



A REVIEW ON MEDICATED CHEWING GUM - NOVEL DRUG DELIVERY SYSTEM

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Abstract

Research and development of oral drug delivery systems have advanced scientifically and technologically in recent years. The oral route's success may have been largely attributed to how simple it was to administer. One of the most well-liked oral confectionary products is chewing gum. It is a potentially useful method for systematically or locally delivering medications through the oral cavity. The use of medicated chewing gum as a drug delivery method has grown increasingly popular in recent years. Compared to conventional drug delivery systems, it has a number of benefits. Unlike chewable tablets, which are intended to be swallowed, medicated chewing gums can be removed from the application site without the need for any invasive procedures. Additionally, the activation and continued release of the drug from medicated chewing gums depend on active and continuous masticatory activities. For self-medication, medicated chewing gum is a great mobile drug delivery system because it is practical and can be used without water.

Keyword- oral route, oral cavity, masticatory activity, self medication, mobile drug delivery system

INTRODUCTION

Nowadays, the majority of medications come in a variety of solid dosage forms, including the most widely used ones like tablets and capsules as well as semi-solid dosage forms like creams, ointments, gels, and so forth. Since the beginning of time, people have enjoyed chewing a variety of substances, leading to the widespread use of chewing gum today. It is a practical method for delivering modified release medications. For centuries, people have used chewing gum to clean their mouths and freshen their breath. The Mayans chewed tree resin (Chicle) from the sapodilla tree a thousand years ago to clean their teeth and freshen their breath.



Fig.no.1-chicle collection from sapodilla tree

In 1948, "State of Maine pure spruce gum," the first chewing gum sold commercially, was introduced in the United States. In 1869, the first patent was submitted. The gum was never marketed despite being intended as dentifrices. In 1928, "Aspergum," the first medicated chewing gum, was introduced. This acetylsalicylic acid-containing chewing gum is still readily available. Another commercially available medication gum is chewing gum for motion sickness that contains dimenhydrinate. However, it wasn't until 1978 that chewing gum started to be accepted as a trustworthy drug delivery method. The European Council's commission approved the use of the term "chewing gum" to refer to a pharmaceutical dosage form in 1991.

MCG is the most recent system with potential applications in pharmaceuticals, OTC drugs, and nutraceuticals. Chewing gum is an effective delivery method for drugs because they frequently have low water/saliva solubility when acting in the oral cavity.



Fig.no2-Medicated chewing gum

DEFINITION

Medicated chewing gums (MCGs) represent a unique platform for drug delivery. They have been defined as solid single-dose preparations, which may contain more than one active pharmaceutical ingredient (API) with base consisting primarily of gum that has to be chewed for a certain period of time.

ADVANTAGES OF THE MCG

- Because there is no need to swallow water, it can be taken anywhere.
- Medication precision.
- Counteracts dry mouth, prevents candida and caries
- well tolerated by children.
- Reduced first-pass metabolism and higher bioavailability.
- Gum does not enter the stomach. As a result, the gastrointestinal tract is less affected by excipients.
- The stomach is not harmed by direct contact with high concentrations of active principles, lowering the risk of gastric mucosa intolerance.
- The fraction of product reaching the stomach is conveyed by saliva delivered continuously, and the duration of action is increased on a regular basis.
- The treatment can be stopped at any time.
- Aspirin, Dimenhydrinate, and Caffeine absorb faster through MCG than tablets, stimulates saliva flow in the mouth.
- Plaque acids that form in the mouth after eating fermentable carbohydrates are neutralised.
- Reduces and prevents stains, which aids in the whitening of teeth.

DISADVANTAGES OF THE MCG

- Chewing gum for an extended period of time causes facial muscle pain and ear ache in children.
- When compared to chewable tablets, there is a greater risk of overdose alternatively, lozenges.
- Sorbitol, which is present in medicated chewing gum, causes flatulence and diarrhoea.
- Chewing gum has been shown to adhere to enamel dentures and fillers to varying degrees.
- Additives such as flavouring agents and cinnamon in gum cause oral ulcers, and liquorice causes hypertension.
- Chlorhexidine oromucosal application is limited to short-term use due to its unpleasant taste and staining properties on teeth and tongue.

MANUFACTURING METHODS OF MCG

1. Conventional Or Traditional Method

Gum ingredients are combined, melted, and sent through a series of rollers to create a thin, wide ribbon. Throughout this procedure, a thin layer of finely Sugar substitutes or powdered sugar are added to prevent gum from sticking and to improve flavour. The gum is cooled in a precisely controlled environment for up to 48 hours. This enables the gum to properly set. The gum is then finally sized to the desired shape and cooled at a temperature and humidity that are carefully regulated

2. Cooling, Grinding, and Tableting Method

The method's objective is to reduce moisture content and address issues associated with traditional methods.

Cooling

The base for chewing gum is cooled to a temperature where the base is sufficiently brittle and would stay that way during the subsequent grinding step without sticking to the grinding apparatus. The mixture is generally kept at a temperature of -15°C or lower. The temperature needed for cooling is determined by the chewing gum's composition and empirically by looking at the composition's properties after cooling. Carbon dioxide, liquid nitrogen, and hydrocarbon slush are used as coolants. Since carbon dioxide can produce temperatures as low as 78.50°C , it is preferred. When the mixture is warmed, the solid carbon dioxide sublimates easily and is not absorbed by the chewing gum composition. It does not negatively interact with the processing equipment and does not leave behind any potentially hazardous or unwelcome residue. The chilled composition is then crushed or ground to produce extremely small pieces of the chilled composition. As an alternative, it is possible to cool the chewing gum composition in multiple steps.

Grinding

Grinding equipment can be cooled by either leaving it in contact with a coolant or by placing the grinding equipment in a liquid nitrogen cooling jacket or another icy beverage. The chewing gum composition can be pre-cooled before cooling to the refrigeration temperature for more effective cooling.

Tableting

Any conventional method, like punching, can be used to compress tablets. Comparable to the traditional method. Even in this process, the tableting process necessitates careful humidity monitoring.

3. Direct Compression Method

Direct compression chewing gum can be directly compressed on a conventional tableting machine, so allowing for the development of a gum delivery system quickly and inexpensively. Pharmagum is a compatible gum system created by SPI Pharma. Pharmagum is a concoction of polyols, sugar, and gum. The main ingredients in Pharmagum® S are sorbitol and gum base. Mannitol, isomalt, and gum base make up Pharmagum® M. These are directly compressible, freely flowing powders. The gum is produced in accordance with food chemicals and under CGMP guidelines.

Factors Effecting Release Of Drug Ingredients

Contact Time

The time of contact of Medicated Chewing Gum in the oral cavity determines whether the effect is local or systemic. In A chewing time of 30 minutes in a clinical trial was considered close to normal use. The typical chewing rate is 60 chews per minute.

Physicochemical properties of active ingredients

The physicochemical properties of the active ingredient play a critical role in drug release from Medicated Chewing Gum. Saliva soluble drugs are released immediately, while lipid soluble drugs are released first into the gum base and then slowly released.

Inter individual variability

Chewing frequency and intensity, which influence drug release from Medicated Chewing Gum, can vary from one person to the next. An in-vitro study recommended by the European Pharmacopoeia suggests a chewing rate of 60 cycles per minute for proper active ingredient release.

Factor in formulation

The composition and amount of gum base used influence the rate of active ingredient release. The release rate decreases as the lipophilic fraction of the gum increases.

Future Trends

Chewing gum not only has clinical benefits, but it is also a visually appealing, discrete, and efficient drug delivery system. Until recently, the only surgical procedure available was for the treatment of some diseases, but now a growing number of diseases can be treated with novel drug delivery systems. In general, it takes time for a new drug delivery system to establish itself in the market and gain patient acceptance; however, chewing gum is thought to manifest its position as a convenient and advantageous drug delivery system because it meets pharmaceutical industry high-quality standards and can be formulated to obtain different release profiles of active substances. However, the application scope for medicated chewing gums is broad, and more products will become available as a chewing medication.

CONCLUSION

To deliver drugs locally to the oral cavity, drugs may be formulated into chewing gum in the future rather than other delivery systems. A chewing gum preparation. It should have a pleasant flavour and texture. The majority of active ingredients have an unpleasant, bitter, or metallic taste. Because the active substance will be released and remain in the oral cavity for a longer period of time than with conventional delivery forms, unique expertise in A medical chewing gum product's success depends on taste definition, taste masking, and taste modification. Chewing gum is to be used

as a drug delivery system. It is critical that the delivery form is acceptable to end users as it expands into additional therapeutic areas. As a result, it can be concluded that chewing gum can be used as a carrier for a wide range of drugs where extended release and local action are desired. Chewing gum can be consumed without the use of water at any time. Medicated Chewing gums can cause both local and systemic effects in the oral cavity. They can also be used to mask the taste of certain drugs.

REFERANCES

1. Prashant K. Pagare, Chandrakant S. Satpute, Varsha M. Jadhav and Vilasrao Kadam; Medicated Chewing Gum: A Novel Drug Delivery System. *Journal of Applied Pharmaceutical Science* 02 (06); 2012: 40-54
2. Abelson D.C., Barton J., Mandel I.D. The effect of chewing Sorbitol-sweetened gum on salivary flow and cemental plaque pH in Subjects with low salivary flow. *J. Clin. Dent.* 1990; 2, 3–5.
3. Athanikar N.K., Gubler S.A.: Process for manufacturing a pharmaceutical chewing gum. US Patent 2001; 6,322,828.
4. Barabolak R., Hoerman K., Kroll N., Record D. Chewing gum Profiles in U.S. Population. *Commun. Dent. Oral Epidemiol* 1991; 19, 125.
5. Cherukuri Subraman R., Bikkina Kirshnayya: Tabletted chewing gum composition and method of preparation. US Patent 1988; 4,753,805.
6. J.Gomathi*, Sathishkumar .P, Sheik Muhammad Tharves .S; A Review on Medicated Chewing Gum as a Novel Drug Delivery System. *Int. J. Pharm. Sci. Rev. Res.*, 68(2), May - June 2021; Article No. 02, Pages: 5-11
7. Prashant P, Chandrakant S, Varsha J, Vilasrao K. Medicated Chewing Gum: A Novel Drug Delivery System. *J App Pharma Sci.* 2012; 2(6): 40- 54.
8. Wilkinson L, Scholey A, Wesnes K. *Appetite.* 2002; 38: 235-236.
9. Naik H, Gupta S. Medicated chewing gums- updated review. *International Journal of Pharma Research and Development.* 2011; 2(8): 66-76.
10. Ikam VK, Kotade K, GawareVM, Dolas RT. Medicated chewing gum as a novel drug delivery system. A review *Pharmacology online.* 2011; 3: 403- 413.
11. Morjaria Y, Irwin WJ, Barnett PX, Chan RS, Conway BR. In Vitro Release of Nicotine from Chewing Gum Formulations. *Dissolution technologies.* 2004 May: 12-15.