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A REVIEW ON ORAL MEDICATED JELLIES AS A BENEFICIAL ORAL DRUG DELIVERY SYSTEM

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ABSTRACT
Oral medicated jellies were introduced in the 20th century to commercial production for its wide acceptance among the people and large number of advantages. The world's first jelly was approved to treat osteoporosis by the ministry of health of Japan in 2012. Jellies are semisolid dosage forms which have both the properties of solid and liquid meant to dissolve in mouth or pharynx for its local or systemic action. It is a easier and convenient oral administration for the pediatrics, geriatrics and other patients who have difficulty in swallowing and mastication like dysphagia problems and psychiatric patients. Jellies are also a very attractive colorful dosage form with various pleasant flavors and tastes which make children get attracted. Other important advantages include bypassing first pass metabolism, increased bioavailability, quick onset of action. The poorly soluble drugs can be administered by this drug delivery system by dissolving in suitable solvents while the formulation process itself. This ultimately increases the bioavailability of drugs. The oral jellies administration does not require water as they are administered directly through the bilingual route, sublingual route and labial route to get dissolved and swallowed to produce action. Oral medicated jellies are formulated by heating and congealing techniques and transferred to molds of required attractive shapes. They should be evaluated for the evaluation parameters like physical appearance, weight variation, viscosity, pH, drug content, in vitro dissolution study, stickiness, grittiness, spreadability and finally stability studies to make sure whether they comply with the ideal properties of jellies. Thus, this review article focuses on covering all the important aspects of oral medicated jellies to provide a useful insight for the pharmacists and scientists to develop this drug delivery system for more wide applications.

KEYWORDS: Oral medicated jellies, Dysphagia, Oral mucosa, Patient compliance, Pediatric, Geriatric, bioavailability, Congealing.

1. INTRODUCTION

An optimal dosing regimen for treating any illness is one that quickly reaches the desired therapeutic drug concentration in the plasma (or at the target site) and maintains this level consistently throughout the treatment period. Oral administration is the most commonly used method for drug delivery. It is regarded as the most natural, straightforward, and convenient way to administer medications, offering greater flexibility in dosage form design, ease of production, low cost, the convenience of self-administration, compactness, and simple manufacturing.[19]

As the oral drug delivery system is non-invasive and offers low cost of treatment, patients usually prefer this delivery system.[6] Current oral formulations come with numerous limitations. The major drawback of the oral dosage forms like tablets, capsules is difficulty in swallowing mainly for pediatrics, geriatrics and other people having nausea and vomiting problems which leads to noncompliance. Also, people who are ill in bed and for patients traveling without water face difficulties with the conventional oral dosage forms. Most available pediatric medications are in the form of tablets, capsules, syrups, solutions, and drops. For liquid formulations, the volume of the dose is a crucial factor.[14] To address these medical requirements, pharmaceutical technologists have created a new oral dosage form called Oral Medicated Jellies (OMJs). These jellies dissolve quickly in saliva, typically within seconds, without requiring water. This rapid dissolution and absorption can lead to faster onset of clinical effects and potentially higher drug bioavailability compared to traditional dosage forms.[19]

According to the 17th edition of the Japanese Pharmacopoeia, jellies are thick, non-flowing preparations with a defined size and shape for oral use. They can be described as clear or slightly cloudy, non-greasy, semi-solid forms for both external and internal applications. Drugs that act quickly and are mainly absorbed in the stomach and small intestine can be made into jellies. Medicated jellies release the drug in the mouth, allowing absorption through the oral tissues and along the gastrointestinal tract. Nowadays, jelly candies are popular among children who enjoy chewing them. They offer a good alternative for drug delivery compared to solid and liquid forms.[6]

Medicated jellies can be used for local treatments in the mouth and for systemic conditions. Drugs with bad tastes, like erythromycin, acetaminophen, aspirin, ibuprofen, antacids, and vitamin supplements, can be made into soft, chewable forms. Jellies can be made from natural gums like tragacanth, pectin, and sodium alginates, or from synthetic materials like methyl cellulose and sodium carboxymethyl cellulose. Pharmaceutical jellies allow drug delivery through sublingual, buccal, labial, and gingival routes. They are suitable for psychiatric patients and those with conditions like stroke, nausea, thyroid disorders, Parkinson's disease, multiple sclerosis, vomiting, and motion sickness.[6]

Oral medicated jellies are flavorful solid dosage forms given in the mouth. They are designed to dissolve in the mouth or throat to provide either local or systemic effects. Oral medicated jellies are favored by a notable portion of people, especially those who have difficulty swallowing. Dysphagia (difficulty swallowing) is prevalent across all age groups but is particularly common among pediatric and elderly populations, as well as institutionalized patients and those experiencing nausea, vomiting, or motion sickness. Dysphagia affects approximately 35% of the general population, up to 60% of elderly individuals in institutions, and 18-22% of patients in long-term care settings. Oral medicated jellies with pleasant taste and flavor enhance the acceptance of bitter medications among various groups. Jellies are considered as the most preferred dosage forms among children. The use of OMJs is feasible for both local treatment on oral cavity and also systemic treatment.[14]

1.1 Dyshpagia

Dysphagia is the term used to describe a patient's feeling of difficulty in moving swallowed food from the mouth to the stomach. This is often described as a sensation of food getting "stuck" in the throat or chest. It is also sometimes referred to as "choking" to indicate the same sensation. Swallowing disorders can manifest through various symptoms beyond just dysphagia. Common symptoms include coughing related to swallowing and the regurgitation of food or liquid that was previously swallowed. Problems with swallowing can arise from issues with nerve control, muscle coordination, inflammation, or tumors.[16]

1.2 Oral mucosa

Oral mucosa refers to the soft tissue that lines the inside of the mouth. It encompasses several components: the mucosa, epithelium, lamina propria, and submucosa. The total surface area of the oral cavity is approximately 100 cm^2, and it is continually bathed in saliva, with an average daily turnover of about 0.5 to 2 liters. The pH of saliva ranges from 5.6 to 7.9 and varies based on the rate of saliva flow.

The functions of the oral mucosa are protecting the underlying tissues from biological, mechanical, chemical stimuli, essential secretions, sensory functions to perceive taste, touch, pain and temperature.[28]

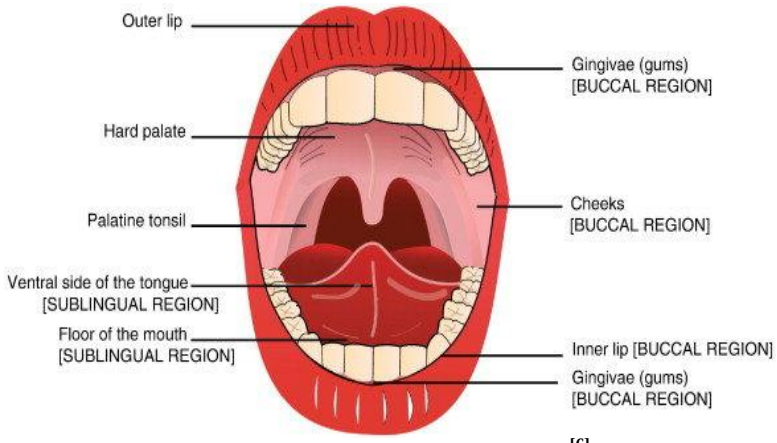


Figure 1: Anatomy of oral cavity.[6]

1.3 Saliva

Saliva is a biological fluid found in the oral cavity. It is a complex fluid produced by several specialized glands and secreted into the mouth. Salivary glands account for 90%-95% of saliva production, while around 100 smaller salivary glands in the oral mucosa contribute the remaining 5%-10%. Saliva contains proteins and electrolytes. The pH of saliva ranges from 6.5 to 7.5. On average, adults produce between 500 and 1500 ml of saliva daily.[9]

1.4 Taste buds

These are small sense organs found on the tongue used to detect different tastes. These groups of cells are found on the pharynx, soft palate, epiglottis. These work by sending various types of tastes to the brain through nerve fibres. Types of tastes recognized are sour, salty, bitter and sweet.

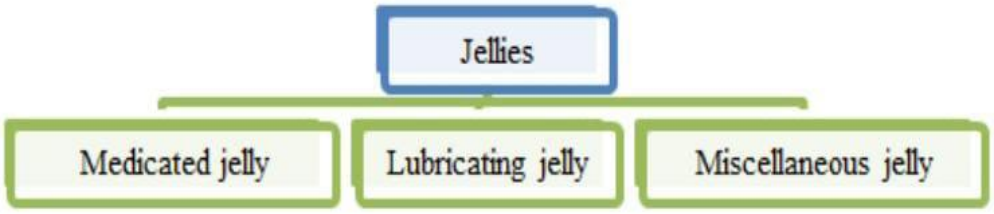
Bitter taste masking techniques

- By using flavors and sweeteners
- Coating using polymer
- Spray drying techniques
- Complex formation with ion exchange resin.[25]

2. Ideal properties of oral medicated jellies

- Minimal residue: Should leave little to no residue in the mouth after oral administration, contrary to some beliefs.
- Pleasant mouth feel: Must be compatible with a pleasing mouthfeel, contrary to popular opinion.
- Effective taste masking: Should employ effective taste-masking technologies for bitter drugs.
- Durability: Should be robust enough to avoid issues with fragility, contrary to some expectations. Low Residue: Must leave negligible or no residue in the mouth after use, contrary to some beliefs. Environmental Stability: Should be minimally affected by changes in environmental conditions.
- High Drug Loading: Should support high drug loading, which is significant.
- Processing and Packaging: Should be adaptable to conventional processing and packaging equipment at a reasonable cost.
- Compatibility: The properties of the drug and excipients should not adversely affect the orally disintegrating jelly.[12]

3. Types of jellies



There are three main types of jellies:

3.1 Medicated jelly

These are primarily used on mucous membranes and skin for their antibacterial, spermicidal, and local anesthetic properties. They contain a sufficient amount of water, which evaporates to provide a cooling effect, while the remaining coating offers protection.

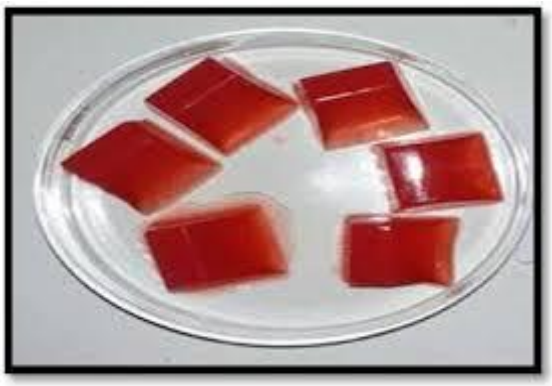


Figure 2: Oral medicated jellies.[6]

3.2 Lubricating jelly

This type is used to lubricate diagnostic tools such as surgical gloves, cystoscopes, finger stalls, catheters, and rectal thermometers. Ideal lubricating jellies are thin, clear, and water-soluble. They must be sterile since they are used for insertion into sterile areas of the body, like the urinary bladder.

3.3 Miscellaneous jelly

a. Patch Testing: These jellies are used to carry allergens for sensitivity testing. Once the patches dry, they leave a residual film that helps keep them in place and prevents mix-ups in results.
b. Electrocardiography: Jelly is applied to the electrode to reduce electrical resistance between the patient's skin and the electrode. This jelly contains Sodium Chloride, Pumice Powder, and Glycerin. Sodium

Chloride enhances conductivity, while Glycerin acts as a humectant to retain moisture.[3]

4. Advantages of oral medicated jellies

- ❖ Ease of administration: Can be easily taken anytime and anywhere, as it is simple to handle and doesn't require water.
- ❖ Control of therapeutic action: The drug's effect can be stopped by spitting out the jelly before it is fully absorbed.
- ❖ Ideal for dysphagia patients: Provides a suitable drug delivery method for those with swallowing difficulties, reducing the risk of aspiration.
- ❖ Improved mouth feel: Enhances the perception of medication due to its pleasant mouthfeel.
- ❖ Rapid onset: Delivers medication quickly for a fast therapeutic response.
- ❖ Flexible treatment: Allows for discontinuation of treatment at any time if necessary.
- ❖ Use of conventional equipment: Can be manufactured with standard equipment.
- ❖ Cost-Effective: Offers a cost-efficient solution.
- ❖ Chemical stability: Maintains stability comparable to traditional oral solid dosage forms.
- ❖ High drug loading: Accommodates high concentrations of active ingredients.
- ❖ Quick drug delivery: Facilitates rapid delivery of medication.
- ❖ Compatibility with existing machinery: Can be processed and packaged using current machinery.[2]

5. Limitations of oral medicated jellies

- Expensive manufacturing process.
- Limited physical protection in standard blister packs.
- Special packaging is necessary to ensure proper stabilization and safety of the product.
- Often exhibits fragile and effervescent granules.
- Difficulty in incorporating high concentrations of active ingredients.
- Orally disintegrating tablets (ODTs) are hygroscopic and need to be stored in a dry environment.[12]

6. Necessity to develop jelly

The primary goal of non-invasive delivery systems for active chemical compounds is to address patients' low acceptance and adherence to existing conventional forms. Additionally, the limited market size for active pharmaceutical ingredient manufacturers and the associated costs of disease management plays a role in this need. The development of oral medicated jelly as an innovative method for effectively delivering active compounds aims to enhance both the safety and efficacy of the administered agents, while also improving patient compliance and convenience.[10]

7. Patient factors

Orally disintegrating dosage forms are particularly beneficial for individuals who find it challenging to swallow traditional tablets and capsules with an 8-ounce glass of water. This includes:

- Pediatric and geriatric patients who struggle with swallowing or chewing solid forms.
- Patients reluctant to take solid medications due to concerns about choking.
- Very elderly individuals who may have difficulty swallowing their daily dose of antidepressants.
- An eight-year-old with allergies who prefers a more convenient option than antihistamine syrup.
- A middle-aged woman undergoing radiation therapy for breast cancer who might be too nauseous to swallow her H2-blocker.
- A schizophrenic patient in a care facility might attempt to hide a conventional tablet under their tongue to avoid taking their daily dose of an atypical antipsychotic.
- A patient experiencing persistent nausea who is traveling or has limited access to water.[19]

8. Formulation challenges

8.1 Palatability

Formulation scientists face a significant challenge in masking the taste of bitter drugs used in Oral Medicated Jellies. Since many medications are unappealing, orally disintegrating drug delivery systems often include the drug in a taste-masked form. Therefore, effectively masking the taste of these drugs is crucial for ensuring patient compliance.

8.2 Aqueous solubility

Water-soluble drugs present several formulation challenges as they can create eutectic mixtures, leading to a depression in the freezing point and the formation of a glassy solid that may collapse during drying due to the loss of supporting structure during sublimation. This collapse can sometimes be mitigated by incorporating various jelly-forming excipients, such as almond gum, which can promote crystallinity and thereby provide rigidity to the amorphous mixture.

8.3 Hygroscopicity/Moisture sensitivity

Many oral jelly dosage forms are hygroscopic and may lose their physical integrity under standard temperature and humidity conditions. Therefore, they require protection from moisture, necessitating specialized packaging to maintain their quality.

8.4 Jelly size

The ease of consuming a jelly is influenced by its size. Research indicates that a jelly with a size of around 7-8 mm is the easiest to swallow, while a slightly larger size, over 8 mm, is more manageable. Consequently, finding a jelly size that is both easy to swallow and handle can be challenging.

8.5 Dose

The use of technologies for Oral Medicated Jellies (OMJs) is constrained by the quantity of drug that can be included in each dose. High-dose drugs pose several

challenges for developing fast-dissolving dosage forms: a) masking the taste of the active ingredient, b) issues with mouthfeel or grittiness, and c) the size of the jelly. These issues are interconnected; the need for taste masking will depend on the drug's bitterness and dose, which in turn impacts the final size of the jelly.

8.6 Drug properties

Various drug characteristics can influence the performance of jellies. For instance, a drug's solubility, crystal structure, particle size, and bulk density can impact the final properties of the jelly, such as its strength and dissolution rate.

8.7 Sensitivity to environmental conditions

Oral Medicated Jellies (OMJs) should typically have low sensitivity to environmental factors like humidity and temperature, as most of the materials used in OMJs are designed to dissolve with minimal water.

8.8 Mouth feel

Oral Medicated Jellies (OMJs) should not break down into large particles in the mouth. The particles formed upon disintegration should be as fine as possible. OMJs should leave little to no residue after being taken. Additionally, incorporating flavors and cooling agents like menthol can enhance the overall mouth feel.[19]

9. Drug selection

- The drug must be able to effectively penetrate the mucous membranes of the oral cavity.
- It should be at least partially non-ionized at the pH of the oral environment, which is important.
- The drug needs to diffuse and distribute well into the upper gastrointestinal (GI) epithelium.
- Ideally, the drug should have a small to medium molecular weight, especially for low doses, preferably under 50 mg.
- Drugs with a very short half-life and those requiring frequent dosing are generally not suitable for oral mucosal delivery (OMJ).
- The drug should exhibit good stability in saliva and water, which is significant for effectiveness.
- Drugs that are very bitter or have unpleasant tastes and odors are inappropriate.
- It should be partially non-ionized at the oral pH.
- The drug must be able to diffuse and partition into the upper GI epithelium (log P > 1, preferably > 2).
  -Drugs that can effectively penetrate oral mucosal tissue are considered ideal for large-scale OMJ formulations.[12][10]

10. Drugs incorporated as jellies

Anti-Thyroid Agents: Carbimazole, Propylthiouracil
Anti-Coagulant Agents: Dicoumarol, Dipyridamole
Anti-Fungal Agents: Butoconazole nitrate, Clotrimazole
Anti-Protozoal Agents: Omidazole, Tindazole, Metronidazole Cardiac Inotropic Agents Amrinone,
Local Anesthetic: Lidocaine
Diurectics : Acetozolamide, Bumetanide, Chlorthiazide
Anti-Muscarinic Agents: Atropine, Benzhexol HCl, Biperiden Neuromuscular Agents Pyridostigmine
Anti-Hypertensive Agents: Amlodipine, Dilitazem HCl, Carvedilol
Anti-Bacterial Agents: Benethamine Penicillin, Clarithromycin
Anti-Neoplastic Agents: Chlorambucil, Cyclosporin, Dacarbazine
Anti-Parkinsonian Agents: Bromocriptinemeslyate, Lysuride maleate
Anti-Histaminic Agents: Cetrizine, Cinnarizine, Loratidine
Anti-Emetic Agents: Ondasetron, Domperidone, Alizapride
Anti-Helmintic Agents: Mebendazole, Albendazole
Anti-Gout Agents: Allopurinol, Probenecide, Sulphinpyrazone
Anti-Migraine Agents: Dihydroergtamine mesylate, Succinate.[4]

11. Excipients used in formulation

11.1Gelling agents

11.1.1 Sodium alginate

It is widely used as thickening agent and suspending agent in a various topical and oral pharmaceutical formulations such as pastes, creams and gels, also used in cosmetics and food products.

11.1.2 Gelatin

It is used as a biodegradable matrix material in an implantable delivery system. Gelatin is also widely used in food products and photographic emulsions.

11.1.3 Pectin

It is used as an adsorbent and bulk forming agent, experimentally it has been used in gel formulation for oral sustained delivery of drugs.

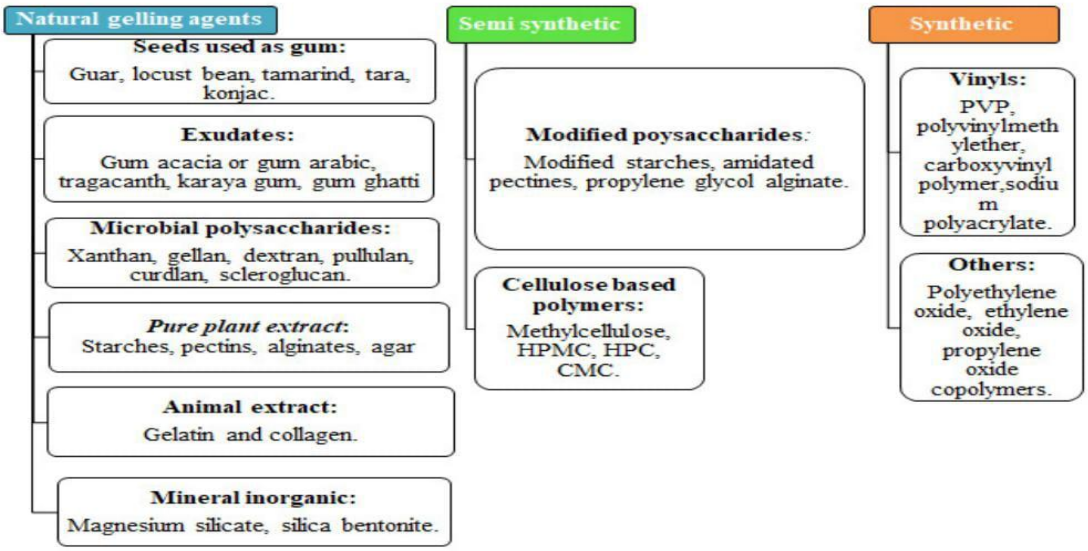
11.1.4 Tragacanth

In several pharmaceutical formulations, it is used as an emulsifying and suspending agent. It is used in creams, gels, and emulsion formulations.

Xanthan gum It is mostly used in topical and pharmaceutical formulations, cosmetics, and food as suspending agent, stabilizing agent, thickening and emulsifying agent. It is also used as a hydrocolloid in the food industry, and in cosmetics it has been used as a thickening agent in shampoo.

11.1.5 Cellulose derivatives

It is acting as a hydrophilic bulking agent and used to produce thermoplastic polymers. E.g. Methyl cellulose sodium carboxymethyl cellulose.[8][10]



11.2Colouring agents

Aid in the identification and differentiation of pharmaceutical products. Assist in aligning the appearance of formulations with their corresponding flavors. Provide visual appeal, enhancing patient acceptance of the product.

Types of coloring agents

- Natural colors

These colorants are derived from natural sources and can also be synthesized, such as β-carotene and lycopene.

- Mineral Colors

Mineral colors, like blends of ferric oxides (primarily red and yellow), yield flesh tones.

- Dyes

These are synthetic chemical compounds that impart color when fully dissolved in appropriate solvents like glycerin or propylene glycol. They typically contain 80 to 93% pure coloring agents. Examples include crystal violet, safranin, and methylene blue.

- Lakes

Lakes are formed when aluminum salts of FD&C hydrophilic dyes are applied to an alumina substrate. Lakes can also be made using calcium salts of FD&C dyes, which are permitted for use.[7]

11.3Flavouring agents

Flavoring agents help mask the bitter taste of products and provide pleasant odor, thereby enhancing patient compliance. There are five categories of flavoring agents:

- Acidic (e.g., orange, lemon, cherry)
- Alkaline (e.g., vanilla, chocolate, mint)
- Bitter (e.g., orange, fennel, lemon)
- Metallic (e.g., grape, berry)
- Sweet (e.g., honey, chocolate, raspberry, mastic, mint).[21]

11.4Preservatives

Jellies are primarily aqueous, making them susceptible to microbial growth. While cellulose derivatives and clay can inhibit microorganism proliferation, preservation is essential to address any incompatibilities between chemical components and other excipients, such as gelling agents, which impact product shelf life. Common preservatives used in jelly formulations include methylparaben, propylparaben, benzoic acid, benzalkonium chloride, and chlorhexidine acetate.[27]

11.5Solubilizers

Solubilizers, such as surfactants, are excipients added to pharmaceutical formulations to improve the solubility of poorly soluble drugs, thereby enhancing the bioavailability of the active pharmaceutical ingredient (API).

Examples include Cremophor RH40, PEG 400, Propylene Glycol, and Sorbitol.[4]

11.6Stabilizers

Stabilizers are typically added to preserve the essential characteristics of formulations and prevent incompatibilities throughout the product's shelf life. Commonly used stabilizers include propylene glycol and sorbitol. Chelating agents, such as EDTA, can also be employed to mitigate incompatibilities between the drug and other formulation components.[30]

12. Preparation of jelly

1. All ingredients will be accurately weighed.
2. In one beaker, a sugar syrup will be prepared by adding 67.7 grams of sugar and adjusting the volume to 100 ml.
3. The gelling agent will be added to this solution while stirring continuously and heated until fully dissolved to achieve the desired consistency.
4. Once the gelling agent is completely dissolved, the stabilizer and citric acid will be incorporated,

followed by further stirring to enhance the jelly's softness and maintain pH, then boiled for a few minutes.

5. After boiling, the preservative will be added, and the mixture will be thoroughly and uniformly combined.
6. The drug will be accurately weighed, dissolved in an appropriate vehicle, and added to the mixture before the jelly begins to set, ensuring thorough mixing.
7. The entire solution will then be poured into molds and allowed to cool and set undisturbed, properly covered to prevent exposure to the external environment.[17][15]

Figure 3: Few pictures of prepared jellies.[22]

13. Evaluation of jellies

13.1General appearance

The texture and clarity of the soft gel were assessed by gently rubbing it between two fingers, evaluating for stickiness and grittiness. Consistency and odor were also examined through physical observation.[29]

13.2Rheological measurement

The viscosity of all batches of soft gels was determined using a Brookfield DV-II+ Pro viscometer. The soft jelly containing drug was extracted from a polyethylene plastic bag by cutting a uniform opening, and the viscosity was measured with spindle LV4 at 50 rpm at room temperature. Measurements were conducted in triplicate, using a fresh sample each time.[20]

13.3Weight variation

To determine the weight variation of formulated jellies, average weight of 10 individual jellies was found by taking them out of the molds.[26]

13.4pH Determination

The pH of the prepared jellies was measured at room temperature (25°C ± 5°C) using a digital pH meter. To do this, a unit dose of jelly was dissolved in 25 ml of distilled water to create a 1% solution, and the pH was recorded.[1]

13.5Taste and Palatability

The evaluation was conducted with a trained panel of six healthy adult volunteers aged 20 to 32 years, with body weights ranging from 56 to 70 kg. The study adhered to ethical guidelines for medical research involving human participants. Bitterness was assessed immediately and at one-minute intervals up to ten minutes.[11]

13.6Spreadability

The spreadability of the jelly was assessed by placing it between two glass slides and applying a weight of 1000 g for 5 minutes to achieve a uniform thickness. The spreading area of the jelly was then calculated using the formula ($A = \pi * r^2$), which represents the area of a circle.[24]

13.7Drug content

To determine the drug content, ten jellies were collected and crushed. An amount of gel equivalent to weight of drug was dissolved in a 100 ml volumetric flask containing a buffer at pH 6.8, and the final volume was adjusted to the mark. Suitable dilutions were then prepared, and the absorbance was measured at 284 nm using a UV/Visible double beam spectrophotometer.[18]

13.8Syneresis

Syneresis refers to the shrinking of a gel during storage, leading to the separation of water from the gel. This phenomenon is more noticeable in gels that use lower concentrations of gelling agents. All jelly samples were monitored for signs of syneresis at room temperature (25 °C ± 5 °C) and at 8 °C ± 1 °C.

13.9In vitro dissolution testing

In vitro dissolution was conducted using the USP 28 Dissolution Apparatus II (Electrolab Dissolution Tester) in a 6.8 pH phosphate buffer (900 mL, maintained at 37°C ± 0.5°C) as the dissolution medium, with stirring at 50 rpm. Samples of 10 mL were withdrawn at 5, 10, 15, 20, 25, 30, 40, 50, and 60 minutes using a prefilter. Each withdrawn sample was replaced with an equal volume of buffer solution to maintain a constant volume throughout the test. The amount of drug dissolved was quantified using a calibration curve at determined wavelength (Lambda max) after appropriate dilution. The percentage

of drug released at 30 and 60 minutes was calculated based on the dissolution data.[23]

13.10 Stability studies

For the stability studies, the chosen jelly formulation was wrapped in aluminum foil, placed in a high-density polyethylene container, tightly sealed, and stored at room temperature (25°C ± 5°C) and at 40°C ± 2°C with 75 ± 5% relative humidity for 90 days, following International Conference on Harmonization guidelines. At the end of the 90-day period, the samples were evaluated for changes in physical parameters such as appearance, pH, drug content, and in vitro studies. A freshly prepared sample served as a reference standard for comparative evaluations.[13]

14. Packaging and Molds for jellies

There are various types of molds used for producing jelly, including plastic, silicone, floral, copper, and chocolate molds. Molds for jelly formulations are illustrated in Figure 3, while packaging materials are depicted in Figure 4.

To prevent incompatibilities, jelly should be stored in glass containers or plastic containers and pouches. A simple paraffin seal is insufficient for preventing spoilage. Hot jelly can sterilize the container itself, eliminating the need for pasteurization.[10]

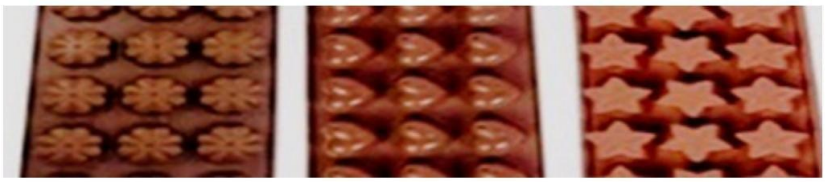


Figure 3: Moulds for jelly formulations

Figure 4: Packaging of jelly formulation [10]

15. Applications

- Pediatric and elderly patients who struggle with swallowing or chewing solid medications.
- Patients at risk of choking.
- Elderly individuals who are unable to swallow a daily dose of antidepressants.
- An eight-year-old with allergies seeking a more convenient option than antihistamine syrup.
- Patients who do not have access to water for taking medication.[22]

An example of marketed jelly formulation

Figure 5: Caloriemate jelly.[6]

CONCLUSION

To be concluded that oral medicated jellies are an emerging oral drug dosage form. These jellies are widely accepted by various group of population like pediatrics, geriatrics and adults having difficulty in swallowing or mastication (Dysphagia). The colourful appearance and pleasant taste and flavour of jellies attract children to consume willingly. As the drug is incorporated in well

dissolved form in suitable solvent and the jellies easily dissolve in the oral cavity and enter systemic circulation quickly, the bioavailability is highly increased compared to other conventional dosage forms. The jellies also have other large numbers of advantages like low cost of production and low market price, less side effects, by passing hepatic metabolism, rapid onset of action and good mouth feel. The jellies have both solid and liquid properties and there is no need of water while ingestion which is beneficial for persons who have no access to water or traveling. Thus, the oral medicated jellies are a novel, acceptable and beneficial oral drug delivery system which has gained enough reputation in pharmaceutical industries and pharmacists.

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