

PHARMACOLOGY DEFINITIONS IN DENTISTRY

Sharayu Shanmathi

Intern

Saveetha Dental College and Hospital

- **DENTIFRICE**

Dentifrice are therapeutic aids used with tooth brushes for cleaning the oral cavity .They are available in the form of liquids, powders, Tooth powder and tooth paste, mouth wash.

Ingredients of ideal tooth paste include:



Fig 1

➤ **Abrasive agents**

Dental abrasives are fine powder preparations .Abrasive is a substance used for grinding, polishing and abrading. The degree of abrasive depends on the concentration of abrasive, particles of abrasive, morphology of particles in the paste they are inorganic salts of low solubility .Generally powders are more powerful than pastes.

E.g. calcium carbonate, magnesium carbonate, prepared chalk, calciumchalk, charcoal, kaolin, alumina

Mostly commonly used are *calcium carbonate and pumice*

Pumice consists of silicates of aluminum, potassium, sodium.

- To fill, polish and clean teeth. Pumice with glycerin is employed

Precipitated calcium carbonate is a mild abrasive which is employed to give final polishing to silver amalgam filling.

- It used to prepare tooth powder and tooth paste.

Uses

- For cleaning, polishing and filling the teeth
- To help the scouring action of tooth brush mechanically

Disadvantages

- The abrasive powder should be fine to avoid the scratching of teeth surface and yellowing teeth as the inner dentin reveals
- some abrasives are not mild enough to be used on dentures and teeth.

➤ Detergents :



Fig 2

These are cleaning agents
The most commonly used detergent is *sodium lauryl sulfate*

Acts by

- 1) Lowering surface tension ie they possess emulsifying agents
- 2) Dissolving fatty substance and mucus plaques
- 3) Foamin on scrubbing the teeth, detergents foam and acts as lubricant
- 4) Loosening the substance adhering to tooth surface
- 5) Some of them liberate oxygen and has chemical properties

Uses:

- they have antibacterial effects
- Dissolve plaque by lowering the surface tension which provides contact to teeth surface easily
- Remove debris by cleaning the teeth surface by foaming

Disadvantages

- Causes ulceration to oral mucosa.
- Irritant to oral mucosa
- . But in some people it can trigger ulcers or canker sores.

➤ Antiseptics:



Fig 3

Antiseptic are medicinal substances which possess the power of arresting the putrefaction in wounds being applicable to tooth tissue and structure. The small amount of antiseptic used in dentifrices may not be sufficient to afford adequate antiseptic action.

Antiseptic used in dentistry are *thymol*, *menthol*, *eugenol*, *benzoic acid*, *boric acid* etc.

Thymol is a powerful antiseptic and a deodorant used in mouthwashes and gargles.

Eugenol has the odor of clove and is also a local anesthetic commonly used for dental filling.

Uses

- to reduce plaque and gingivitis build up, and kill germs which causes bad breath
- help in maintaining good oral hygiene

Disadvantage

- Drying effect on skin
- Certain antiseptic are toxic. And leads to irritation of mucous membrane

➤ Sweetening agents



Fig 4

These are used to impart a sweet taste to the preparation. And make it more pleasant and acceptable.

Saccharine sodium which is an artificial sugar is commonly used. It is found that artificial sugar is 50 times stronger than the natural sugar. Sucrose is not used because it ferments

Uses:

- Xylitol is a sweetener which provides anti caries activity.
- Flavoring agents do not promote tooth decay. (No ADA-Accepted toothpaste contains sugar or any other ingredient that would promote tooth decay.)

Disadvantage:

- Artificial sweeteners promotes insulin secretion which leads to dizziness.

➤ Flavoring agent

Toothpaste comes in a variety of colors, and flavors intended to encourage use of the product.

Three most common flavorants are *peppermint*, *spearmint*, and *wintergreen*. Toothpaste flavored with peppermint-anise oil is popular in the Mediterranean region. These flavors are provided by the respective oils, e.g. peppermint oil.

More exotic flavors include Anethole anise, apricot, bubblegum, cinnamon, fennel, lavender, neem, ginger, vanilla, lemon, orange, and pine.

More unusual flavors have been used, e.g. peanut butter, iced tea, and even whisky. Unflavored toothpastes exist.

Advantage:

More palatable

Disadvantage:

While rare, mucosal irritations from toothpaste (i.e., ulceration, gingivitis, angular cheilitis, perioral dermatitis) are usually linked to flavourings or preservatives they contain

➤ **Remineralizers**



fig 5

Hydroxyapatite nanocrystals and calcium phosphate are included in some formulations for remineralization,[7] i.e. the reformation of enamel. All ADA-Accepted toothpastes contain fluoride.

uses:

Fluoride to strengthen tooth enamel and remineralize tooth decay.

➤ **Antibacterial agents**



Fig 6

it prevents gingivitis and, according to the American Dental Association, helps reduce tartar and bad breath.

Triclosan, an antibacterial agent, is a common toothpaste ingredient in the United Kingdom.

A 2006 review of clinical research concluded there was evidence for the effectiveness of 0.30% triclosan in reducing plaque and gingivitis.

Uses:

majority of toothpastes combine the caries protection of fluoride with other therapeutic agents to control plaque, tartar and gum disease.

Many toothpastes include triclosan, which has been shown to offer a clinically useful improvement in gum health.

Other pastes specifically target "tartar" (hardened plaque) and use pyrophosphate to inhibit the mineralization of dental plaque and hence the buildup of tartar (calculus).

➤ **Humectants**



Fig 7

It is used to prevent water loss in the toothpaste. humectants act to retain moisture and prevent the toothpaste from hardening on exposure to air.

Glycerol, sorbitol and propylene glycol are commonly used.

➤ **Thickening agents or binders**

These are used to stabilize the toothpaste formula. They include mineral colloids, natural gums, seaweed colloids or synthetic cellulose. Binding agents (1%).

They are usually derived from cellulose, sodium carboxy-methyl cellulose being the most commonly used. Carrageenans (seaweed derived), xanthan gums and alginates are also used

Uses:

These agents prevent separation of solid and liquid ingredients during storage.

According to Moore and addy, Detergents appear able to attack the dentine surface to produce wear. Abrasives vary considerably in wear produced under similar conditions. Detergents modulate the effect of abrasives in a way that may reflect the rheological properties of the mixture.

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According to manupatiprasanth, it is demonstrated that triclosan containing toothpastes formulations are more effective in control of oral microflora compared to non-triclosan containing synthetic toothpastes.

According to the studies, it is concluded that fluoride prevents caries among adults of all age

Mouthwash

: mechanical agents used for gargles. It is a non sterile aqueous solution

Mouthwash doesnot have abrasive.

- **Alcohol** as a preservative and a semi active ingredient
- **Surfactant** ;used to reduce debris by foaming agents
- **Flavours**
- **Coloring agent**

It is classified into *cosmetic* and *therapeutic* .

Uses :

Cosmetic rinses

- Helps remove oral debris before or after brushing
- Temporary suppresses bad breath.
- Diminish bacteria in mouth and refresh the mouth with pleasant taste

Therapeutic rinses also have the benefits of cosmetic counterparts and also have an added active ingredient that helps to protect against the oral diseases.

Mouth wash may be *medicated* or *non medicated* .

Difference between gargle and mouthwash

Most of the mouthwashes can be used as a gargle usually because they are made of an antibacterial or a disinfectant solution component. But gargles usually cannot be used as a mouth wash because they are mostly medicated and are not meant to be swallowed.

For eg.listerine mouthwash can be used as a mouthwash and a gargle, but hydrogen peroxide can be used only as a gargle and not a mouthwash.

An ideal dentifrice

1. Non caustic to mucous membrane
2. Non decalcifying and non over abrasive to the teeth
3. Non poisonous to the body
4. Not inhibit the secretion and alter the reaction of saliva
5. Not destroy the ferments of saliva

According to the study by brunette DM and pros inHM dentifrice systems have effects on oral malodor.

Obtudent :

fig 8

agents used to diminish dentin sensitivity

Classification :

1. By paralysing sensory nerve ending phenol ,thymol ,camphor.
2. By precipitating surface proteins :astringents -silver nitrate and zinc chloride
3. By destruction of nerve tissues:alcohol 70%

Properties of good obtundent

- 1) Should not produce any irritation or pain
- 2) Should not stain the denture
- 3) Should penetrate the dentin to remove the stain sufficiently

Clove oil is an ideal obtundent

Advantage:

- used to make the excavation painless.
- .it is a chemical that has sedating or numbing action on a sensitive teeth

Disadvantage

- Pulp may shrink and irritants leads to formation of secondary dentin
- After the administration of local anaesthesia ,use of obtundent has declined

- **Mummifying agents:**



Fig 9

Astringents and antiseptics are combined to harden and dry the tissues

Eg liquid formaldehyde ,Para form

Advantage

- It helps the tissue resilient to infections
- Used especially in cases where it is difficult to remove the pulp nd contents if root canal completely
- They remove water and preserve the tissues

- **Bleaching agents**

Uses

- To oxidise the color pigments in the discoloured teeth in order to whiten it .

Disadvantage:

- Pain for sensitive teeth caused by open dentinal tubule
- Risk of increased hot or cold sensitivity.
- Risk of bleaching
- Chemical burns
- Has negative effect on tooth enamel

- **Disclosing agents**

An agent which is used to reveal plaque

Dyes used are erythrosin ,two Tone dyes.

Advantages

- Dyes used to differentiate mature and immature plaques.
- do not stain the gingival tissues.

Disadvantage

- Certain agents cause a high incidence of allergic reaction like iodine solutions.

- **Demulcent**



Fig 10

It is an agent that forms a soothing film over a mucous membrane, relieving minor pain and inflammation of the membrane. Demulcents are sometimes referred to as mucoprotective agents.

Demulcents such as *pectin, glycerin, honey, and syrup* are common ingredients in cough mixtures. Methyl cellulose, propylene glycol and glycerine are synthetic demulcents.

Advantage

- These demulcents will coat the throat and relieve the irritation causing the cough. They can be used to treat any type of cough, but are particularly useful to treat dry coughs.
- They have a high content of mucilage, and help soothe and protect irritated or inflamed internal tissues of the body.
- Some demulcents may not be suitable for diabetics as they are based on sugar.

- **Astringents**

Astringents act by precipitating proteins in superficial layers of cells and are used to diminish the excretion or exudation of superficial cells.

Classification

Astringents are usually classified into three groups according to their mode of action:

- (1) those that decrease the blood supply by narrowing the small blood vessels (e.g., epinephrine and cocaine)

- (2) those that abstract water from the tissue (e.g., glycerol and alcohol)
- (3) Those that coagulate the superficial tissue layers into a crust (e.g., metallic astringents, such as calamine or alum).

The different types of astringents used in dentistry are:

TANNIC ACID-

It is vegetable astringent obtained from nutgalls. It acts by precipitating protein and gelatin as tannates owing to its acid radical. While hardening the superficial cells it forms pellicle on them. Tannic acid glycerin (30% tannic acid) and mouthwashes/ gum paints containing 1-5% of tannic acid are used to strengthen gums and check bleeding. Its preparations are used as astringent mouth wash, astringent dentifrices, local hemostatic, and mummifying agent and obtundent.

Another astringent of vegetable origin i.e. catechu is also used as an astringent mouthwash.

Zinc chloride-It is a caustic astringent, used as 5-10% solution in ulcerative gingivitis, pyorrhoeal pockets and aphthous ulcers.

ZINC SULPHATE-It is used as astringent in 0.5-1% concentration in the form of mouthwash and lotion in mastoiditis, stomatitis and chronic alveolar abscess

COPPER SULPHATE-It is used as astringent mouth in 0.5- 2% concentration in indolent ulcer of gums.

ALUM-It has an astringent, antiseptic and hemostatic properties and used in 1-2% concentration to harden the gum or for inflamed and ulcerated gums. Certain other metallic astringents e.g. ferric chloride solution, lead acetate, silver nitrate, mercuric chloride etc. are used as astringents in dentistry. These are used to relieve irritations and protect the skin.

Conclusion: the use of various terms has been discussed .Dentifrice and its ingredients are used for polishing and cleaning the oral cavity .obtundent to make the excavation painless. Mummifying agents are used to resilient infection. Astringent used to prevent exudation of superficial cell

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