tissues migrate to treated areas, causing re-pigmentation. Re-pigmentation may also be attributed to the melanocytes which are left during surgery as stated by Ginwalla et al (1966).[80] These may become activated and start synthesizing melanin.

In this study, out of 26 sites treated with ceramic soft tissue trimming bur, 22 sites resulted in delayed repigmentation at 6 months as compared to scalpel depigmentation technique where 24 sites resulted in delayed repigmentation at 1 month and 6 months.

The pattern of recurrence with re-pigmentation was patchy in distribution and due to its mild intensity, the results were considered to be satisfying for the patients. Recurrence can be prevented by the entire removal of melanin including free gingiva and interdental papilla since repigmentation starts as a result of migrating melanocytes from free gingiva. Adequate

tissue removal may not be possible at the marginal gingiva and interdental papilla region due to close proximity of the adjacent teeth. Ginwallaet al80 reported re-pigmentation in 50% of their cases between 24 and 55 days.

Kawar NI et al (2021)[81] in a case report presented a simple non-invasive gingival sculpting depigmentation technique, using a combination of diamond burs and scalpels. They stated that gingival sculpting is minimally invasive procedure that which renders excellent esthetic results.

The findings of this study were similar to a systematic review and meta-analysis conducted by Gul M et al (2019)[72], where they assessed the most effective method for the management of physiologic gingival hyperpigmentation. They concluded that, surgical stripping has been the conventional treatment of choice, but the new techniques are equally effective or even better than conventional scalpel surgery when different parameters were assessed.

In this study, ceramic soft tissue trimming bur treated areas required minimal chair side time and effort with delayed repigmentation than scalpel depigmentation technique. The finding of this study was not in accordance with the study reported by Abdelmagyd HA et al (2019).[82] They stated that gingival depigmentation using scalpel method has an advantage of being effective and requires minimum time and effort with the lowest rate of repigmentation compared to laser and abrasion methods.

Thus, within the limitations of the present study, this minimally invasive surgical technique with ceramic soft tissue trimming bur resulted in reduction of the gingival melanin hyperpigmentation with minimal bleeding, rapid wound healing and less post-operative pain and discomfort. Hence, the use of ceramic soft tissue trimming bur might prove to be a boon in achieving aesthetic satisfaction.Occurrence of repigmentation needs to be assessed and comparative evaluation of repigmentation, evidence of repigmentation with ceramic soft tissue trimming bur versus scalpel depigmentation technique needs to be done are the limitations of the study.

## CONCLUSION

The present study was conducted to comparatively evaluate depigmentation using ceramic soft tissue trimming bur versus scalpel for treatment of physiological gingival melanin hyperpigmentation.

A total of 52 sites with physiological gingival melanin hyperpigmentation and with esthetic concerns for the same were included in this study. 26 sites with gingival melanin hyperpigmentation were treated using ceramic soft tissue trimming bur in the Group A, whereas scalpel depigmentation technique was performed in the other 26 sites in the Group B. The clinical parameters were assessed at baseline, 7th day, 1 month and 6 months.

There was a statistically significant decrease in the pigmentation scores, wound healing index scores as well as the degree of pain and discomfort at 6 months as compared to the baseline scores.

Thus, within the limits of this study, it can be concluded that the effectiveness of ceramic soft tissue trimming bur in the treatment of gingival melanin hyperpigmentation is clinically favourable. This minimally invasive surgical technique with Ceramic soft tissue trimming bur is better than scalpel depigmentation technique as it causes minimal bleeding, rapid wound healing and less post-operative pain and discomfort as compared to scalpel depigmentation technique. Hence, the use of ceramic soft tissue trimming bur might prove to be a boon in achieving aesthetic satisfaction.

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