Chemical plaque control

Chemical plaque control agents (chemoprophylactic agents): They have proven to be an ideal adjunct to mechanical plaque control.

Ideal properties of chemical plaque control agents:

- Should reduce plaque and gingivitis.
- Should prevent growth of pathogenic bacteria.
- Should prevent resistant bacteria.
- Should compatible with the oral tissues.
- Should not stain teeth or alter taste.
- Should exhibit good retentive properties.
- Should be inexpensive and easy to use.

Modes of action

- Inhibition of bacterial colonization by reducing bacterial adhesion to teeth surfaces.
- Inhibition of bacterial growth and metabolism: Most of chemoprophylactic agents are broad spectrum.
- Disruption of mature plaque by dispersion of plaque then elimination.
- Modification of plaque biochemistry and ecology.

Delivery systems

- Mouth rinses.
- Dentifrices.
- Gels.
- Sustained release devices and varnishes.
- Chewing gums and lozenges.

**Types of chemoprophylactic agents**

**Chlorhexidine (CHX):** This antiseptic agent has both bactericidal and bacteriostatic activity depending on its concentration. It binds readily to the negatively charged cell wall and cause disruption of the membrane. Also, CHX is more effective against gram +ve and yeast organisms. Tooth paste should be used before rinsing with chlorhexidine. Two daily rinses with 10 ml of 0.2% solution of chlorhexidine gluconate will completely inhibited the development of dental plaque, calculus and gingival inflammation. It can be used in concentration of 0.12% in 15 ml twice daily.

**Triclosan:** It is phenol derivative included in mouthwashes and toothpaste, is a non-ionic antimicrobial agent with hydrophilic and hydrophobic properties. It has a broad spectrum of activity against gram positive and negative bacteria and fungi.

**Essential oil mouthwashes or Listerine:** They have been used with plaque reduction of 20% to 35 % and gingivitis reduction of 25% to 35%.

**Enzymes:** Certain enzymes are bactericidal to microorganisms. They would be able to breakdown already formed matrix of plaque and calculus. Enzymes like amyloglucosidase.

**Sanguinaria extract (SE):** It is a herbal preparation obtained from the blood root of Sanguinaria Canadensis plant. They are effective against gram –ve and gram
positive bacteria including oral bacteria. SE exhibits good retentive properties with dental plaque when used as mouth rinse. Also it has substantive properties.

**Metal ions:** Salts of zinc and copper are the most commonly used. These are effective plaque inhibitors at high concentration. Metallic salts reduce the glycolytic activity in microorganisms and delay bacterial growth.

**Antibiotics:** Vancomycin, erythromycin and kanamycin have been used as agents for plaque control.

**Dentifrices:** They are substance used with toothbrush for purpose of cleaning the accessible surfaces of teeth. They may contain the followings:

- The therapeutic agent like fluoride to inhibit dental caries.
- Antimicrobial agent such as chlorhexidine to reduce microorganisms.
- An anticalculus agent as zinc chloride to dissolve calculus.

The function of toothpaste in conjunction with toothbrush is:

- Minimizing plaque buildup.
- Anti-caries action.
- Removal of stains.
- Mouth fresher.

**Composition of dentifrices:** A dentifrice contains a number of ingredients that serve a definite purpose in providing adequate plaque control thus preventing caries and periodontal disease. The following are the common ingredients:

- Abrasive agents (Calcium carbonate, silicas): These agents have a mild abrasive action which aids in eliminating plaque and remove stained pellicle from tooth surface. Calcium carbonate often reacted adversely with fluorides.
- Binding agents (Water soluble agents): These agents control stability and consistency of toothpaste and effects ease of dispersion of the paste in the mouth.

- Detergents (Sodium lauryl sulfate): They are producing the foam which aid in the removal of food debris and also dispersion of the paste in the mouth.

- Humectants (Glycerin, mannitol): These agents aid in reducing the loss of moisture from the toothpaste.

- Flavoring agents (Peppermint oil): They render the product pleasant to use and leave a fresh taste in the mouth after use.

- Anticalculus agents (Pyrophosphates): These agents are designed to inhibit the mineralization of plaque.

- Sweeteners and coloring agents (Saccharine, mannitol): They serve a dual role as sweetening agents and humectants.

- Anticaries agents (Sodium fluoride): These agents aid in the control of caries.

- Essential-Oil Dentifrices (Listerine).

- Desensitizing agents (Potassium nitrate).

- Whiteners (hydrogen peroxide or carbamide peroxide): The dentifrices (contain whiteners) control stain via physical methods (abrasives) and chemical mechanisms (surface active agents or bleaching/oxidizing agents).