



EXPLORING ANTICANCER LOZENGES: A COMPREHENSIVE REVIEW ON MANUFACTURING, CLASSIFICATION, EVALUATION AND APPLICATION IN ORAL DRUG DELIVERY

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Abstract : Lozenges are one of the widely used solid, unit dosage form of medicament which are meant to be dissolved in mouth or pharynx. The benefits of the medicated lozenges is they increase the retention time of the dosage form in oral cavity which increases bioavailability, reduces gastric irritation and bypasses first pass metabolism. This dosage form can be adopted for local as well as systemic therapy and a wide range of active ingredient can be incorporated in them. The present review covers more or less all aspects associated with lozenges such as its manufacturing, classification, evaluation and its application. Lozenges are one of the widely used solid, unit dosage form of medicament which are meant to be dissolved in mouth or pharynx.

Key words – metabolism , bioavailability , retention , medicament

INTRODUCTION

Lozenges are the flavoured medicated dosage form intended to be sucked and held in the Mouth or pharynx containing one or more medicaments usually in the sweetened base. Lozenges are intended to relieve oropharyngeal symptoms, which are commonly caused by local infections and also it provides systemic effect, the drug is well absorbed through the buccal linings or when it is swallowed. They are usually used for throat pain as well as irritation into throat extensively used to deliver the drug having topical anesthetic effect and also antibacterial effect.

The significant disadvantage of this route is for pediatric and geriatric patients difficulty in swallowing. Almost 35% of everyone, particularly the older patients and children, experience the ill effects of trouble in swallowing, which brings about a high rate of resistance and inadequate treatment. Swallowing problems are very common in children because of their poorly developed muscular and nervous systems. Other groups who may also experience problems in swallowing conventional oral dosage forms are the patients with tremors of extremities, intellectually sick, non-conscious patients, and Patients with diminished fluid admission plans or patients suffering from nausea. Sore throat or pharyngitis is inflammation of the throat which exhibits symptoms such as the runny nose, cough, headache, difficulty swallowing, swollen lymph nodes, and a hoarse voice. Lozenges slowly release the drug into buccal cavity for the purpose of yielding the required quantity of drug. Anethole in the dosage form of lozenges which show greater effect against oral cancer.



Fig.1 :- lozenges

Multiple number of drugs or ingredients can be incorporate into lozenges. [among the various routes of administration, the oral route is the most favored route because of different points of interest including simplicity of ingestion, flexibility, and in particular patient compliance. Oral cancer most often occurs in people over the age of 40 and affects more than twice as many men as women. Most cancers in the mouth are related to tobacco use, drinking alcohol, or both, and most throat cancers are caused by the human papilloma virus (HPV). The Incidence of HPV-positive oral cancer has risen in recent years. Gernal reason for causes of oral cancer are Tobacco and alcohol use, HPV (human pappilloma virus) Sun Exposure, Poor nutrition, Genetic. Treatment option is targeted therapy, which is a newer type of cancer treatment that uses drugs to precisely identify and attack cancer cells.

Oral cancer is a squamous carcinoma frequently identified on lips, gums, tonsils, tongue, slivary glands, back of the throat, floor of the mouth and palate, inside of cheeks and oropharynx. A high level (52.7%) of oral cancer is diagnosed with stage IV of cancer development. Conventional treatments for oral cancer rely heavily on surgery with or without assistance of chemo- and radiotherapy care. Although they are efficient, both have significant Adverse effects limiting their use. Those treatments can therefore be more aggressive causing numerous unwanted side effects and can have a negative impact on non-cancer cells in mucosal tissue. Traditional medicine could therefore be an effective combination or alternative treatment for cancer that may be efficient and more specific than compounds like cisplatin used in chemotherapy. Indeed, many bioactive compounds derived from scented plants, like anethole, 1-methoxy-4-[ϵ -1-propenyl]-benzene, have been reported to have anti-cancer properties on MCF-7 and PC-3 cell lines. Indeed, it has been demonstrated that anethole inhibits cell growth, induces apoptosis and cytotoxicity towards cancer cell lines. However, no study has Yet investigated the effects of anethole on oral squamous carcinoma and on normal cells of Mucosa. Cancer initiation and development involve signaling pathways such as the activation of Caspases, MAP kinases, and Wnt. Anticancer treatment can include one or all these signaling pathways. It was reported that identical mutations downstream of MEK/ERK proteins of EGFR pathway, particularly in KRAS and BRAF, were highly frequent in cancers. The effects of anethole on the proliferation, apoptosis, autophagy and oxidative stress of Ca9-22 cells.

We also assessed the effects of anethole on cell migration and modulation of bronchogenic (cyclin D1), apoptotic proteins, epithelial-mesenchymal transition (E-cadherin, Vimentin), MAPK (ERK1/2, p38, Jnk), Wnt (β -catenin) and NF- κ B signaling pathways. The different results could help understanding the anti-cancer activities of anethole which may lead to an alternative or complementary anti-oral cancer therapy. Anethole exerts significant anti-proliferative effects on skin cancer cells, but has minimal toxicity on normal human skin cells. Furthermore, anethole treatment induces apoptosis in Skin cancer cells. At the molecular level, the anticancer effects of anethole on skin cancer cells occurs through the modulation of miR- 498/STAT4 signal axis. Anethole should be. Further investigated in animal models of skin cancer for its potentials in the treatment of skin cancer.

Research Through Innovation

Objectives

- It very well may be given to those patients who experience issues in gulping.
- Simple to regulate to geriatric and pediatric populace.
- It broadens the hour of medication in the oral cavity to evoke a particular impact.
- Foundational assimilation of medication can be conceivable through buccal cavity.
- Taste of medication can be veiled by sugars and flavors utilized in definition.

- It can increment in bioavailability.
- It can decrease dosing recurrence. No disintegration. Do not require water for intake.
- Less production time.
- Less production cost.
- Lozenge can be withdrawn if dose is not needed.
- No need of medical professional for administration of lozenges.
- Avoid gastric irritation .
- It can bypass first pass metabolism.
- Reduce gastric irritation.
- Easy to administer .
- Reduce frequency of administration

Isolation of Anethole

Anethole is isolated by using various methods such as steam distillation, soxhlet extraction and steam distillation. In isolation of anethole by using soxhlet apparatus toluene is used as solvent. Time required for soxhlet extraction for isolation of anethole is 1 hour.



Fig. 2- Soxhlet extraction

Characteristics of anethole

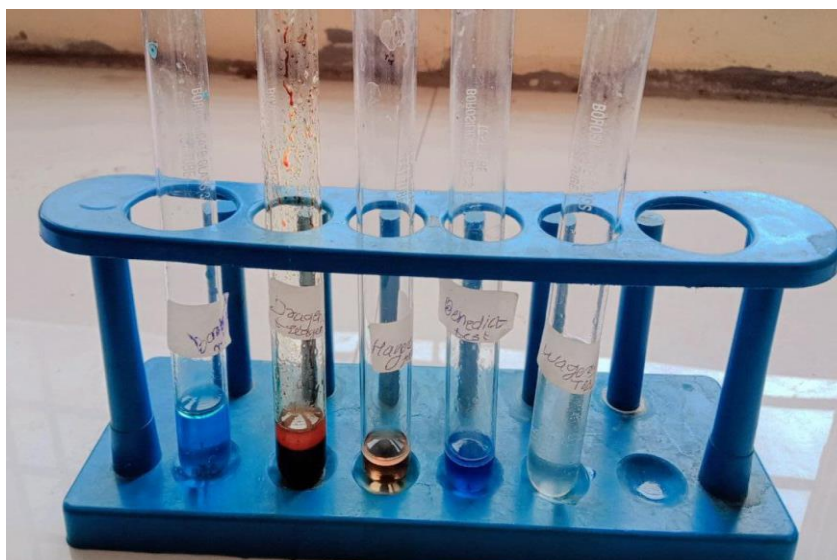


Fig.3 Phytochemical test

Odour – Aromatic

Colour – green

Chemical constituents – alkaloid , flavonoids, volatile oil, tannin.

Nature – in solid state it is white crystalline in nature.

Solubility – more soluble in ethanol, Methanol, acetone , benzene and less soluble in water.

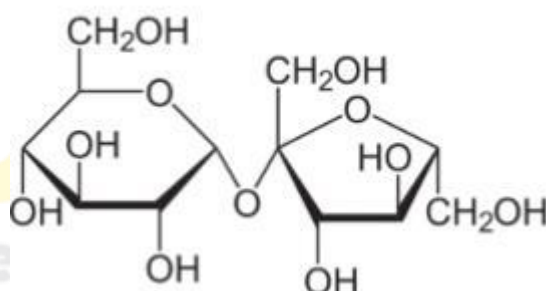
Drug Profile :-

Excipients profile

1. Sucrose

Synonyms:

Beet sugar: cane sugar: refined sugar: saccharose: saccharum, sugar



Chemical name:

B-D-fractofuranosyl- α -D- glucopyranoside

Molecular weight: 342.30

Melting point :160–186°C

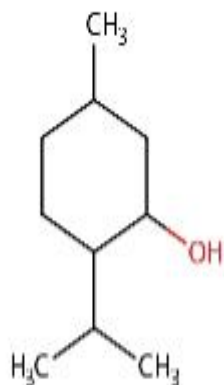
Functional category:

Confectionary base; coating agent; granulation aid; suspending agent; sweetening agent; tablet binder; tablet and capsule diluent; tablet filler; therapeutic agent; viscosity-increasing agent.

Applications:

It is used for oral liquid formulations in the concentration of 67% w/w as syrup and sweetening agent.

2. Menthol



Synonyms: Menthol, mentholum, racemicum, menthomenthol.

Chemical Name: (1R, 2R, 5R)-(+)-5-Methyl-2-(1-methylethyl)cyclohexanol

Empirical Formula: C₁₀H₂₀O

Molecular Weight: 156.27

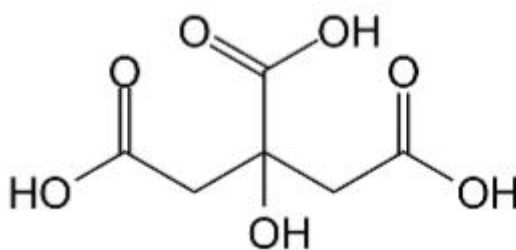
Functional Category:

Flavouring agent, therapeutic agent.

Applications:

Menthol is widely used in pharmaceuticals, confectionery, and toiletry products as flavouring agent or odour enhancer. In addition to its characteristic peppermint flavour, l-menthol, which occurs naturally, also exerts a cooling or refreshing sensation that is exploited in many topical preparations.

3. CITRIC ACID



Synonyms:

Acidum citricum monohydricum; E330; 2-hydroxypropane-1,2,3- tricarboxylic acid monohydrate.

Chemical Name:

Hydroxy-1, 2, 3-propanetricarboxylic acid monohydrate

Empirical Formula: C₆H₈O₇H₂O

Molecular Weight: 210.14

Melting point: 100°C

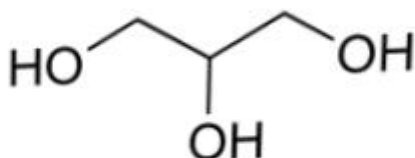
Functional Category:

Acidifying agent, antioxidant, buffering agent, chelating agent, flavour enhancer, preservative.

Applications:

- Citric acid is widely used in pharmaceutical formulations and food products, primarily to adjust the pH of solutions.
- In food products, citric acid is used as a flavour enhancer for its tart, acidic taste.

4. GLYCERIN



Synonyms:

Croderol; E422, Glycerol, Glycerine, glycerolum, Glycon G-100, Kemstrene, Optim, Pricerine, 1,2,3-propanetriol, trihydroxypropane, glycerol.

Chemical Name: Propane-1,2,3-triol

Empirical Formula: C₃H₈O₃

Molecular Weight: 92.09

Functional Category:

Antimicrobial preservative; co solvent; emollient; humectants; plasticizer; solvent; sweetening agent; tonicity agent.

Applications:

- Glycerine is additionally used in aqueous and non aqueous gels and also as an additive in patch applications.
- In oral solutions, glycerin is used as a solvent, sweetening agent, antimicrobial preservative and viscosity-increasing agent. It is also used as a plasticizer and in film coatings.
- Glycerin is used as a plasticizer of gelatin in the production of soft-gelatin capsules and gelatin suppositories.

Evaluation test

- Weight Variation
- Disintegration Time
- Friability
- Measurement of pH

- v. Determination of Moisture
- vi. Determination of Thickness
- vii. Hardness

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