



A COMPARATIVE EVALUATION OF THE EFFICACY OF TEETH WHITENING AGENT WITH AND WITHOUT DIODE LASER: A SPLIT-MOUTH STUDY.

Periodontics

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ABSTRACT

Over the decades, the demand for teeth whitening has increased which has prompted the creation of numerous novel bleaching products. A teeth-whitening product called Synergy gel makes claim to cause no significant sensitivity, is highly effective, has ease of handling, and is used without a gingival barrier. Hence, this study is to evaluate the efficacy of teeth-whitening agents with and without the use of a diode laser. **Method:** The teeth in this split-mouth design were grouped into group A (Novo Synergy tooth whitening with an 810nm diode laser) and group B (Only Novo Synergy tooth whitening). **Result:** There is a significant difference between both groups at immediate and 15 days. But, there is no significant difference between both groups at 3 months. **Conclusion:** The use of diode lasers (810nm) to enhance bleaching has significant efficacy to that of the synergy gel bleaching but for a shorter period of time.

KEYWORDS

SYNERGY GEL, DIODE LASER, INDOCYANINE GREEN

INTRODUCTION

A beautiful smile and white teeth are prized in today's youth which has led to an increase in demand for tooth whitening.¹ A teeth-whitening product called Synergy gel makes claim to cause no significant sensitivity, is highly effective, has ease of handling, and is used without a gingival barrier. Unlike other generic whitening methods that use a high concentration of hydrogen peroxide, the components used in this composition (carbamide peroxide and titanium dioxide) are gentle on the soft tissues without the technique-sensitive application of a gingival barrier. Sensitization to singlet oxygen, which results in teeth whitening, is the main mechanism through which ICG photobleaches.² Moreover, titanium dioxide can hasten the oxidation reaction of bleaching processes and support a more potent whitening outcome.³ Another relatively new method for tooth whitening is laser light, which has several benefits. Hence, this study is to evaluate the efficacy of teeth-whitening agents with and without the use of a diode laser.

Inclusion Criteria

1. Patient willing to sign an informed written consent and complete the study period
2. Patient with mild to moderate stains (Lobene Index) and tooth color A2-A3.5 shade was included.

Exclusion Criteria

1. Teeth with intrinsic stains.
2. Patient with a history of systemic disease.
3. Pregnant women.

The teeth in this split-mouth study were grouped into:

- Group A – Novo Synergy tooth whitening with 810nm diode laser.
Group B – Only Novo Synergy tooth whitening.

Parameters

Evaluation of tooth color by Vita Classical Shade Guide.

The prearranged shade of VITA classic shade guide from lighter to darker are as follows:

B1, A1, B2, D2, A2, C1, C2, D4, A3, D3, B3, A3.5, B4, C3, A4, C4.2



Figure 1: Novogreen Dye, Synergy Gel, And Novolase Laser

Procedure

A total of 10 patients were selected from the Department of Periodontology, Bharati Vidyapeeth (Deemed to be University) Dental college and hospital, Sangli, with mild to moderate tobacco stains. Patients with the same tooth shade in all 6 anterior teeth were included to avoid the bias factor. Scaling of the patient was performed and impressions were taken, and models were prepared to fabricate the tray. The tray then was cut into halves. The synergy gel (0.25 – 0.50 gm) was dispensed onto a dappen dish and 2 to 3 drops of the photodynamic therapy dye (Indocyanine green) were mixed thoroughly for both groups.

The left maxillary anterior (group A) was treated with a teeth whitening agent (Synergy gel) along with an 810nm diode laser (NovoLase) and the right maxillary anterior (group B) was treated with a teeth whitening agent (Synergy gel) only without laser.

In Group A, the synergy gel with dye was painted onto the teeth surface with an applicator tip on the second quadrant and left for 30 minutes. The 810 nm laser with a quadrant prism having 4W power for 2 minutes was used for activation. A soft sheet bleaching tray was given to avoid the displacement of gel and discomfort to the patient and then the synergy gel was cleaned with cotton.

In Group B, the synergy gel with dye was painted onto the teeth surface with an applicator tip on the first quadrant and left for 30 minutes. A soft sheet bleaching tray was given to avoid the displacement of gel and discomfort to the patient and then the synergy gel was cleaned with cotton.

RESULT

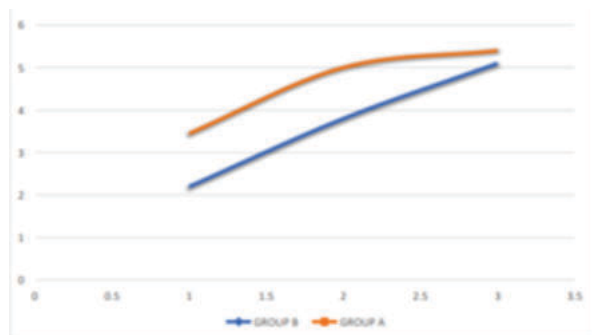
Table 1: Comparison Of Tooth Shade Of Group A And Group B Between Time Intervals At Baseline, 15 Days, And 3 Months.

	GROUP A		GROUP B	
	Mean	SD	Mean	SD
Baseline	8.2	1.94	8.2	1.94
Immediate	6	2.60	4.7	2.41
15 days	4.4	2.72	3.1	1.80
3 month	2.8	1.74	2.95	1.79
F value	20.34575*		29.76344*	

Table 2: Pairwise Comparison At Different Intervals For Group A And Group B

		GROUP A	GROUP B
PAIRWISE COMPARISON		Q VALUE	Q VALUE
Baseline	Immediate	4.5*	7.82*
	15 Days	7.43*	11.40*

	3 Months	10.56*	11.74*
Immediate	Baseline	4.5*	7.82*
	15 Days	3.13	3.58
	3 Months	6.26*	3.91
15 Days	Baseline	7.43*	11.40*
	Immediate	0.34	3.58
	3 Months	3.13	0.34
3 months	Baseline	10.56*	11.74*
	Immediate	3.91	3.91
	15 Days	0.34	0.34



Graph 1: Groupwise Comparison Of The Difference In The Shade At Different Intervals Between Group A And Group B.

DISCUSSION

In order to speed up the release of free radicals from the bleaching gel and shorten the time it takes to whiten teeth, laser-assisted bleaching is used.

In the current study, Lobene stain was included to standardize the study's inclusion criteria. Only mild-moderate tobacco stains were included in the study as one sitting of Novo Synergy gel is sufficient for tooth whitening. The Vita classic shade guide was utilized in the current investigation for the visual assessment.⁴ The most popular approach is this one because it is quick, easy, and has been proven effective in numerous tests.⁴ The novel Synergy system prevents demineralization due to its high pH and simultaneously releases free calcium to aid in remineralization. It is made up of titanium dioxide, calcium carbonate, silica, titanium dioxide, sodium pyrophosphate, and carbamide peroxide. Free radicals cause a gradual but steady process, therefore the manufacturer's instructions state that the ultimate result of the tooth whitening gel was visible after two weeks (15 days). As Polydorou et al. (2013)⁵ showed that the use of light units increases in-office bleaching effectiveness for a brief length of time, a follow-up period of three months was chosen in the current investigation to assess the color stability.

In the current work, indocyanine green (ICG), a photosensitive dye that is stimulated by light in photodynamic treatment (PDT), is used.⁶ They can donate extremely energetic electrons in their triplet excited state and decrease O₂ and H₂O₂ to generate H₂O₂, HO₂, and HO. The dyes will also produce singlet oxygen (¹O₂) through spin-orbit coupling with triplet oxygen (³O₂), the typical form of molecular oxygen, during intersystem crossover (from singlet to triplet excitation). Together, photodynamic bleaching enhancement allows for the production of the two strongest bleaching agents, singlet oxygen and the hydroxyl radical, making it an extremely robust enhancement.⁶

The baseline tooth shade for group A was (8.2 ± 1.94), which has decreased to (6 ± 2.60), (4.4 ± 2.72) and (2.8 ± 1.74) at immediate, 15 days, and 3 months respectively showing a significant change in color shade. These findings were supported by the 2017 study conducted by Fekrazad R et al.⁷

The baseline tooth shade for group B was (8.2 ± 1.94), which has reduced to (4.7 ± 2.41), (3.1 ± 1.80), and (2.95 ± 1.79) at immediate, 15 days, and 3 months showing a significant change in color shade. These findings were supported by the 2006 study conducted by Kugel et al.⁸

There is a significant difference between Group B and Group A at immediate, 15 days. But, there is no significant difference between Group B and Group A at 3 months.

CONCLUSION

Within the limitations of the present study, the use of diode lasers (810nm) to enhance bleaching has significant efficacy to that of the synergy gel bleaching but for a shorter period of time that is immediate and 15 days. For immediate results of teeth whitening the use of a diode laser with Novo synergy gel could improve the teeth whitening effectiveness.

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