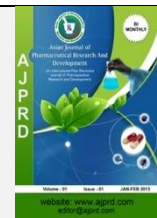


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Review Article

Polyherbal Chewing Gum: A Comprehensive Exploration of Design and Quality for Mouth Ulcers Relief

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ABSTRACT

Gummies are mobile drug delivery systems. Extract from herbal medicines can be incorporated into chewing gum and can be used in the treatment of mouth ulcers. It was concluded that the gum is an excellent drug delivery system for self-medication as it is convenient and can be administered directly without water and contain one or more active substances that are released by chewing and are intended for use for local treatment of oral diseases or systemic administration after absorption through the buccal mucosa. Natural gum base that is economical, safe, environmentally friendly and used in the treatment of various oral diseases.

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INTRODUCTION

Man is constantly waging a war against disease. Nature has endowed mankind with various powers weapons in the fight against the diseases they suffer from. In past years, a person was addicted to drugs of natural origin to fight against diseases, but for a period time invented drug synthesis as its own a weapon against the diseases they suffer from; late synthetic drugs became more popular than natural opposites, but there are still some areas natural drugs are preferred over their synthetic counterparts part, one such area is ulcer medication.

Mouth ulcer ⁽¹⁾

A mouth ulcer (also called a mouth ulcer or mucous ulcer) is an ulcer that occurs on the mucous membrane oral cavity. They are painful round or oval boils that forms in the mouth, mainly on the inside of the cheeks or lips. Mouth ulcers are very common and occur in association with many diseases and various mechanisms, but usually there is no serious basis cause. Common causes of mouth ulcers include: nutritional deficiencies such as iron, especially vitamins B12

and C, poor oral hygiene, infection, stress, digestive disorders, mechanical injury, food allergies, hormone imbalance, skin disease, etc. Mouth ulcers, also known as can be painful when eating, drinking or tooth brushing.

Types of mouth ulcer ⁽¹⁾

On the basis of ulcer size and number, mouth ulcer can be classified as Minor, major, and herpetiform.

- **Minor ulcers:**

These are around 2-8mm in diameter and they usually clear up in 10 days to 2 weeks.

- **Major ulcers:**

These are bigger and deeper, often with a raised or irregular border. This type of ulcer can take several weeks to heal and may leave a scar in the mouth.

- **Herpetiform ulcers:**

This type of ulcer is a cluster of dozens of smaller sores about the size of pinheads.

- **Causes of mouth ulcers:**⁽²⁾

Mouth ulcers are not contagious. The exact cause of oral ulcers is not known, but there are several factors that are suspected of contributing to their appearance.

- **Trauma or Tissue Damage:**

Damage to the mouth lining is common. Damage from vigorous brushing, orthodontic braces, ill-fitting dentures or biting the inside of your mouth can cause a mouth ulcer to form.

- **Infections:**

Bacterial, viral or fungal infections may cause mouth ulcers.

- **Stress Related Mouth Ulcers, Aphthous Ulcers:**

Most common in teens, stress-related mouth ulcers will heal within a couple of weeks. Prevention is by resolving stress-related problems or using stress-busting relaxation strategies. Hormonal changes and allergic reactions may also cause mouth ulcers.

- **Foods and Drinks:**

Mouth ulcers may be triggered by acids in certain foods, including oranges, lemons, pineapples, strawberries, tomatoes, and others.

- **Toothpaste or Oral Rinses:**

Pastes or rinses that contain sodium lauryl sulfate may contribute to the appearance of mouth ulcers.

- **Vitamin Deficiencies:**

A deficiency of vitamins such as B-12, iron, folate or zinc could also be a cause of mouth ulcers.

- **Quitting Smoking:**

Immediately after quitting smoking you may get mouth ulcers. This is usually temporary.



Figure 01: Mouth Ulcers

Herbal anti ulcer drugs:⁽³⁾

- Harra (*Terminalia chebula*)⁽⁴⁾ chewed after dinner cures mouth ulcers.
- Basil leaves (*Ocimum sanctum*)⁽⁵⁾ and Tomato juice (*Lycopersicum esculentum*) are taken for mouth ulcers.

- Powder of nirgund (*Vitex negundo*) and Musli (*Chlorophytum borivilicum*) is prepared and take four times a day for mouth ulcers.
- Mulberry (*Morus alba*) juice is given to infants for this ailment.
- Akarkara (*Spilanthes calva*) flower is chewed in mouth ulcers. It gives strength to the teeth.
- Ash of burnt fruit bark of the water melon is also given.
- Solanum and gingelly oil are also used for mouth ulcer.

Mouth ulcer treatment:

Mouth ulcers can heal within 2 weeks without treatment but medicine and treatment may provide relief⁽⁶⁾. Treatment can numb the pain, protect the ulcer from further damage or decrease the chances of a bacterial infection; some medicines may speed up the healing if used early enough. Paste treatments, gel treatments, mouth washes, liquid paint treatments, neutralizing acid and numbing of the pain, pain killers, corticosteroids.⁽⁷⁾

Medicated chewing gum:

Medicated chewing gum (MCG) is a new drug delivery system containing a chewing gum base with pharmacologically active ingredient and intended for use for the local treatment of oral or systemic diseases absorption through the oral mucosa. The MCG is considered to be vehicle or drug delivery system for administering the active substance principles that can improve health and nutrition. Medicated chewing gum is a solid or semi-solid dose in a form that consists of one or more active ingredients (water soluble or insoluble) incorporated into water insoluble base. Many scientific studies have investigated the role of chewing gum in supporting healthy teeth. Rubber chewing is a common habit in many countries.⁽⁸⁾ Initially, sugar was used to sweeten chewing gum, which led to dental cavities. Today, however, sugar substitutes (polyols) are used to sweeten more than half of the chewing gum sold in Europe. Clinical data indicates that chewing gum without sugar does not cause caries because the polyols do not cause a clinically significant amounts of metabolic acids to be produced in tooth plaque. This systematic literature review aims to evaluate the available data about the potential therapeutic or anti-carcinogenic benefits of sugar-free chewing gum for individuals. With potential applications in pharmaceuticals, over-the-counter medications, and nutraceuticals, MCG is the newest system^(10,11).



Figure 02: Medicated Chewing Gum

Merits of MCG⁽¹³⁻¹⁷⁾:

1. Does not require water to swallow. Hence can be taken anywhere.
2. Advantageous for patients having difficulty in swallowing.
3. Excellent for acute medication.
4. Counteracts dry mouth, prevents candidiasis and caries.
5. Highly acceptable by children.
6. Avoids first pass metabolism and thus increases the bioavailability of drugs.
7. Fast onset due to rapid release of active ingredients in buccal cavity and subsequent absorption in systemic circulation.
8. Gum does not reach the stomach. Hence G.I.T. suffers less from the effects of excipients.
9. Stomach does not suffer from direct contact with high concentrations of active principles, thus reducing the risk of intolerance of gastric mucosa.
10. Fraction of product reaching the stomach is conveyed by saliva delivered continuously and regularly. Duration of action is increased.
11. Aspirin, Dimenhydrinate and Caffeine show faster absorption through MCG than tablets.
12. Stimulates flow of saliva in the mouth.
13. Neutralizes plaque acids that form in the mouth after eating fermentable carbohydrates.
14. Helps whiten teeth by reducing and preventing stains.

Demerits of MCG⁽¹⁸⁻²²⁾

1. Risk of over dosage with MCG compared with chewable tablets or lozenges that can be consumed in a

considerable number and within much shorter period of time.

2. Sorbitol present in MCG formulation may cause flatulence, diarrhoea.
3. Additives in gum like flavouring agent, Cinnamon can cause Ulcers in oral cavity and Liquorice cause Hypertension.
4. Chlorhexidine oromucosal application is limited to short term use because of its unpleasant taste and staining properties to teeth and tongue.
5. Chewing gum has been shown to adhere to different degrees to enamel dentures and fillers.
6. Prolonged chewing of gum may result in pain in facial muscles and ear ache in children.

Types of Chewing Gum:

Chewing gums come in a variety of flavors, shapes and sizes. There is no standard type of gum, but mostly is a small stick or wad of gum. Chewing gum is basically made by combining a water-insoluble phase with a water-soluble phase of sweeteners, flavoring and food coloring. Several types of chewing gum are designed for dental hygiene. There are gums to whiten teeth, clean teeth and fresh breath. The most popular flavors are mint, spearmint, peppermint, wintergreen, cinnamon, licorice, sour apple, cherry, grape, orange, watermelon, strawberry, lemon, and blueberry⁽²⁶⁾.

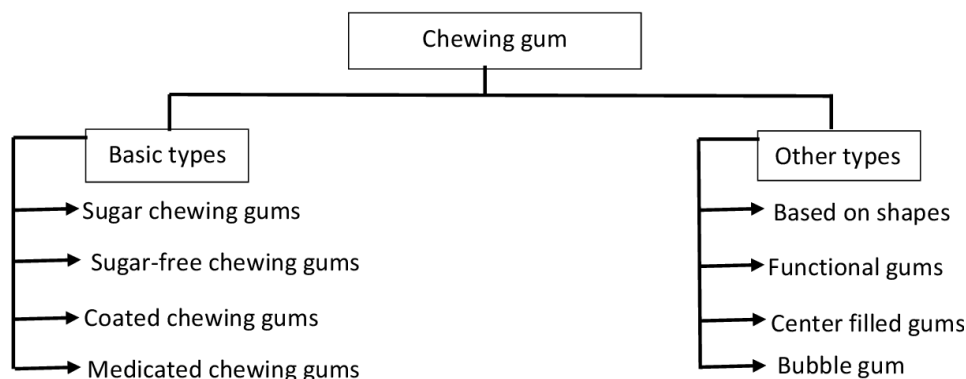


Figure 03: Classification of Chewing Gum



Figure 04: Types of Chewing Gum

Materials:

Gum Base

Gum base is an inert and insoluble nonnutritive product used as a support for the edible and soluble of the chewing gum (sugar and flavoring agent) other raw materials. Gum base is made of a combination of food-grade polymers, waxes, and softeners. e.g., gum ghatti, chicle gum.

Sweeteners

Bulk Polyol Sweeteners are responsible for initial sweetness, whereas intensive sweeteners are intended for prolonging the sweetness effect. Intensive Sweeteners are often encapsulated to delay the release of flavor. The most important among these are that added sugar in chewing gum acts as a sweetener, preservative, texture modifier, fermentation substrate, flavoring and coloring agent, bulking agent. e.g., sugar.

Flavoring Agent

For taste and sensory appeal. Flavor components in gum exist in liquid, powder forms. A variety of flavoring agents are used to improve flavour in chewing gum. Carminative, Flavoring agent, Aromatic and stimulant. e.g., cardamom.

Coloring Agent:

For visual appeal ⁽²³⁻²⁸⁾.

Physical Evaluation of Herbal Chewing Gum:

Stickiness:

The formulated herbal chewing gum was placed on plane surface. A mass of 250gm was hammered on it up to 10min, after 10min, sticking of mass to hammered surface was observed²⁹.

Weight Variation Test:

Chewing gum from each batch were individually weighted on analytical balance. The average weight and standard deviation were calculated which was found in acceptable unit⁽²⁴⁾.

Plasticity/Hardness:

The hardness of chewing gum was determined by Monsanto hardness tester and the average hardness and standard deviation were reported ⁽²⁴⁾.

Percentage Drug Content:

One gram of formulation taken in mortar, to this about 20ml of 6.8 phosphate buffer was added and triturate. This was transferred to conical flask. About 30ml of 6.8 phosphate buffer was added to this and shaken well for about 3 hours using orbital shaking incubator at 100rpm. Then was filtered and the filtrate was made up to make with the same buffer solution. Suitable dilutions were made, and the drug concentration was determined by measuring the absorbance at 279nm⁽³⁰⁾.

Recent Advances:

The future of chewing gum will reflect the efforts of all researchers in the development and advancements in chewing gum based on modern medicine. In the future,

people will try to use gum as a delivery system to create additional drugs. Treatment of fungal infections, prevention of dental problems such as caries and smoking are among the hygiene functions of MCG. However, the many advantages of this new drug, such as dental treatment, cold treatment, improving energy and preventing nausea, will play an important role in future research. MCG is recommended for chewable or standard tablets and orodispersible dosage forms.

Actually, it will take time for gum chewing to be recognized as a drug delivery, but we hope that MCG, with its many advantages, will soon become popular among patients in the business and market.

Fragrance, gum packaging, release time and other new MCGs are designed for the same purpose that previous delivery systems were used to fix, are popular and will be considered a new type of chew in the future, biodegradable, in about 1 month dissolves.

We foresee that MCG, a new drug delivery vehicle, has a better future than the previous oral administration.

CONCLUSION:

It is possible to create a herbal medicated chewing gum with components that have been shown in studies to effectively treat mouth ulcers. In this regard, Effective treatment procedures have been provided by traditional medicine for a variety of illnesses. Since the beginning of medicine, chemicals originating from plants have been employed to cure human illnesses. Throughout the last two decades, natural products have been the source of about 50% of newly developed chemical entities. Recent developments in technology have rekindled interest in natural products for the development of novel drugs. Consequently, the focus should be on identifying and characterizing the active principles as well as clarifying the connection between structure and activity.

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