© IJCIRAS | ISSN (O) - 2581-5334
May 2022 | Vol. 4 Issue. 12

# DYNAMIC FORMULATION OF EFFERVESCENT ANTIMICROBIAL MOUTHWASH REVIEW.

***Dr. Sandip.R. Pawar[1], Mr. Gopal Jagannath Ahire[2], Dr. Bharat.V. Jain[3], Mr. Tanveer.Y. Shaikh[4]***

*Smt. Sharadchandrika Suresh Patil College of Pharmacy, Chopda-425107, Maharashtra, India*

**Abstract**

***Mouthwashes (mouthrinses) are generally classified as either cosmetic or therapeutic or a mixture of the 2. Cosmetic rinses are commercial products that remove oral debris before or after brushing, temporary suppress bad breath, diminish bacteria within the mouth and refresh the mouth with a nice taste. Therapeutic rinses often have the advantages of their cosmetic counterparts, but also contain an additional active ingredient, (for example fluoride or chlorhexidine), that help protect against some oral diseases. The number of the various ingredients in mouthwashes varies from product to product. Some practically have the identical composition as toothpastes, although they are doing not contain abrasives. Different from toothpastes most mouth-washes contain alcohol, as a preservative and a semi-active component. The number of alcohol is sometimes starting from 18 - 26 %..***

***Keyword: Effervescent, Antimicrobial, Mouthrinses***

## 1.INTRODUCTION

As health awareness in population is increasing day by day within the present era, healthcare systems are finding an ample scope for growth, e.g. Community based health programs. Community based health programs are the health programmes arranged by a corporation to supply basic help and treatment to their community. Programs are arranged for mental state, maternity health (prenatal, obstetric), AIDS and cancer related programs, Counseling's for STD's tuberculosis etc. Besides, there are screening programs for preventing examination like Pap test, HPV Testing, Blood testing for Cholesterol, glucose, checking pressure level, vaccination programs etc. In some developed countries like ny, programs for diabetes also are being arranged. together with of these programs, there are programs for oral health care also, which has increasing the notice amongst community, setting goals and objectives and respective plans and techniques to satisfy the identical. Many community-based programs and efforts to forestall oral disease by promoting science-based prevention strategies and monitoring oral health status and risk factors are established1. Many committees and bodies like Healthy People are engaging programs and setting their objectives for oral health care. a number of the objectives of healthy people 2020 are2, 3:

- To increase the detection of the oral and pharyngeal cancers at the earliest stage
- To increase the proportion of population served by community water systems with optimally fluoridated water.
- To increase the proportion of youngsters and adults who use the oral health care system annually.
- To increase the proportion of low-income children and adolescents who received any preventive dental service during the past year.
- To increase the amount of Stares and also the District that has an oral and craniofacial health closed-circuit television
- To reduce the proportion of kids and adolescents who have tooth decay experience in their primary or permanent teeth.
- To reduce the proportion of young children aged 3 to five years with tooth decay experience in their primary teeth.
- To reduce the proportion of adolescents age 13 to fifteen years with the decay experience in their permanent teeth.

### *1.1 Why oral health important*

Oral health is over dental health. It includes healthy gums, hard and lip, linings of the mouth and throat, tongue, lips, salivary glands, chewing muscles, and upper and lower jaws. Good oral health enables us to talk, smile, kiss, breathe, whistle, smell, taste, drink, eat, bite, chew, swallow and express emotion. The rima plays a central role for intake of basic nutrition and protection against microbial infections. The World Health Organization (WHO) describes oral health as a state of being free from mouth and facial pain, mouth and throat cancer, oral infection and sores, periodontal (gum) disease, caries, tooth loss and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing‖. Oral health could be a right, an integral a part of general health and essential for overall wellbeing. Oral health and general health have close linkages. On the one hand, oral health may be compromised by variety of chronic and infectious diseases which show symptoms within the mouth.

- Tooth Pastes
- Tongue Cleaner
- Mouth Gargles
- Mouth Spray
- Mouth Gel
- Tooth Foam
- Dental Cones
- Varnish
- Bio-adhesive Tablets
- Dentifrices
- Flossing Agents
- Mouth Wash
- Chewable tablets

During the past few years, there has been a dramatic increase within the use of mouthwashes. These are perceived by users to take care of oral health and have a fresh —dental‖ taste (data on file, SmithKline Beecham Consumer Brands). Some health care professionals recommend their use as an adjunct to traditional mechanical removal of plaque'and this recommendation has been supported by studies which have shown that tooth brushing is just poorly administered. Mouthwashes are formulated containing anyone of a full range of various antimicrobials agents like Bisbiguanides (chlorhexidine), Quaternary am-ammonium compounds.

### *1.2 Oral cavity*

The mouth is that the point of entry for digestive and respiratory tracts. The mucosa of the mouth consists of squamous epithelium covering vascularized animal tissue. The epithelium is keratinized over the surface, lips and gingiva, while elsewhere it's non-keratinized. Mucous glands (minor salivary glands) are spread through the oral mucosa. Sebaceous glands are present within the region of the lips and therefore the buccal mucosa only. animal tissue is present within the sort of tonsils and adenoids. The mouth is that the site of various congenital and bought diseases. Besides, many systemic diseases have oral manifestations. The readily visible components of the rima include the lips (labia), the within of the cheeks (buccal), the teeth and gums (gingivae), the hard and soft palates, the ground of the mouth, and therefore the tongue (Fig. 1). Not visible, but clearly important, are the muscles, nerves, blood vessels, glands, joints, and particularly the bones of the upper (maxilla) and lower (mandible) jaws that provide support for and performance with the visible components. The rima oris begins at the junction of the vermilion border of the lips and also the mucosa lining the within of the lips, and extends posteriorly to the palate glossal folds or arch. Beyond the palatoglossal folds are the palatopharyngeal folds and therefore the beginning of the oropharynx, where the digestive and respiratory tracts close. The palatine tonsilsare located within the tonsillar fauces between the palatoglossal and palatopharyngeal folds. The animal tissue of the palatine tonsils, together with that of the adenoid (adenoids) and also the lingual tonsils, guards the doorway to the oropharynx. Anteriorly, the tract (nasal cavity) is separated from the rima by the surface, and posteriorly by the palate.

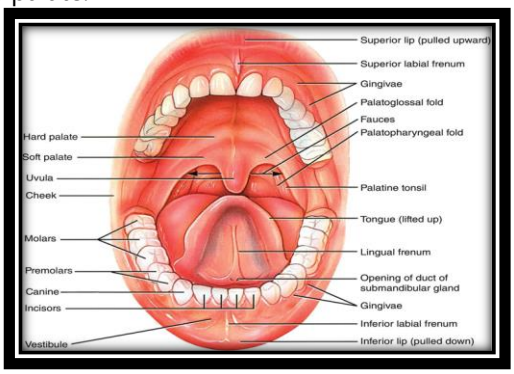


*Fig. No 1; Diagram illustrating the anatomy and main structure of the oral cavity.*

### *1.3 Oral mucosa*

Mucosa may be a wet, soft tissue membrane that lines an interior body space, e.g., the rima oris, the gastrointestinal, urinary, and reproductive tracts. The oral mucosa consists of three layers: a surface epithelium; a supporting lamina propria consisting of a layer of loose animal tissue (papillary layer) slightly below the epithelium and a deeper layer of dense irregular animal tissue (reticular layer); and an underlying sub-mucosa consisting of dense irregular animal tissue (Fig. 2). The sub-mucosa frequently contains minor salivary glands, and in some locations may contain fat. In some regions of the rima oris, the sub-mucosa could also be absent, and also the mucosa is sure to either bone or muscle by the lamina propria.

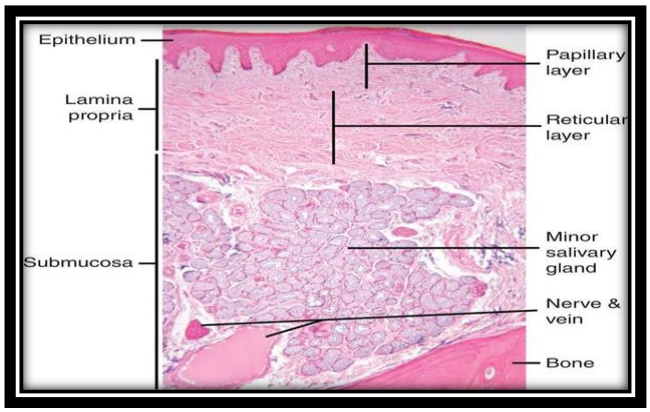


*Fig.No 2: Light micrograph showing the layers and components of the oral mucosa.*

A sub-mucosa isn't present altogether regions of the oral fissure. Three sub-types of mucosa are found within the mouth. Lining or moveable mucosa incorporates a stratified squamous non- keratinized epithelium, and is found on the within of the lips and cheeks, within the vestibules and also the floor of the mouth, and on the alveolar processes, the ventral surface of the tongue, and also the taste bud. Masticatory mucosa encompasses a stratified squamous keratinized or para-keratinized epithelium, and is found on surfaces subjected to the stresses induced by chewing our food (mastication), the surface and also the gingivae. Specialized mucosis found on the dorsal surface of the tongue. This mucosa is taken into account specialized because it forms four differing types of papillae, three of which have taste buds through which taste sensations are received.

### *1.4 Teeth*

The teeth are among the foremost unique and sophisticated structures of the body. Although they're designed to last a lifetime, teeth are often destroyed or lost in a very relatively short time if we fail to require care of them. They accommodates three different hard, or mineralized, tissues – dentin, cementum, and enamel– and are supported by a fourth hard tissue –bone (Fig. 3.). The interface between the teeth and also the gingivae is that the only place within the body where a structure composed of hard tissues breaches a soft tissue covering.

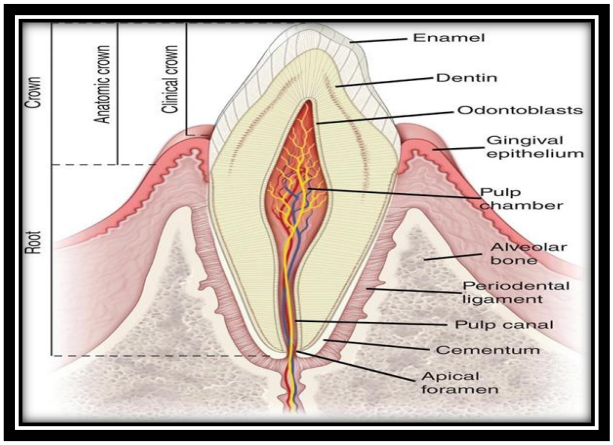


*Fig.No. 3 Diagram illustrating the structure of a tooth and its supporting tissues*

The teeth are among the foremost unique and sophisticated structures of the body. Although they're designed to last a lifetime, teeth will be destroyed or lost in an exceedingly relatively short time if we fail to require care of them. They incorporate three different hard, or mineralized, tissues – dentin, cementum, and enamel– and are supported by a fourth hard tissue –bone. The interface between the teeth and also the gingivae is that the only place within the body where a structure composed of hard tissues breaches a soft tissue covering. These unique anatomic supportive tissues of the tooth (periodontium) and its subsequent loss. The most tissue of the tooth is dentin. Dentin supports the enamel, which covers the crown, and it forms the foundation of the tooth. Dentin encloses the pulp, which

through its blood and nerve supply and immunologic and regenerative functions maintains the vitality of the dentin and therefore the cells that produce it, odontoblasts. Odontoblasts line the periphery of the pulp and secrete and mineralize the medium constituents of dentin, mainly collagen. Each odontoblast features a long apical or distal cytoplasmic process, the odontoblast process that extends partway through the dentin in an exceedingly dentinal tubule.

### *1.5 Disease of oral cavity*

#### *1.5.1 Mucocutaneous lesions*

Lesions of the oral mucosa occur in many diseases of the skin and that they are similar in morphology. a number of these are listed as under

**a. Lichen planus.** Characteristically, oral lichen appears as interlacing network of whitening or keratosis on the buccal mucosa but other oral tissues like gingival, tongue and palate may additionally be involved.

**b. Vesicular lesions.** variety of vesicular or bullous diseases of the skin have oral lesions

**c. Pemphigus vulgaris -**Vesicular oral lesions appear invariably all told cases at your time within the course of pemphigus vulgaris. In about half the cases oral lesions are the initial manifestations

**d. Pemphigoid-**Vesicles or bullae appear on oral mucosa similarly as on conjunctiva in Pemphigoid and are seen more often in older women.

**e. Erythema multiforme-** Sub epithelial vesicles may occur on the skin likewise as mucosae.

**d. Stevens-Johnson syndrome** may be a rather fatal and severe style of erythema involving oral and other mucous membranes occurring following ingestion of sulfa drugs.

**f. Epidermolysis bullosa** may be an inherited disorder having subepidermal bullae on the skin furthermore as has oral lesions.

#### *1.5.2 Inflammatory diseases*

- Stomatitis-Inflammation of the tissue layer of the mouth is termed stomatitis.
- Aphthous ulcers (Canker sores) is that the commonest type of oral ulceration.
- Herpetic stomatitis is an acute disease occurring in infants and young children.
- Necrotising stomatitis (Noma or Cancrumoris) occurs more commonly in poorly-nourished children like in kwashiorkor; infectious diseases like measles, immunodeficiency and emotional stress.

#### *1.5.3 Mycotic infections.*

Commonly involving the oral mucosa are actinomycosis and candidiasis

- Cervico facial action mycosis. this is often the most common form (60%) and has the simplest prognosis. The infection enters from tonsils, carious teeth, periodontitis or trauma following tooth extraction.
- Candidiasis (moniliasis or thrush) is caused by Candida albicans which could be a commensal within the mouth. It appears as an infection in immunocompromised host. There are erythematous lesions on the palate and angular cheilitiss

#### 1.5.4 Pigmentary lesions

Oral and labial melanotic pigmentation could also be observed in certain systemic and metabolic disorders like Addison's disease, Albright syndrome, Peutz-Jeghers syndrome and haemochromatosis. all sorts of pigmented naevi furthermore as skin cancer can occur in rima. Exogenous pigmentation like because of deposition of lead sulfide can even occur.

#### *1.5.5 Dental plaque*

Dental plaque is created up mainly of microbial masses held together by a mucinous ground substance, and it adheres to tooth surfaces. It varies in color from white to yellowish gray and is brought up as material alba, dentobacterial plaque, gelatinous plaque, microcosm, oral debris, and sordes. Initially it's a soft mass which accumulates within some days after refraining from tooth brushing. This kind of fabric is termed as soft

plaque. It contains additionally to bacteria, a scattering of leukocytes, macrophages, and epithelial cells. Plaque formation is alleged to occur in two stages: first, an amorphous, nonbacterial layer is laid down (acquired pellicle or cuticle). This can be followed by second step of bacterial invasion and subsequent bacterial proliferation. The character of plaque is variable and dynamic, expressed by constant change in chemical composition and microbial population. Plaque is about 80% water and 20% solids. When it's —young,‖ the solids fraction contains relatively small amounts of inorganic material (ash). because the plaque ages, the ash content of solid increases, and plaque which is just some days old can have over 40% ash, supported solids. the character of microbial population also changes. it's been demonstrated that as plaque ages the proportion of cocci decreases while the proportion of filamentous organism increases. Further evidence for the variability of plaque is that the observation that its composition could also be different from one site within the mouth to other. A mature plaque is basically a bacterial community. The metabolic activity of the residents varies with local conditions and may lead to the assembly of the many different substances which might markedly affect adjacent tissues. Plaque manifests itself in additional than one form, as demonstrated by differences within the nature of the oral hygiene problems it can generate.

### *1.5.6 Dental caries*

Dental caries is that the most typical disease of dental tissues, causing destruction of the calcified tissues of the teeth. decay is basically a disease of contemporary society, related to diet containing high proportion of refined carbohydrates. It's been known for nearly 100 years that mixture of sugar or bread with saliva within the presence of acidogenic bacteria of the mouth, especially streptococci, produces organic acids which may decalcify enamel and dentin. Caries occurs chiefly within the areas of pits and fissures, mainly of the molars and premolars, where food retention occurs, and within the cervical a part of the tooth. Dental caries could be a disease characterised by dissolution of the mineral portion of the tooth. As caries progresses, destruction of solid body substance and dentine occurs followed by inflammation of pulp and periapical tissues. Presently, seven different MS species (known as S. mutans, S. rattus, S. cricetus, S. sobrinus, S. ferns, S. macacae, and S. downei) are recognised. of those seven species it's mainly S. Mutans and S. Sobrinus that remain of import in terms of human caries. The gingival tissues tend to recede over time, exposing the structure to cariogenic bacteria that may cause root caries. Even the foremost protective property and developmental milieu are unlikely to confer resistance to decay within the absence of positive personal behaviors.

### *1.5.7 Calculus*

Dental calculus is calcified plaque, composed primarily of phosphate mineral salts deposited between and within remnants of formerly viable microorganisms. A viable plaque covers mineralized calculus deposits. Levels of calculus and site of formation are population specific and are full of oral hygiene habits, access to professional care, diet, age, ethnic origin and time since last dental cleaning, systemic disease and also the use of prescription medications. In populations that practice regular oral hygiene and with access to regular professional care, supragingival dental calculus formation is restricted to tooth surfaces adjacent to the salivary ducts. Levels of supragingival calculus in these populations are minor and therefore the calculus has little if any impact on oral-health. Subgingival calculus formation in these populations occurs coincident with periodontitis (although calculus itself appears to own little impact on attachment loss), the latter being correlated with bacterial plaque. The composition of calculus and adhesive aspects are influenced by the placement of its formation further as its age.

### *1.5.8 Salivary flow disturbances*

**a. Sialorrhoea (ptyalism)-** Increased flow of saliva is termed sialorrhoea or ptyalism. It occurs commonly due to: stomatitis, teething, people state, schizophrenia, neurological disturbances, increased gastric secretion and sialosis.

**b. Xerostomia-** Decreased salivary flow is termed xerostomia. it's related to the subsequent conditions: Sjögren's syndrome, sarcoidosis, mumps parotitis, Mikulicz's syndrome, megaloblasticanemia, dehydration, drug intake (e.g. antihistamines, antihypertensive, antidepressants)

### *1.5.9 Periodontal disease*

Periodontal disease may be a general term accustomed describe diseases that affect the gingiva and cause damage to the supporting animal tissue and bone which anchor the teeth to the jaws. Disease is caused by specific bacteria from the biofilm within the periodontal pocket. Periodontitis is additionally an disease resulting from a posh interplay of bacterial infection and host response, but is characterized by attachment and bone loss round the teeth. Most gingivitis doesn't attain Periodontitis. Early-onset Periodontitis may be a rare form that affects teenagers (juvenile Periodontitis) and young adults (rapidly progressive Periodontitis) and will be related to specific host factors. As anaerobic infection takes hold, a fancy cascade of tissue- destructive pathways is about in motion, triggered by bacterial products and fuelled by inflammatory mediators. The expanse of the mouth tormented by periodontitis will be large, adore the area of 1 to 2 hand-spans (300 cm2).

### *1.6 Oral diseases specifically caused by anaerobic microorganism*

| 1 | Diseases | Micro-organisms |
|---|---|---|
| 1 | Dental carries | Streptococcus mutans |
| | | Campvlobacterrectust, Fusobacteriumnucleatuni, Peptostreptococcus micros, Prevotellaintermedia, Eubacteriumtimidum, Eubacteriumalactolyticum, |
| 2 | Periodontitis | Fusobacteriumalocis,Selenomonassputigena, Eubacteriumbrachy, Peptostreptococcusanaerobius, Porphyronionasgingivalis, Bacteroidesforsythus, Actinobacilhis, Actinomycetemcomitans. |
| 3 | Gingivitis | Streptococcus anginosus, Campylobacter concisus, T. socranskii subspecies paredis, Actinomycesnaeslundii (type III), and S. sanguis |
| 4 | Pericoronitis | P. gingivalis and Eubacterium species |
| 5 | Endodontic infections | P. gingivalis, P. intermedia, and Porphyromonasendodontalis |
| 6 | Peri-implantitis | A. actinomycetemcomitans, P. intermedia, P. gingivalis, Capnocytophaga species, C. rectus, and E. corrodens |
| 7 | Actinomycosis | Actinomyces and Arachnia species |

**Table 1: Micro-organisms associated with oral and dental diseases**

### *1.7 Mouthwash concept*

Mouthwashes are solutions or liquids won't to rinse the mouth for variety of purposes: (a) to get rid of or destroy bacteria (b) to act as astringent (c) to deodorize and (d) to possess a therapeutic effect by relieving infection or preventing tooth decay. Mouthwashes also provide a secure, effective chemical means of reducing or eliminating plaque accumulation. In contradiction to one's thinking that mouthwashes are used just for refreshing the rima or simply for treatment of dental carries and cleansing the mouth, it's found much use in preventing and treating infection of mouth, treating inflammatory cases like ulcers and relieving the pain associated with its etc. Aerosol mouthwash or mouth fresheners are recommended for breath freshening after eating, drinking or smoking and frequently contain only

flavoring agent, though they will contain antibacterial agents. Products used for freshening breath or cleaning teeth are existing for hundreds of years. Water is that the simplest mouthwash and aqueous saline is that the least complex kind of mouthwash. Many of the traditional societies including the Egyptians, Chinese, Greeks and Romans had recipe for such preparations. They used a range of ingredients; from edible materials like fruit, honey or dried flowers to less appealing compounds like ground lizard, minced mice or urine. These products were generally ineffective and in some cases were harmful to the sensitive enamel coat each tooth. While tooth cleaning preparation steadily improved over the years, it had been not until the first 1800s when the fashionable toothpaste was developed that really effective oral products became available. the primary mouthwash were basically solution of ethyl alcohol and were likely developed accidentally during this era. one amongst the foremost famous brands, Listerine was developed during the 1800s and continues to be sold today.

### *1.8 Types of mouthwashes*

**Broadly mouthwashes can be classified according to categorical function**

- **Antiseptic mouthwash**. The most common type of mouthwash is antiseptic mouthwash. Classically enclosing alcohol, antiseptic mouthwash works to halt the growth of microorganisms and stave off infection. The most common brand of antiseptic mouthwash is Listerine.

- **Analgesic mouthwash.** Commonly used in the ulcerative condition. Triclosan mouthwash will have analgesic effect and can significantly relieve pain, shorten the ulcerative phase.

- **Anti-inflammatory mouthwashes.** These mouthwashes are used in a specific condition somewhere there is an element of inflammation either as the primary cause of the state or as secondary complication state. These mouthwash contain benzydamine hydrochloride.

- **Fluoride mouthwashes are used for the prevention of carries.** Stannous fluoride mouthwash produces highly bactericidal effect.

- **Salivary substitute mouthwashes:** Salivary substitute mouthwashes have been used for the treatment of xerostomia and mainly used for the treatment of dysphagia (difficulty with eating and swallowing) and dysphonia (difficulty in speaking).

- **Covering agent are effective in ulcerative conditions.** Sucralfate as covering agent used for the mouth that has shown a pain management of mucositis patient.

- **Breath freshener mouthwashes are mainly used for the treatment of bad breath**. During the day bad breath level inversely related to saliva flow. If saliva flow low then bad breath increases. For the treatment of bad breath used a first marketed preparation Listerine® in 1994.

- **Antibacterial rinses have many uses in the oral cavity.** For antibacterial rinses to be effective in the oral cavity they need to be bactericidal or bacteriostatic and most of all must have a degree of Substantivity.

### *1.9 Formulation*

Most of mouthwashes contain four basic ingredients: alcohol, flavors, humectants and surfactants, with water and minor ingredients making up the remainder of the product. In addition, depending upon the final use a mouthwash may contain one or more active ingredients like anti-bacterial, astringent, deodorizing, buffering components. An ideal mouthwash contains an astringent, breath freshener, humectant, buffer sweetener, flavor and color besides its active ingredient. It should have long acting pleasant flavor and cooling agent, should remove the fermentative and putrefactive debris and clean teeth and tissue. The actives used in mouthwash should prevent decaying of the teeth and should not impart unwanted color to teeth. Mouthwash should also neutralize the acid produce by microorganism in biofilm. The excipient and actives

which can be used in formulating a mouthwash are mentioned in table 2 and Table 3 respectively

| Type | Example |
|---|---|
| Abrasive | Silicates, Aluminates and Carbonates: alpha-alumina trihydrate, colloidal silica, Alumina, calcium carbonate, magnesium trisilicate, kaolin, aluminosilicates. Polymers: Polyvinyl chloride, polyamides, polymethyl methacrylate, hydrogels and aerogels.<br>Resin: Phenol-formaldehyde resin, melamine- formaldehyde resins, epoxy resins |
| Astringent | Zinc oxide and other zinc compounds |
| Breath fresheners | 3-1-methoxy propane -1, 2-diol, N-substituted-p- methane-3-carboxamides. |
| Humectants | Glycerol, polyol, sorbitol,polyethylene glycol (PEG),propylene glycol |
| Viscosity Enhancer | Alginates, pectin's, polyvinylpyrolidone, gellan gums, Bentonite, carboxymethyl cellulose, glycerin, PEG 40<br>,propylene glycol, xanthum gum, silica, starch, tragacanth gum, sodium carboxymethyl cellulose and Hydroxypropyl cellulose |
| Effervescent mixture | Sodium bicarbonate, sodium carbonate and acids like tartaric acid, citric acids, benzoic acid |
| Chelating agent | EDTA, Dicalcium orthophosphate |
| Surfactant | Cationic: Tween 20, Tween 60, Tween 80, sulfonates and Sarcosinates: Sodium dodecylbenzenesulfonate, sodium lauroylsarcosinate.<br>Anionic: sodium lauryl sulfate<br>No-ionic:pluronic F127, poloxamer 338, poloxamer407,<br>Polysorbates: Polyoxyethylene, Polysorbate 60, polysorbate 80 |
| Solvent antibacterial | Ethanol |
| Buffer | Citrate/Acetate/Benzoate/Phosphate systems/Boric acid |
| pH Modifier | Sodium hydroxide |
| Sweetener | Saccharin sodium, Sorbitol, Xylitol, Mannitol, Maltitol |
| Flavor | Menthol, peppermint oil, lemon oil, Cinnamaldehyde, Eucalyptol, Methyl salicylate |
| Color | FD&C color |
| Vehicle | Water, Alcohol |

**Table 2: Excipient used in mouthwashes**

| Ingredients | Uses |
|---|---|
| **Buspirone** | **Topical treatment of cutaneous, ocular and mucosal hypersensitivity.** |
| **Flurbiprofen, ketoprofen** | **Periodontal diseases** |
| **Spiperone** | **In mucosal pathology** |
| **Cetylpyridium chloride** | **Antibacterial, Halitosis** |
| **Triclosan** | **Antiplaque** |

| | |
|---|---|
| **Chlorhexidine** | **Antibacterial, Antiplaque** |
| **Tetracycline** | **Antibiotic, Treatment of Mucositis** |
| **Hydrogen peroxide** | **Antimicrobial** |
| **Azadirachta indica extract** | **Antiplaque,Antibacterial,AntifungalAntimalarial,Antipyretic, Anti-inflammatory** |
| **Echinaceae extract, Cayenne extract** | **Antiseptic, Astringent, Heal sores and Wounds, Prevent tooth decay** |
| **Thymol, anise,** | **Malodor agent** |
| **Jambu oleoresin, spilanthol** | **As tingling sensate** |
| **Caspase inhibitor** | **Prevent non-cancerous cell death** |
| **Cyclodextrin glucanotransfera ses** | **Antiplaque** |
| **Protease inhibitor(GELIN)** | **Treatment of periodontal diseases** |
| **Transferrin, albumins, lysozymes** | **Treatment of periodontal diseases** |
| **Calcium phosphate** | **Polishing agent** |
| **Divalent tin cation** | **Reduces the skin irritation, pain of mouth, sore throats, gum irritation, ulcers** |
| **Potassium bicarbonate** | **Desensitizer** |
| **Potassium chloride** | **Desensitizer** |
| **Stannous fluoride** | **Antiactivity** |
| **Strontium cation** | **Anti-irritant** |
| **Zinc, bicarbonate, carbonate ions** | **Deodorizer, breath freshener, tartar control agent** |
| **Fluoride** | **Anticavity, Halitosis** |

**Table 3: Active Ingredient Used In Mouthwashes**

### *1.10 Chlorhexidine – As a mouthwash*

Chlorhexidine mouthwash formulations are widely used for reducing the microbial burden in the oral cavity. Chlorhexidine is the most effective antiplaque agent to date. The role of dental plaque in the etiology of dental diseases is well recognized with many excellent reviews. While there are other factors to consider, thorough and regular plaque removal will result in profound reductions of these diseases. The concept of effective mechanical plaque control is intellectually simple, but there are many barriers to its successful implementation. For many years, researchers have been searching for an effective chemical mouth rinse that prevents oral plaque growth, to replace mechanical plaque control. Until now chlorhexidine (CHX) seems to be the most effective chemical agent. The toxicity of CHX is low and therefore

used in medicine, surgery and most popular use in dental industry. Chlorhexidine gluconate in a concentration of 0.2% is used in clinical practice as an antiseptic oral rinse due to its activity against a wide range of oral microbial species including Candida. Mouthwashes containing chlorhexidine have been suggested for the primary and secondary prevention of gingivitis, periodontitis and tooth decay. In particular, their use would appear lead to a decrease in plaque, gingival bleeding and gingival inflammation. Moreover, continued use of mouthwash containing Chlorhexidine has not been associated with bacterial resistance

### *1.10.1 Mechanism of action*

Chlorhexidine is an antimicrobial agent. It is a cationic bisbiguanides with broad antibacterial activity, low mammalian toxicity and a strong affinity for binding to skin and mucous membranes. The antibacterial mode of action of chlorhexidine is thought to be as follows. The bacterial cell is characteristically negatively charged. The cationic chlorhexidine particle is quickly concerned to the negatively charged bacterial cell surface, with exact and strong adsorption to phosphate-containing compounds. This alters the integrity of the bacterial cell membrane and chlorhexidine is attracted towards the inner cell membrane. Chlorhexidine binds to phospholipids in the inner membrane, leading to increased permeability of the inner membrane and leakage of low-molecular- weight components, such as potassium ions it causes the cell death.

### *1.11 Effervescent Tablets*

Effervescent or carbon tablets are tablets which are designed to dissolve in water, and release carbon dioxide.They are products of compression of component ingredients in the form of powders into a dense mass, which is packaged in blister pack, or with a hermetically sealed package with incorporated desiccant in the cap. To use them, they are dropped into water to make a solution. The powdered ingredients are also packaged and sold as effervescent powders or may be granulated and sold as effervescent granules. Generally powdered ingredients are first granularized before being made into tablets.

Effervescent medicinal beverages date back to the late 1800s and originally arose to mask the taste of bitter waters taken as curatives, during the water cure craze of that era.

Effervescent tablet formulations generally include an agent that is capable of releasing CO2 (sodium carbonate and sodium bicarbonate) and an agent that induces releases of CO2 (adipic acid, malic acid, tartaric acid, ascorbic acid, fumaric acid, maleic acid, succinic acid, or citric acid). API is either present in the effervescent granule mixture, or if it is having poor solubility, then it is converted into the salt form during the dissolution process. Effervescent tablets are formulated by mixing these agents along with binders, diluents, and lubricants, and then compressing them into tablets. Water-soluble lubricants are used such as sodium benzoate, polyethylene glycol, and adipic acid. Magnesium stearate, the most commonly used lubricant, is insoluble in water and thus it will interfere with the process of effervescence. Effervescent tablets do not need disintegrants incorporated into their formulations as the evolution of in situ CO2 facilitates the disintegration process.

*Fig.No 4 an effervescent tablet in a glass of water*

*Fig.No 5 an effervescent tablet with cleaning agent for dentures dissolves in a glass of water*

## 2. DRUG PROFILE:-

### *2.1 Chlorhexidine gluconate solution*

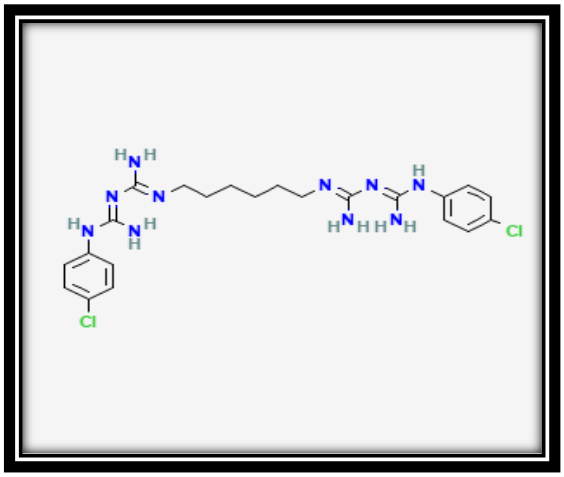

*Fig.No 6: Structure of chlorhexidine gluconate.*

Chlorhexidine Gluconate Solution is an aqueous solution of 1, 1′-hexamethylenebis [5- (4-chlorophenyl) biguanide] digluconate.75

**2.1.1 Molecular formula**: C22H30Cl2N10, 2C6H12O7

**2.1.2 Molecular weight:** 897.8

**2.1.3 Description.** An almost colorless or pale yellowish, clear or slightly opalescent liquid; almost odorless.

**2.1.4 Standards**

Chlorhexidine Gluconate Solution contains not less than 19.0 per cent w/v and not more than 21.0 per cent w/v of C22H30Cl2N10, 2C6H12O7.

**2.1.5 Storage.** Store protected from light

## 3. CONCLUSION

Recent trends of patient oriented practice demands design of patient oriented dosage form to achieve patient compliance and better therapeutic profile. The number of preparation related factors contributes to non-compliance and poor drug release profile. Hence, there is a necessity to design patient oriented drug delivery system. Present work lead to the optimization of process for preparation of lyophilize chlorhexidine gluconate solution and development of effervescent tablet comprising a solid water soluble excipient i.e. glycine, ribitol, aspartame which dissolve in 160 seconds. Formulation being a solid dosage form, the predicted stability of chlorhexidine gluconate is more, as chlorhexidine gluconate is available in liquid form and possesses stability problems if not stored at low temperature. Further a fast dissolving tablet strip will always be preferred by an end user over a liquid mouthwash bottle. The said formulation will be widely useful for a traveler, tourist or a camper, as it is difficult to carry liquid mouthwash bottle with him because of weight, fragility or bulk hence offering patient compliance and also solving the problem of shelf space at the retail outlet and home.

## REFERENCES

[1] Oliver, R. C.; Brown, L. J.; Löe, H. Periodontal Diseases in the United States Population. J. Periodontol.1998, 69 (2), 269–278.

[2] Williams, R. C.; Barnett, A. H.; Claffey, N.; Davis, M.; Gadsby, R.; Kellett, M.; Lip, G. Y. H.; Thackray, S. The Potential Impact of Periodontal Disease on General Health: A Consensus View. Curr. Med. Res. Opin.2008, 24 (6), 1635– 1643.

[3] Tanner, A.; Stillman, N. Oral and Dental Infections with Anaerobic Bacteria: Clinical Features, Predominant Pathogens, and Treatment. Clin. Infect. Dis.1993, 16 Suppl 4 (Suppl 4), S304–S309.

[4] Mandel, I. D. Chemotherapeutic Agents for Controlling Plaque and Gingivitis. J. Clin. Periodontol.1988, 15, 488–498.

[5] Scully, C.; Field, E. A.; Randall, C. Over-the-Counter Remedies for Oral Soreness. Periodontol. 2000.2008, 48 (1), 76–84.

[6] Lalla, R. V.; Schubert, M. M.; Bensadoun, R. J.; Keefe, D. Anti-Inflammatory Agents in the Management of Alimentary Mucositis. Support. Care Cancer.2006, 14 (6), 558–565.

[7] Andres, C. J.; Shaeffer, J. C.; Windeler, A. S.; others. Comparison of Antibacterial Properties of Stannous Fluoride and Sodium Fluoride Mouthwashes. J. Dent. Res.1974, 53 (2), 457–460.

[8] Eveson, J. W. Xerostomia. Periodontol. 2000.2008, 48, 85–91.
[9] Kozlovsky, A.; Goldberg, S.; Natour, I.; Rogatky-Gat, A.; Gelernter, I.; Rosenberg, M. Efficacy of a 2-Phase Oil: Water Mouthrinse in Controlling Oral Malodor, Gingivitis, and Plaque. J. Periodontol.1996, 67 (6), 577–582.
[10] Lynch, M. J. Dentifrice Formulation and Method of Treating Teeth , Mouth and Throat Therewith to Reduce Plaque Accumulation and Irritation. U.S. Patent 4610872 A, September 9, 1986.
[11] Theobaldo, T. Oral Rinse Formulation and Method of Treating Mouth and Throat Irritations Therewith. U.S.Patent 4457909 A, Jully 3, 1984.
[12] Pensak, P.; Januszewski, J. P. Oral Product. U.S.patent 3947570 A, March 30, 1976.
[13] Wo, A.; Losee, P.; Austin, F. R.; Blaine, D. Oral Composition for Improving Mouth Environment. W.O. Patent 2008079101 A2, Jully 3, 2008.
[14] Arnold, M. J. Antiplaque Oral Composition. U.S.Patent 5804165 A, September 8, 1998.
[15] Canceil, S.; Hartshom, R. T.; Roberto, M.; Spadoni, L. Effervescent Compositions and Dry Effervescent Granules. E.P.Patent 0975724 A1, February 2, 2000.
[16] Battaglia, A. D. Mouthwash Capsule and Package Apparatus. U.S.Patent 5332096 A, Jully 26, 1994.
[17] Hurwitz, M. M. Oral Hygeine Tablets and Capsules for Direct Oral Delivery of Active Ingredients. U.S.Patent 8728446 B2, May 20, 2014.
[18] Shah, P.; Hood, D.; Jurek, M. Cleaning Tablet. U.S.Patent 20070238635 A1, Octomber 11, 2007.
[19] Valenti, P.; Antonini, G. Patente Protein Preparation for the Prevention and Therapy of Periodontitis. U.S.Patent 5830489 A, November 3, 1998.
[20] Greenberg, M. J. Enhanced Flavors Using 2 ' -Hydroxypropiophenone. U.S.Patent 5795616 A, August 18, 1998.
[21] Hahn, G. S.; Thueson, D. O. Formulations and Methods for Reducing Skin Irritation. U.S.Patent 5756107 A, May 26, 1998