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Medicated Chewing Gum: A Novel Drug Delivery System

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Abstract:

Research on oral drug delivery system has to new formulations technologies. This type of delivery is important for patients. The review covers aspects of medicated chewing gum, including its history, benefits, drawbacks, manufacturing methods differents in composition, evaluation teste, and example of medicated chewing gum the use of medicated chewing gum has increase over the years due to its benefits and developments of new formulations with a different drug. This new type of medication chewing gum are expected to enter the market and have many potentials uses in future. Currently the standard for these gums are similar to those for tablet studys focused on patient include medicated chewing gum as method of delivering medication which help to improve adherence to treatment.

Introduction:

A medicated chewing gum,(MCG) is a type of solid dosage medication that conten one or more active incredient.It is design to be chewed fore a specific amount of time to effectively delivard the medication.

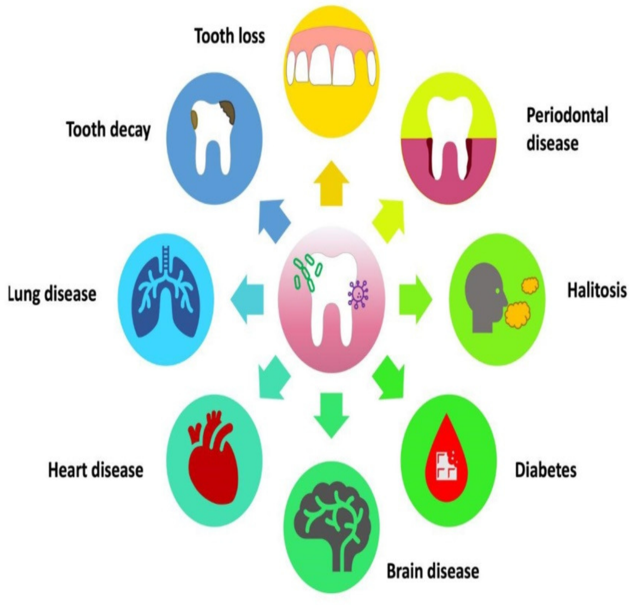
In 1924 , the first medicated chewing gum was introduce as aspergum.this method called medicated chewing gum(MCG). Combines elastic gelatine with binding agents, sweeteners,and medicine.MCG treats mouth disease locally or allows medicine to be absorbed throw the mouth mucosa.

Containe pecutical incredient that are either water soluble or insoluble in fat based mixture. Chewable forms like chewing gum and tablet are designd to healp dissolve or breakdown medication in the mouth.

Ancient greeks chewed a resin from the mastic tree.Archaeogical digs show that chewing gum like substance data back 5,000 years. Pieces of resion with teeth marks have been found in ffinland and Sweden.

the first medication of chewing gum happened in 1848 when chicle fromas .. sapoolilla tree was used.john Curtis and his son boiled spruce tree sap added sugar, flavour, and fillers then rolled itvin tosticks wrapping them in paper for. As their company grew the son recognized the need for improvement and development a machine that mass produce gum.

Thomes Adams was the first tobmake mechanically produce chewing gum (MCGs) using natural latex and recived the first patient for a machine that makes chicle and pliable.Today, most chewing gum are made from synthetic resins.The European pharmacopoeia (EP) contain a monograph that define MCG. And the term “Chewing gum’’ was officially include in pharmaceutical guidelines.



Chewing gum are popular worldwide due to their easy use. They have a nice taste and offer health , nutrition and cognitive benefits.

- **Advantages of MCG**

1. It can be taken without water.
2. Highly acceptable by children.
3. Fast bowel recovery after GI surgery.

4. Good stability against light, oxigen and moisture.
5. Low/Few side effects
6. Reduce food craving.
7. Better blood circulation can help to keep the brain awake and functioning well.
8. Accuracy of medication.
9. Less first pass metabolism.
10. Increase effectiveness compared to other way of delivering medication.
11. Work faster.
12. Reduce risk of overdosing when a substance is whole and swallowed.
13. Reduce hypoglycemic shocks in people while taking antidiabetic druds.
14. Helps whiten teeth by reducing and preventing stain.

Disadvantages:

1. Cause allergic reaction by artificial sweeteners.
2. Master problems.
3. Short administration time due to factors like eating, speaking, and drinking.
4. Rapid clearance of the drug from the oral cavity due to salivary dilution.
5. Variable release profiles resulting from individual difference in chewing gum patterns.
6. Choking hazard risk young children due to gum ingestion.
7. Tooth decay due to sugar coating.
8. Masseter muscle issue.
9. Risk of TMJ disorders due to prolong jaw stress.
10. Gastro intestinal issue like sorbitol in medicated chewing gum may cause flatulence and diarrhoea.
11. Adhesion concerns like chewing gum can stick to dental work , including enamel , dentures ,and fillings to varying degree.
12. Stomach irritation pain and gastric ulcer due to continuous swallowing of saliva.

Type of chewing gum:

Cut and Wrap:

The gum bases for this type of line required specific elasticity to handle the stretching in the cooling tunnel. The formulation of chewing gum need to be soften than regular gum because it is larger.This larger size created by adding more liquids like glucose and sweeteners to the formula.

Stick and tablets chewing gum :

Gum bases for laminated products need to be flexible enough to be shaped by rolls and then harden after curing so they can be wrapped properly. Laminated chewing gum typically contains a higher percentage of gum based compared to cut and wrap gum. The glucose contain must be changed to provide the right hardness for packaging. At the same time, it should have enough flexibility to prevent the pieces from breaking when they are bent.

Pellets/Pellow:

Chewing gum is made in pellets form similar to sticks. The gum base use for laminated product must be able to shaped by rollers. After a curing period it should become hard enough to handle the cooling process.

Hallow Balls:

Gum bases for innovative product need to be elastic but not as much as traditional cut and wrap products .They must also be plastic enough to keep their shape avoid leaks when filled. After the canter is cured, it should be firm enough to handle the coating process.

Liquid Filled Gums:

Particular qualities of gum base for stamped chewing gum should include :
Adequate flexible to endure the equalize step create by the forming machines dies. The rang of the chewing gums base percentage should enable both good and a good seal. The product will disorder if the gum base conten is either too higher to low.

Gum filled candy:

All though all bubble gum base can typically be utilized for this kind of product. Gum base with lesser viscosity may be more challenging to deal with because they can turn liquid at high confectionery temperatures.

Composition:

Chewing gum is made out of a blend of natural and synthesis chemicals including water soluble bulk material and water insoluble gum base .The non-nutritive portion of gum that dose not dissolve when chewed is called gum base. Modern gum bases employ either very little or on natural rubber 15-30% of chewing gum is gum base.

Gum base are a mixture of natural gum , latex plastics ,solid paraffin and beeswax.

Elastomers are polymers that are flexible against breaking or cracking due to their strong elasticity and elongation capabilities .chewing gum formulas use a variety of materials including natural and synthesis of elastomers. This kinds and quantities of elastomer determine how well the formulation process works.

Emulsifier can increase softness and the production of bubble gum by allowing to disperse with in one another .It aids in the hydration impact during chewing as well as mixing and softness throughout shelf life.

Chewing gum composition can be softened and made more consumer friendly by adding plasticizer.by adding fluidity ,decreasing brittleness and softening the elastomers ,it enhance gum texture.

In addition to providing over all texture a texturizer makes blending and other processing steps easier. Texturizer level affects cut size chewing ability and stretch.

The production of bubble gum is likewise linked to rubber the resin employed in these formulation serves as both an elastomeric plasticizer and a binding agent between texturizer and elastomers.

Uber is also linked to the production of bubble gum it is merely the resin utilized in formulation that serves as a binding agent between texturizer and elastomers as well as an elastomeric plasticizer.

High-intensity artificial sweetener link wise add sweetness, but because of their partial intestinal absorption they produce fewer calories.

In addition to giving the product a tolerable flavour flavouring chemicals can canceld the taste of the active ingredient.

Colorant create a soft delicate tint that enhance the formulations colour. Anti- -oxidation which stop bacteria from growing. Anti-lack chemicals eliminate self-adhesiveness known as blockage notably rubber which have a tendency to stick together.

Manufacturing process:

Fusion Method:

Anti-caking agents are used to stop caking and lumps from forming. They help materials flow better, rehydrate more easily, and package more effectively.

The process of making chewing gum begins by melting and softening the gum base at 60°C and mixing it in a kettle with blades. Then, sugar, glycerin, sweeteners, and a taste-masking agent are added. Flavoring is mixed in at 40°C, followed by cooling and rolling. The gum is then cut into desired shapes and sizes. For coated gum tablets, a coating agent is sprayed to create a uniform surface.

The second type of this method involves a different approach. First, set up a mixer, like a sigma blade. For sugar-containing gum, begin by adding corn syrup to the mixer. Then, gradually add finely powdered sugar, which can include sucrose, dextrose, fructose, corn syrup solids, or combinations thereof.

Plasticizers, like glycerin, are used to adjust texture and cohesiveness in mixtures. Depending on the desired traits, fillers, colorants, and flavorings may be added. Flavorings should be added last, as they are usually volatile. Proportions differ, but powdered sugar often has the greatest amount.

The mechanical forces of a mixer, like compression and shear, along with heat, help soften materials. Without heat, more power is needed. Mixing continues until everything is fully blended, usually for about eight minutes. Alternatively, you can mix by slowly adding sugar until all other ingredients are combined.

The text discusses the process of preparing a gum base. Initially, matrix preparation is done, followed by completely mixing the elements. Commercially prepared gum base particles are then added to the chamber all at once. However, it is suggested that these particles should be heated and mixed beforehand. At this stage, the mixing process continues for 10 to 20 minutes.

In this new method, the sweetener matrix is formed first, then gum base pellets are added. In the conventional method, sweeteners and other ingredients are mixed into the molten gum base. This new approach reduces the chances of sugar lumps forming.

Tableting Method:

Mixing gum base with sweeteners, corn syrup, starch, flavoring agents, and colorants creates the desired taste and look for chewing gum. This mixture is cooled below −15°C using a freezer or a coolant like carbon dioxide, then crushed into small pieces. These particles are heated to bind together, creating a uniform texture. If they don't naturally adhere, low pressure is applied manually or mechanically, then warmed to room temperature to aid self-adhesion.

You can cool the grinding equipment to combine cooling and grinding. Let the coolant evaporate after grinding. Coat particles with edible substances or mix with powders. During tabletization, use compressing punches with an anti-adherent agent to prevent sticking.

Direct comparison:

A new technology for making chewing gum tablets involves direct compression and high-speed tableting. This method results in quickly breaking down gum that forms a uniform mass after a few seconds of chewing. A granulating agent like sorbitol, which doubles as a sweetener, and a lubricant such as magnesium stearate or other substances, is used before tableting.

Ensure the temperature does not exceed the gum base's melting point initially. Once a smooth mass forms, lower the temperature to add other ingredients. The compressed tablet releases its active ingredient in the mouth after 2-10 chews.

Conclusion:

Chewing gum is increasingly recognized as a novel method for drug delivery, offering benefits like supporting both local and systemic distribution, protection against acids and enzymes, lower first-pass metabolism, increased alertness, and cognitive enhancement. It shows promising stability and potential familiarity for patients and markets. Currently, chewing gum is used for treating conditions like motion sickness, pain, smoking, dental issues, ear infections, gastrointestinal problems, oral fungi, and inflammation, by incorporating drugs as active agents. This indicates a growing acceptance and application of chewing gum in medical treatments. The technology to bring chewing gum to market and health System as a reliable alternative for different kinds of tablets Has not been ready and fully understood yet because there Are much more information and knowledge to be explored For manufacturing chewing gums. But, fortunately, the Progress of this procedure is admissible.Scientists and researchers should also consider new Formulations for chewing gums for increasing variations of Chewing gum due to patients' different styles and providing Appropriate release pattern for chewing gums containing Drugs.

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