INTRODUCTION
Dentin hypersensitivity is an abnormal response of the exposed vital dentine to thermal, osmotic, chemical or tactile stimuli and which cannot be ascribed to any other dental defect or pathology. Various etiologic and predisposing factors for dentine hypersensitivity include occlusal disequilibrium, attrition, abrasion, erosion, parafunctional habits, anatomic predisposition due to structural deficiency of the enamel–cement junction and root planing. Advancements in dentistry has led to reduction in tooth loss and hence dentin hypersensitivity prevalence is likely to increase in next years as more adults keep their teeth into later life.

A plethora of techniques and products have been proposed for the treatment of dentin hypersensitivity; however, superiority of one modality over others alone has not been currently proven.

METHODOLOGY:
The study was conducted on 90 teeth with dentin hypersensitivity assessed by tactile and cold air stimuli measured by visual analog scale (VAS). Teeth were randomly divided into three groups, G1 (n=30) treated by Nanohydroxyapatite desensitizing paste; G2 (n=30) treated by Nd:YAG laser and G3 (n=30) received Nd:YAG laser plus Nanohydroxyapatite desensitizing paste. The level of sensitivity was analyzed by VAS at each control. The VAS reduction percentages were calculated and data subjected to statistical analysis.

Result: Comparing the means of responses for the three groups revealed that Nd:YAG laser group and the combination treatment group had a higher degree of desensitization compared to group treated with only desensitizing paste.

KEYWORDS
Dentine Hypersensitivity, Nd:YAG laser, Nanohydroxyapatite
Both air and tactile stimuli evaluations were performed before and after treatment session. The patients were recalled for evaluation after one month. The tactile and air stimuli tests were performed again and results recorded on the VAS. The VAS reduction percentage were valued for each group between the pretreatment and the posttreatment session (immediate -/-). The obtained results were statistically analyzed.

RESULTS

The comparison of mean Air evaluation (Fig. 3) and mean probe evaluation (Fig. 4) Pre, post and after 1 month was done using the One-way ANOVA test. There was a significant difference in mean Air evaluation post and after 1 month between Groups 1, 2 and 3.

![Fig3. Mean Air evaluation](image)

### Table 1.

<table>
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<th>Air evaluation</th>
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<th>p-value</th>
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<tbody>
<tr>
<td>Difference from Pre to post</td>
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<td>Group 2</td>
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<td>Group 1</td>
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<td>-0.60</td>
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<tr>
<td></td>
<td>Group 2</td>
<td>Group 3</td>
<td>-1.17</td>
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<tr>
<td>Difference from Pre to post 1 month</td>
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<tr>
<td></td>
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<td>-0.53</td>
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<td></td>
<td>Group 2</td>
<td>Group 3</td>
<td>-1.17</td>
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### Table 2.

<table>
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<tr>
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<td>Group 3</td>
<td>-1.13</td>
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### DISCUSSION

Dentine hypersensitivity is most common complaint reported by the patients due to which they are unable to consume hot or cold beverages, sweets and have difficulty in brushing their teeth. Despite a variety of treatment modalities available, still a standardized clinical protocol for the management of dentine hypersensitivity has not been developed as most of the therapies have failed to satisfy the patient. The objective of the present study is to evaluate the efficacy of nanohydroxyapatite desensitizer and Nd:YAG laser alone and in combination for the treatment of dentine hypersensitivity.

Studies have shown that individuals with dentin hypersensitivity show open dentinal tubules that are wider and are more numerous than nonsensitive surfaces. The concept of treatment for dentine hypersensitivity is related to the interruption of stimuli transmission to the nerve endings of odontoblast processes by reducing the movement of dentinal fluid by creating a barrier that completely or partially obliterates the dentinal tubes (Branstrom hydrodynamic theory, 1986).

The rationale behind the use of n-HA emerged from the fact that it would obliterate the open dentinal tubules and since it is similar to the inorganic composition of the tooth it would blend with it. This principle is in accordance to majority of desensitizing toothpastes available in the market.

With the advent of the lasers, a new treatment option appeared for the management of dentine hypersensitivity. Diode laser (908 nm), CO2 laser (10600 nm) and Er:YAG (2940 nm) have been used for dentine hypersensitivity but literature shows that the results of Nd:YAG (1064 nm) laser are more effective for the reduction in pain in dentine hypersensitivity.

Irradiation with Nd:YAG laser leads to dissolution and resolidification of the hydroxyapatite crystals in dentin which causes obliteration of tubules. Nd:YAG laser seals dentinal tubules to a depth of approx. 4 μm within the tubules causing reduction in dentine hypersensitivity. According to the literature only Nd:YAG laser appears to have an additional analgesic effect as compared to other lasers which is due to direct nerve analgesia and suppressive effect achieved by blocking the depolarization of A δ and C fibres. This mechanism explains a decrease in sensitivity levels at the second evaluation period (after 1 month) as compared to immediate after treatment. In the present study, the group treated with Nd:YAG laser showed clinical results that were expected, significantly reducing pain levels immediately and over the course of time. None of the laser treated teeth showed secondary effects which confirms the safety of this treatment modality.

One cannot be sure that Nd:YAG irradiation caused sealing of all the dentinal tubules with the protocol used in the study but Nd:YAG laser behaved at power more than 1.5 W may form more. Despite, carbonization of the tooth surface and increase in pulpal temperature. This is the reason some patients still had sensitivity even after irradiation with Nd:YAG laser.

The group which showed maximum reduction in hypersensitivity was the one in which Nd:YAG laser was used in combination with nanohydroxyapatite desensitizer. The dentinal tubules that were not sealed by means of resolidification process of Nd:YAG laser could
have been occluded by means of nanohydroxyapatite desensitizer. The results of our study are in accordance with the study where sodium fluoride varnish when used in combination with Nd:YAG laser showed a synergistic desensitizing effect and it was related to higher sodium fluoride gel adhesion following laser treatment.15 Lopes et al.16 demonstrated that when a desensitizing agent Gluma and a low power laser were used alone and in combination, all of the treatment modalities were effective in reducing dentine hypersensitivity but the best results were obtained with combination therapy.

In our study VAS was used to measure the level of pain because according to literature, VAS for assessing pain affect has been shown to be valid and sensitive to treatment effects and to have ratio scales qualities.21

Within the limitations of the study, all the treatment modalities were effective in reducing dentine hypersensitivity. Management of hypersensitivity with Nd:YAG laser alone and in combination with nanohydroxyapatite desensitizer promises a noninvasive and safe treatment option provided correct protocols are used.

CONCLUSION:
Our study indicated that irradiation with Nd:YAG laser showed promising results for the treatment of Dentine hypersensitivity. There was no significant synergistic effect of nanohydroxyapatite toothpaste in combination with Nd:YAG lasers. To establish a standard treatment for dentinal hypersensitivity further long term studies on larger populations are required.

REFERENCES: