Dentine hypersensitivity (DH) is one of the most common clinical problems which can cause considerable discomfort to the patients. Once initiated it can cause sensitivity or can trigger pain and create severe discomfort for the patient. Gingival recession and enamel loss both, resulting in the exposure of dentine, contribute to the prevalence of this condition. Dentine hypersensitivity is believed to occur due to the movement of fluid within the dentinal tubules occurring in response to thermal, chemical, tactile and evaporative stimuli, in accordance with Brannstrom's Hydrodynamic Theory. Its management requires a good understanding of the complexity of the problem, there are a variety of treatments available to treat DH. This review describes the etiology, incidence and management of dentine hypersensitivity.

**ABSTRACT**

Dentine hypersensitivity (DH) is one of the most common clinical problems which can cause considerable discomfort to the patients. Once initiated it can cause sensitivity or can trigger pain and create severe discomfort for the patient. Gingival recession and enamel loss both, resulting in the exposure of dentine, contribute to the prevalence of this condition. Dentine hypersensitivity is believed to occur due to the movement of fluid within the dentinal tubules occurring in response to thermal, chemical, tactile and evaporative stimuli, in accordance with Brannstrom's Hydrodynamic Theory. Its management requires a good understanding of the complexity of the problem, there are a variety of treatments available to treat DH. This review describes the etiology, incidence and management of dentine hypersensitivity.

**KEYWORDS:**

dentine hypersensitivity, dentinal tubules, gingival recession

**Introduction:**

Dentine hypersensitivity (DH), is described clinically as an exaggerated response to non-noxious stimuli and satisfies all the criteria to be classified as a true pain syndrome. Dowell and Addy have defined dentine hypersensitivity as a transient pain arising from exposed dentine, typically in response to chemical, thermal, tactile or osmotic stimuli, which cannot be explained as arising from any other form of dental defect or pathology. DH can affect people of any age group but the majority of affected people have been reported to be in their third and fourth decade of life. Some studies have suggested that DH affects more women than men. DH prevalence has been reported to be 60-98% in patients having history of periodontal disease.

**Mechanism of dentine hypersensitivity**

A number of theories have been put forth in recent years to explain the mechanism of dentine hypersensitivity. The most widely accepted theory till date is called the Hydrodynamic theory. This theory was first put forward or postulated by Gysi in the year 1900 and was later developed by Brannstrom (1963). It was proposed in this theory that application of external stimuli, such as cold or hot, tactile or osmotic pressure, to exposed dentine will cause movement of dentinal fluid. The movement of the fluid in turn will stimulate the mechanoreceptors which are near the base of the dentinal tubules and under the influence of certain parameters; a pain response will be triggered. Note the outward flow of fluid in response to stimuli, represented by the black arrows shown in fig. 1.

**Fig. 1: Brännström’s Hydrodynamic Theory**

**Etiological and predisposing influences**

There are numerous and varied etiological factors for and predisposing to dentine hypersensitivity. Certainly, no prime cause can be identified. By definition, dentine hypersensitivity may arise as a result of loss of enamel and/or root surface demudation with exposure of underlying dentine. Gingival recession due to chronic periodontal disease is thought to be a very important etiological factor associated with DH. Moreover, Dababneh et al. (1999) suggested that hypersensitivity which occurs in association with periodontal disease might have an etiology which is different from the etiology of DH occurring alone i.e. because of possible penetration of dentinal tubules by bacteria. Some of the etiological and predisposing factors associated with DH have been summarized in Table 1.

**Table 1. Etiological and some predisposing factors associated with dentin hypersensitivity**

<table>
<thead>
<tr>
<th>Factor</th>
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<tbody>
<tr>
<td>Loss of enamel</td>
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<tr>
<td>Denudation of cementum</td>
</tr>
<tr>
<td>Gingival recession</td>
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<tr>
<td>Attrition</td>
</tr>
<tr>
<td>Abrasion</td>
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<tr>
<td>Abfraction</td>
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<tr>
<td>Erosion (intrinsic and extrinsic)</td>
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<tr>
<td>Tooth malposition</td>
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<tr>
<td>Thinning, fenestration, absent buccal alveolar bone plate</td>
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<tr>
<td>Periodontal disease and its treatment</td>
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<td>Periodontal surgery</td>
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<td>Patient habits</td>
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**Differential Diagnosis**

It is worth to note that although many individuals seem to have exposed dentine, not all end up experiencing its symptoms. For those who do, it is important to eliminate other possible causes of patient’s pain by considering a differential diagnosis such as:

1. Chipped teeth
2. Fractured restorations
3. Pulpal response to caries
4. Pulpal response to restorative treatment
5. Cracked tooth syndrome
6. Palatogingival groove

**Diagnosis**

Diagnosis of DH starts with a thorough clinical history and examination Clinical signs and symptoms that a dental professional should be aware of and inquire about include sensitivity or pain when a stimulus is applied (such as hot/cold/sweet/sour/touch), exposed
dentine at the site of sensitivity, and in the absence of dental caries, fracture lines, or poor restorations. A simple clinical method of diagnosing DH includes a jet of air or using an exploratory probe on the exposed dentine, in a mesio-distal direction, examining all the teeth in the area in which the patient complains of pain. The severity or degree of pain can be quantified either according to categorical scale (i.e., slight, moderate or severe pain) or by using a visual analogue scale.

**Prevention and treatment of DH**

Treatment of hypersensitivity essentially involves the reduction of the functional diameter of the dentinal tubule to limit its fluid movement. This can be achieved by:

1. Formation of a smear layer by burnishing the exposed root surface.
2. Topical application of agents that form insoluble precipitates within the tubules.
3. Impregnation of tubules with plastic resins.
4. Applications of dentine bonding agents/adhesives that seal the dentinal tubules.

Educating the patient on the causes and management of dentine hypersensitivity is a primary goal for dental professionals when creating a treatment plan for this condition. There are multiple etiologies and once the main cause has been identified, education is the next step, which may entail behavior modifications. (Table 2).

<table>
<thead>
<tr>
<th>Table 2. Patient education</th>
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<tbody>
<tr>
<td>Causes of dentine hypersensitivity</td>
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<tr>
<td>Instructions on toothbrushing technique and when to brush.</td>
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<tr>
<td>Advice on toothbrush type - avoid medium and hard bristles</td>
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<tr>
<td>Advice on appropriate use of toothpaste.</td>
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<tr>
<td>Advice on technique for interdental cleaning</td>
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<tr>
<td>Dietary advice (avoiding carbonated beverages, acidic foods and drinks)</td>
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<tr>
<td>Hypersensitivity associated with tooth whitening.</td>
</tr>
</tbody>
</table>

Various desensitising agents are used for dentine hypersensitivity. Grossman suggested the following ideal requirements for a satisfactory desensitising material:

1. Non-irritant to the pulp
2. Relatively painless upon application
3. Easily applied
4. Rapid in action
5. Effective for a long time
6. Devoid of staining elements
7. Consistently effective.

**Classification of desensitizing agents**

1. **Mode of administration**
   - Home use desensitizing agents
   - In-office treatment

2. **On the basis of mechanism of action**
   - Nerve desensitization
     - Potassium nitrate
   - Protein precipitation
     - Glutaraldehyde
     - Silver nitrate
     - Zinc chloride
     - Strontium chloride hexahydrate
   - Plugging dentinal tubules
     - Sodium fluoride
     - Stannous fluoride
     - Strontium chloride
     - Potassium oxalate
     - Calcium phosphate
     - Calcium carbonate
     - Bio active glasses
   - Dentine adhesive sealers
     - Fluoride varnishes
     - Oxalic acid and resin
     - Glass ionomer cements
     - Composites
     - Dentine bonding agents
   - Lasers
     - Neodymium: Yttrium Aluminum Garnet (Nd–YAG) laser

**In-office desensitizing agents**

Theoretically, the in-office desensitizing therapy should provide an immediate relief from the symptoms of DH. The in-office desensitizing agents can be classified as the materials which undergo a setting reaction (glass ionomer cement, composites) and which do not undergo a setting reaction (varnishes, oxalates). Products that have been used include resin-based materials, sodium fluoride varnish, silver fluoride solution, oxalates, and an aqeous solution of glutaraldehyde and hydroxyethylmethacrylate. These products generally occlude and seal the exposed dentinal tubules.

**Conclusion**

Dentine hypersensitivity can be a challenging condition for dental practitioners to diagnose and treat effectively. With the advancement in dental products, options for providing relief from pain and sensitivity are great and vary according to the severity of the condition. Dental practitioners should be more aware and effective in asking patients questions about sensitivity. With practitioners being more pro-active with this condition, patients may not need to experience the pain associated with hypersensitivity. However, if they do have this condition, they can certainly receive treatment that can provide relief.
References: