

Original Research

A comparative study of diode laser and fluoride varnish in dentin hypersensitivity cases- A clinical study

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ABSTRACT:

Background: Dentine hypersensitivity (DH) is an abnormal response of the exposed vital dentine to various stimuli. The present study was conducted to compare diode laser and fluoride varnish in dentin hypersensitivity. **Materials & Methods:** This study was conducted on 50 patients of dentine hypersensitivity which were divided into 2 groups (25 each). Group I patients were treated with diode laser (DL) and group II patients were treated with fluoride varnish. All patients underwent scaling and dentine hypersensitivity (DH) was evaluated by tactile and evaporative stimulus. VAS score was recorded at baseline, 15 days, 1 month and 2 months. **Results:** The mean VAS score for tactile stimulus at baseline in group I was 7.12, at 15 days was 6.15, at 1 month was 5.17 and at 2 months was 4.24. In group II, at baseline score was 7.18, at 15 days was 6.20, at 1 month was 5.93 and at 2 months was 5.28. The mean VAS score for air blast stimulus at baseline in group I was 8.12, at 15 days was 6.78, at 1 month was 5.40 and at 2 months was 3.92. In group II, at baseline score was 7.50, at 15 days was 6.75, at 1 month was 6.42 and at 2 months was 6.72. The difference was significant ($P < 0.05$). **Conclusion:** Authors found that there was reduction in tactile and air blast stimulus recorded on VAS in both groups. After 2 months diode laser revealed better results. Hence both diode laser and fluoride varnish can be effectively used in dentine hypersensitivity.

Key words: Dentine hypersensitivity, Diode laser, fluoride varnish

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INTRODUCTION

Dentine hypersensitivity (DH) is considered as an abnormal response of the exposed vital dentine.¹ It may result from various stimuli such as thermal, evaporative, tactile, osmotic, or chemical. DH is one of the frequently encountered complaints for patient seeks expert opinion.² The number of patients with DH is on rise and the cause may be increase use of acidic

products such as cold drinks etc.³ Both genders experience DH with no gender discrimination. Among various reasons, gingival recession, wasting diseases, periodontal treatment such as scaling, root planning, and also improper tooth brushing are the main one. DH leads to sharp, localized pain of short duration arising from exposed dentin in response to stimuli, typically

and which cannot be ascribed to any other form of dental defect or pathology.⁴

Various theories such as transducer theory, gate control theory, direct receptor mechanism or direct stimulation theory or modulation theory and hydrodynamic theory have been proposed for DH. The hydrodynamic theory is the most widely accepted hypothesis to explain how stimuli applied on the dentin surface influence nerve fibers, thus resulting in pain impulses.⁵ Brannstrom's hydrodynamic theory of DH, the most widely accepted among various theories, suggests that certain external stimuli can cause a movement of fluids within the dentinal tubules, resulting in stimulation of nerve endings within the tubules subsequently causing pain. Therefore, it is understood that any materials or techniques that reduce dentinal fluid movement should decrease DH.⁶ The present study was conducted to compare diode laser and fluoride varnish in dentin hypersensitivity.

MATERIALS & METHODS

This study was conducted in the department of Periodontitis on 50 patients of both genders. Inclusion criteria were patients age ranged 20-60 years, VAS >3

and those willing to participate. Exclusion criteria were patients using desensitizing toothpaste, patients having attrition and those who did not want to participate. Ethical clearance was obtained beforehand. All patients were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Each group comprised of 25 patients. Group I patients were treated with diode laser (DL) (beam of 980 nm wavelength directed perpendicularly to the exposed tooth surface for 30 seconds) and group II patients were treated with fluoride varnish (Flour protector varnish). All patients underwent scaling and dentine hypersensitivity (DH) was evaluated by tactile and evaporative stimulus. Tactile stimulus (TS) was determined with an explorer with light manual pressure in the cervical region. Evaporative stimulus was performed using an air syringe that was directed to the exposed tooth area for 3 seconds. VAS score was recorded where 0 showed "no pain" and 10 showed "worst possible pain" at baseline, 15 days, 1 month and 2 month. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Assessment of Tactile stimulus

Duration	Group I	Group II	P value
Baseline	7.12	7.18	0.12
15 days	6.15	6.20	0.14
1 month	5.17	5.93	0.19
2 months	4.24	5.28	0.05
P value	0.05	0.02	

Table I, graph I shows that mean VAS score for tactile stimulus at baseline in group I was 7.12, at 15 days was 6.15, at 1 month was 5.17 and at 2 months was 4.24. In group II, at baseline score was 7.18, at 15 days was 6.20, at 1 month was 5.93 and at 2 months was 5.28. The difference was non-significant (P> 0.05).

Graph I: Tactile stimulus

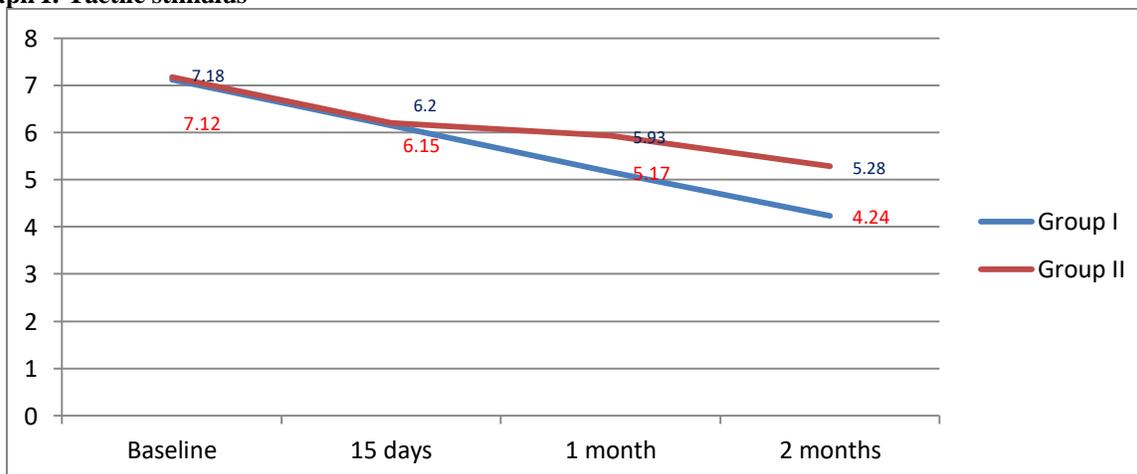
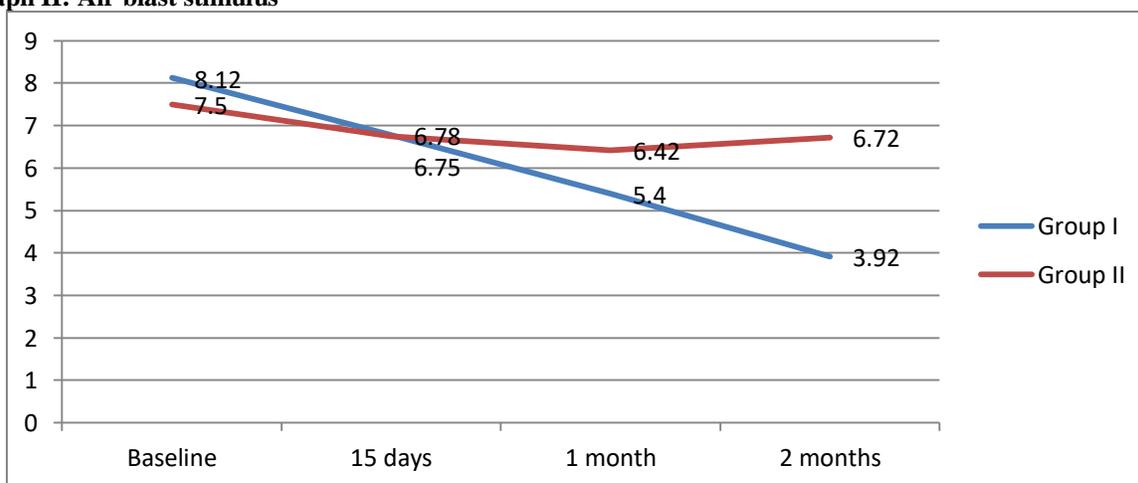


Table II Assessment of Air blast stimulus

Duration	Group I	Group II	P value
Baseline	8.12	7.50	0.02
15 days	6.78	6.75	0.91
1 month	5.40	6.42	0.01
2 months	3.92	6.72	0.01
P value	0.02	0.71	

Table II, graph II shows that mean VAS score for air blast stimulus at baseline in group I was 8.12, at 15 days was 6.78, at 1 month was 5.40 and at 2 months was 3.92. In group II, at baseline score was 7.50, at 15 days was 6.75, at 1 month was 6.42 and at 2 months was 6.72. The difference was significant (P< 0.05).

Graph II: Air blast stimulus



DISCUSSION

Dentine hypersensitivity is among commonly experience complaint among patients visiting dental clinics. Anti-inflammatory agents, protein precipitants (formaldehyde, silver nitrate, and strontium chloride), tubule-occluding agents (potassium oxalate, calcium hydroxide, potassium nitrate, and sodium fluoride [NaF]), tubule sealants (resins and adhesives), and miscellaneous (lasers) etc. are commonly used agents in the treatment of DH. Various agents such as mouthwashes, dentifrices, gel, ionic exchange gadgets etc. have been tried in the management of DH cases. However, none of these agents are capable of delivering the drug constantly for long periods and requires frequent revisits by patients or may take long time for providing relief. Contradictory results of treatment have been seen in various clinical trials.⁸The present study was conducted to compare diode laser and fluoride varnish in dentin hypersensitivity.

In present study, group I patients were treated with diode laser (DL) and group II patients were treated with fluoride varnish. There were 25 patients in each group. Suri et al⁹ compared the 5% topical NaF varnish and 980 nm gallium aluminum arsenide (GaAlAs) DL alone and combination of 5% NaF + 980 nm GaAlAs DL in the management of DH on 120 teeth in thirty patients

with DH assessed by tactile and air blast (AB) stimuli measured by visual analog scale (VAS). There was a significant reduction in DH. The VAS reduction percentages were calculated, and there was a significant decrease in DH above all in G4 (NaF + DL) than G3 (DL) and G2 (NaF).

We found that mean VAS score for tactile stimulus at baseline in group I was 7.12, at 15 days was 6.15, at 1 month was 5.17 and at 2 months was 4.24. In group II, at baseline score was 7.18, at 15 days was 6.20, at 1 month was 5.93 and at 2 months was 5.28. Aghanashini S et al¹⁰ in their clinical trial on 40 teeth selected from 17 patients evaluated visual analog scale (VAS) >3 from both sexes were randomly allocated into two groups: 20 teeth in diode laser group and 20 in fluoride group. Authors found that after 15 days both the treatment modalities were effective and the effectiveness was maintained all through 60 days. However, the effectiveness of fluoride varnish started reducing by the end of 60th day, whereas, diode laser shown significant effectiveness in reducing DH even at the end of 60th day.

We observed that mean VAS score for air blast stimulus at baseline in group I was 8.12, at 15 days was 6.78, at 1 month was 5.40 and at 2 months was 3.92. In group II, at baseline score was 7.50, at 15 days was 6.75, at 1

month was 6.42 and at 2 months was 6.72. Jain et al¹¹ included 50 teeth from 14 patients which were divided into two groups: 26 teeth in bifluoride group and 24 in laser + bifluoride group. Dentine hypersensitivity is evaluated with the help of VAS at the start of study, at 15 min; 15, 30, and 60 days. The effectiveness of fluoride varnish in reducing evaporative stimulus (ES) was maintained until 15 days. However, the laser + fluoride varnish was more effective in reducing thermal stimulus (TS) at 15 days. The effectiveness of laser + fluoride varnish was more than the varnish group. The effectiveness of laser also reduced after 30 days for both ES and TS.

Studies have revealed that lasers such as Nd: YAG, Er: YAG, CO₂, and diode reduce DH through coagulation and protein precipitation of the plasma in the dentinal fluid or by alteration of the nerve fiber activity. Although various studies addressed the safety of using lasers, it carries its own disadvantages such as high cost and complexity of use.¹²

CONCLUSION

Authors found that there was reduction in tactile and air blast stimulus recorded on VAS in both groups. After 2 months diode laser revealed better results. Hence both diode laser and fluoride varnish can be effectively used in dentine hypersensitivity.

REFERENCES

1. Hashim NT, Gasmalla BG, Sabahelkheir AH, Awooda AM. Effect of the clinical application of the diode laser (810 nm) in the treatment of dentine hypersensitivity. *BMC Res Notes* 2014;7:31.
2. Umberto R, Claudia R, Gaspare P, Gianluca T, Alessandro del V. Treatment of dentine hypersensitivity by diode laser: A clinical study. *Int J Dent* 2012;2012:858-950.
3. Yilmaz HG, Kurtulmus-Yilmaz S, Cengiz E. Long-term effect of diode laser irradiation compared to sodium fluoride varnish in the treatment of dentine hypersensitivity in periodontal maintenance patients: A randomized controlled clinical study. *Photomed Laser Surg* 2011;29:721-5.
4. Paine ML, Slots J, Rich SK. Fluoride use in periodontal therapy: A review of the literature. *J Am Dent Assoc* 1998;129:69-77.
5. Addy M. Tooth wear and sensitivity: Clinical advances in restorative dentistry. In: Addy M, Embery G, Edgar WM, Orchardson R, editors. *Dentine Hypersensitivity: Definition, Prevalence Distribution and Aetiology*. London: Martin Dunitz; 2000. p. 239-48.
6. Rees JS, Jin LJ, Lam S, Kudanowska I, Vowles R. The prevalence of dentine hypersensitivity in a hospital clinic population in Hong Kong. *J Dent* 2003;31:453-61.
7. Kimura Y, Wilder-Smith P, Yonaga K, Matsumoto K. Treatment of dentine hypersensitivity by lasers: A review. *J Clin Periodontol* 2000;27:715-21.
8. Ipci SD, Cakar G, Kuru B, Yilmaz S. Clinical evaluation of lasers and sodium fluoride gel in the treatment of

- dentine hypersensitivity. *Photomed Laser Surg* 2009;27:85-91.
9. Suri I, Singh P, Shakir QJ, Shetty A, Bapat R, Thakur R. A comparative evaluation to assess the efficacy of 5% sodium fluoride varnish and diode laser and their combined application in the treatment of dentin hypersensitivity. *Journal of Indian Society of Periodontology* 2016 May;20(3):307.
10. Aghanashini S, Puvvalla B, Nadiger S, Mundinamane DB, Bhat D, Andavarapu S. Comparative evaluation of diode laser and fluoride varnish for treatment of dentin hypersensitivity: A clinical study. *J Interdiscip Dentistry* 2018;8:110-7.
11. Jain P R, Naik G D, Uppor S A, Kamath DG. Diode laser and fluoride varnish in the management of dentin hypersensitivity. *J Interdiscip Dentistry* 2015;5:71-4.
12. Asnaashari M, Moeini M. Effectiveness of lasers in the treatment of dentin hypersensitivity. *J Lasers Med Sci* 2013;4:1-7.