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The Science Behind Soothing Pastilles

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Abstract: *Pastilles are small, sweet, chewable, medicated or non-medicated dosage forms designed to release active ingredients slowly in the mouth for local, releasing active ingredient or systemic benefits. The pastilles can be medicated, such as for having a sore throat, mouth infection, and drugs for cough, or non-medicated, such as with herbal extracts or the vitamins. With a history dating back to ancient times, food products and pastilles have evolved into a popular delivery system for pharmaceuticals and Nutraceuticals. This abstract provides an overview of pastilles, including types, applications, disadvantages and advantages, formulations, and the evaluation. There are mainly two types of pastilles: medicated pastilles, containing APIs for therapeutic activity, and non-medicated pastilles, containing natural ingredients, minerals, or vitamins and some or the Common Pastilles ingredients are include such as acacia ,gum, glycerine, flavour ,and gelatin Pastilles are commonly prescribed for conditions such as throat pain management, oral infection, smoking cessation, and nutritional deficiencies. They help to hold the shape, add taste, and make the medicine dissolve slowly. Pastilles include the advantages and disadvantages of pastilles, including ease of administration, local and systematic effects, bioavailability, pleasant taste and texture and prolonged use. In conclusion, pastilles are the simple, patient-friendly, and safe dosage form used for the mild and local systematic action. Pastilles are popular in treating sore throats, minor mouth problems, and coughs.*

Keywords: *Pastilles*

I. INTRODUCTION

Medicinal pastilles are derived in ancient remedies where they are used for therapeutic activities, primarily to treat throat and digestive infections. In the 19th century, these pastilles come into more commercialized versions, typically made of medicinal herbs, soothing derivatives and sugar for ease of consumption. By the mid-1800s, some known brands like Grateers Pastilles became very important for their healing properties. By that time, these pastilles was manufactured with additional ingredients to improve taste and efficacy ,making them popular in all over worldwide as soothing pastilles Today, pastilles are usually used in a variety of medicinal forms, ranging from throat lozenges to those intended for digestive health.[1] [2][3]

Over the centuries, pastilles, medicated sweets and troches have evolved in both form and function. In ancient times, they were made in the form of honey and herbal extracts to soothe throat and digestive discomfort and gum bases. These preparations gradually incorporated refined sugar and flavouring agents to improve both stability and palatability. A historical overview from the Royal Pharmaceutical Society explains how mouth-dissolving tablets, or lozenges (from the French word "lozenge"), and pastilles were created as "pleasant oral presentations" designed to dissolve slowly in the mouth, allowing the medicine to gently soothe and coat the active medicament to bathe irritated mucosal surfaces.[4]

An important example of a pastille-brand with deep historical roots is Grater's Pastilles. This product came around 1850 in England under the name of Allen burys Pastilles, derived from black current juice by the London-based firm Allen & Han bury Ltd. The brand then migrated its production and identity to Switzerland when Donetsk Greeter AG

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acquired the rights and renamed the product in 1974. Today the distinctive gold tin remains iconic style and the formulation regain its high-quality, soothing throat compounds. [5]

Over these years, the manufacturing of Greeter's Pastilles has come across its original recipe from 1850, and still continues to explore craftsmanship, high-quality natural ingredients, and advanced processing. For example, the production site in Altman on Lake Constance (Switzerland) uses vegetable glycerin, agar-agar from red seaweed, and sun-ripened berry and flower essences — and the pastilles still mature for around three months in climate-controlled chambers prior to sale. [6][7]

The word "pastille" derived from the Latin word "pastille" meaning "a lump of meal" or "bread," which is also the meaning of the word "pastry". A pastille was originally a pill- shaped lump of compressed herbs, which was burnt to release its medicinal properties. A pastille is a type of sweet or medicinal pill made of a thick liquid that has been solidified and is meant to be consumed by light chewing and allowing it to dissolve in the mouth. A Pastille is also known as a semi solid compound which is a medicated pastille that dissolves on mouth like sweets. [8]

Pastilles, or medicated lozenges, have retained attention as a promising drug delivery system due to their comfortable administration to the individual, palatability, and efficacy for controlled drug release .[9]

Principles of Pastilles:

Pastilles provide an efficient, cost effect process for continuous converting of molten product into uniform, round and dust free granules ideal for bagging, transporting and bulk material handling system. The size of pastilles is 1-25 in diameter and viscosities is 5-30,000 m Pas. [10]

Pastilles are made up of pouring a thick liquid into a powdered, sugared, or waxed mold and then allowing the liquid to set and dry. The substances contained in the dried liquid are slowly released when chewed and allowed to dissolve in the mouth and absorb by mucus membrane of oral cavity or in Gastro intestinal tract. Due to oily nature of these active substances, pastilles are usually based on mixture of starch and gum Arabic, which emulsifies the substance and bind them in a hydro colloidal matrix. The starch and gum also reduces the rate in which the pastilles dissolve and moderates the amount of active substance delivered at a time. [11]

ADVANTAGES OF PASTILLES

- Pastilles is the increase the retention time of the dosage form in oral cavity which is increase bioavailability, reduce gastric irritation and bypass first pass metabolism
- Pastilles provide palatable means of dosage form administration and enjoy its position in pharmaceutical market owing to its several advantages but it suffers from certain disadvantages too.
- 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. [12]
- Avoid first pass metabolism, thus increase in bioavailability can be used for purpose of both local and systemic effect through buccal mucosa.
- It offers better patient compliance and can be given to those patients who have difficulty in swallowing.
- Easy to manufacture and store.
- Medicated pastilles also have drawbacks like non-ubiquitous distribution of drug within saliva for local therapy and possible draining of drug from oral cavity to stomach along with saliva. [13]

Limitations of the Pastillation technology

This technology is particularly applicable to carries of low melting point which melt and are capable of re-solidification at room temperature i.e. lipids, waxes and macrogols. In addition, as the fabrication process involves the use of temperature for melting the excipient, the drug being incorporated should not be degraded processing, i.e. it must be thermo stable in the processing temperature range. [14]

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Fig: 1 Pastllies

Process of Pastillation:

The crystallization and deformation of drops on a cooled substrate is examined to achieve the desired size and shape of the product and to predict the required crystallization time. As example a bisacodyl melt is chosen. The crystallization occurs immediately after the deformation. The rule of the contact angle of the drop on a substrate is investigated by different experimental variables. The static contact angle is increased with increasing degree of surface roughness. It is, however, decreased with increasing Reynolds number and degree of sub cooling. The phenomenon of spreading and rebounding of drops is observed and used to discuss the deformation process. Madejski's model predicts the degree of deformation. It is increased with increasing Reynolds number. Using a simple drop solidification model allows to numerically study the degree of deformation based on the achieved experimental data. To estimate the normalized deformation and crystallization times, which are found to be proportional to the Reynolds number to the power of 1.23 the numerical study can also be used. On basis of the crystallization time the solidification equipment can be designed. [15]

Good Pastilles Required a Number of Characteristics

1. Uniformity of compound: Each pastille should contain a uniform and accurate amount of active ingredient to ensure consistent dosage and gives therapeutic effect. [16]
2. Pleasant Taste and Mouth feel; Since pastilles dissolve slowly in the mouth, they should have an agreeable flavor and smooth texture to enhance patient compliance. [17]
3. Appropriate Hardness and Consistency; The pastilles should be stable enough to fix their shape but not too hard to dissolve in comfortably in the mouth. [18]
4. Controlled Dissolution Rate; Pastilles should dissolve slowly, releasing the drug gradually for sustained to give local therapeutic action. [19]
5. Stability; The formulation will remain stable against temperature, humidity, and microbial contamination to maintain efficiency. [20]

TYPES OF PASTILLES:

Types of pastille	Base used	Purpose /Use	Examples
Gelatin based pastilles	Gelatin and glycerin	Soothing throat,cough relief	Glycerin -gelatin pastilles, cough lozenges
Gum based pastilles	Acacia (Gum arabic) or Tragacanth	For slow drug release and smooth texture	Gum acacia pastilles, herbal gum pastilles
Pectin based pastilles	Pectin (fruit- derived polysaccharide)	Used for vegetarian formulations	Vitamin C pectin pastilles, herbal pectin pastilles
Sucrose based pastilles	Sugar (Sucrose) and glucose syrup	Sweet, palatable, for mild formulations	Candy type Vitamin pastilles
Gelatin pectin combination	Gelatin + pectin	Better consistency and stability	Herbal or multivitamin soft

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pastilles			pastilles
Agar based pastilles	Agar agar (from sea weed)	Suitable for heat stable formulations	Herbal agar pastilles
Synthetic polymer based pastilles	Polyvinylpyrrolidone(PVP) or cellulose derivatives	Controlled release, improved stability	Nicotine pastilles, drug delivery pastilles

APPLICATIONS OF PASTILLES

Social Applications:

- Better patient Acceptance: -pastilles gives a pleasant taste and it is easy to use. It is very helpful for children's, adults, and elders, and to the patients who feels difficult in swallowing the tablets
- Improved drug Absorption: the medicine can be taken through buccal cavity, and increases bioavailability and metabolism gives fast therapeutic effects
- Gentle on the stomach:-pastilles dissolve in mouth but not in digestive tract and also helps lo reduce gastrointestinal discomfort.
- Dual therapeutic action: It can provide both local relief such as sore throat and delivery of active ingredient for therapeutic benefits
- Accessible self care option: many pastilles are found including vitamins, herbal extracts, and soothing effects, that helps in easy for self treatment.

Industrial Applications:

- Pharmaceutical Industry: Used in formulating of new drugs that requires a prolonged retention into the oral cavity, enhancing drug efficiency and patient consumption.
- Food and Confectionery Industry: involved in the production of medicated candies, lozenges, and essential foods enriched items containing vitamins, minerals, and herbal extract compounds..
- Cosmetic and Personal Care Industry: Introduced into products such as breath fresheners, oral hygiene supplement activities, and therapeutic lozenges.
- Veterinary Medicine: Utilized for administering drugs to animals in a more acceptable and palatable form.
- Chemical Industry: Employed in controlled-release which is essential for industrial chemicals, such as slow-dissolving cleaning agents and air fresheners. [21,22,23]

COMPOSITION/EXCIPIENTS:

In addition to the herbal powders, the following excipients were used in the preparation of the polyherbal pastilles:

Glycerin: it maintain the moist and softness, it gives smooth texture of pastilles. [24]

Honey: it gives natural sweetness and also have therapeutic benefits - it softs and heals that makes suitable for oral care formulations. [25]

Orange Oil: Used as a flavoring agent to enhance the palatability of the pastilles. [26]

Purified Water: it helps during manufacturing process, maintains moisture. it also helps to supply for all the components during manufacturing of pastilles.

Menthol: provide therapeutic action such as soothing sore throat or delivering vitamins. [27]

Tartrazine: provide attractive appearance and help in identification. [28]

Sodium benzoate: prevent microbial growth in moisture containing pastilles

Ascorbic acid: protect ingredients from oxidation and prolong self stability

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MANUFACTURING:

METHODS OF PREPARATION OF PASTILLES:

Small Scale Methods

Fabrications Techniques;

A laboratory-scale device was custom-designed for producing pastilles. The apparatus included a glass syringe with a stainless steel plunger, metallic hypodermic needles, a metal plate, a heating coil, and a 1.5A transformer. The heating coil was wrapped around the exterior of an open-ended ceramic tube and coated with a thick layer of ceramic clay for insulation. It was then connected to the transformer and powered by electricity. The syringe, fitted with a hypodermic needle, was inserted into the ceramic tube, and this setup was positioned above the metallic plate using a burette holder. To facilitate cooling, the metallic plate was placed over an ice tray containing ice cubes.

The drug and necessary excipients were added to a lipid/PEG melt and heated to 140–150ºC while being manually stirred until a clear, homogeneous mixture was obtained, ensuring uniform drug distribution. Once solidified, the pastilles were scraped off using a sharp metallic scraper and manually filled into size '0' capsules.

Rollosizer MI;

Delivering all the benefits of standard rot form system but on a small scale, the rot form MI (mini) is ideally suited to use in laboratory testing operations to define quality, production rates and other key parameters of products in the development stages. System capacity depends on the product being processed and can be up to 20 kg/h. product with viscosities from 10 – 5000 mPas can be handled successfully.

Fig: 2 Manufacturing of pastllies

Large Scale Method;

The ZN system: The ZN system, the predecessor of the "DN" from KAISER, was introduced in 1953, making it the first-ever pastillation process. It works with a drop-forming principle, achieved by the up-and-down motion of the needle within the nozzle. The size of the pastilles is mainly influenced by the needle and nozzle diameter, the liquid level inside the tub, and the number of needle strokes.

The GS System

The system was made for products with medium to high viscosities. In contrast to the ZN method, a cylinder and piston combination is used in place of the needles. The molten product may be placed onto the belt to create uniform pastilles thanks to the cylinder and piston's up-and-down action.

Rollomat

The Rollomat system accommodates the widest range of viscosities among all rotating pastillators. Its rotary depositor operates on a principle similar to that of a gear pump. At the importance of this system is a larger, hollow inner cylinder, which interacts with a pressing roll that engages with its teeth. The product is fed with a controlled rate by the plug-in lance, flowing into the rotating pressing roll, where it becomes sandwiched between the outer cylinder and the inner pressing roll. Each time the teeth of the hollow cylinder engage with those of the pressing roll, the product is pushed through the nozzle and onto the cooling belt. The Rollomat also described a heated product scraper, ensuring the outer surface of the cylinder remains clean as it reaches the drop-off point.

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Rollosizer

The Rollosizer, is the latest advancement in rotating pastillation technology, complements the existing pastillation systems by enabling or keeping high-capacity production with low-viscosity products in a single unit. The design of the KEISER-Rollosizer incorporates several advantageous features from the KEISER-Rollomat, which has been successfully used in various operations for many years.

The drop-forming principle works on a static, heated cylinder equipped with an inner product channel and tubes for the heating medium. Using a specialized product distribution bar, the product flows onto the cooling belt through perforations in the cylinder. Pastilles are formed as the holes in the product distribution bar align with those in the rotating cylinder, allowing precise drop formation.

EVALUATION OF PASTILLES:

The formulations of poly herbal pastilles are taken from different physicochemical factors for quality, safety, and effectiveness. The conducted tests are given below.

Organoleptic Evaluation

The organoleptic properties are derived from poly herbal pastilles—including color, taste, shape, and surface texture—were granted by visual and versatile inspection. Observations were made on randomly selected samples under natural light conditions.

Physicochemical Evaluation

Friability Test

The friability test was conducted to assess the mechanical strength of the pastilles and their ability to withstand stress during handling. Randomly 10 selected pastilles were weighed accurately and placed in a Roche fabricator. The drum was rotated at 25 rpm for 4 minutes (100 revolutions). [29] After the test, the pastilles were dedusted and reweighed. The percentage friability was calculated using the formula.

Friability (%) = [(Initial Weight – Final Weight) / Initial Weight] × 100

Hardness Test

Hardness of the pastilles was measured using a Monsanto Hardness Tester. Three randomly selected pastilles were tested. The load required to break each pastille was noted in kg/cm². The values indicate the mechanical strength and ability of pastilles to withstand pressure without breaking.

Weight Variation Test

Weight variation was assessed by individually weighing 10 randomly selected pastilles using a digital analytical balance. The mean weight and individual deviations from the mean were calculated. The test ensures uniformity of weight among the dosage units.

Thickness Test

The thickness of the pastilles was measured using a Vernier caliper. Five pastilles were selected randomly, and the thickness was measured in millimeters to ensure uniformity and proper dose distribution.

Ph Determination

The pH of the polyherbal pastilles was determined by dissolving one pastille in 20 mL of distilled water. The solution was stirred gently, and the pH was measured using a calibrated digital pH meter.

Moisture content Determination

Moisture content was evaluated by the weight loss on drying method. The initial weight of the pastilles was recorded, and they were subjected to drying at a controlled temperature. The samples were weighed at successive drying stages until constant weight was achieved. The percentage moisture loss was calculated to assess stability.

Disintegration Test

The disintegration test was performed to determine the time taken for the pastilles to break down in the buccal cavity. The test was conducted by placing the pastille in phosphate buffer (pH 6.8) and observing the time required for complete disintegration. The disintegration time is critical for determining the release rate of active constituents.

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Dissolution Test

The dissolution profile was assessed using a USP Type II (paddle) dissolution apparatus. The test was carried out in phosphate buffer (pH 6.8) at 37 ± 0.5 °C with a rotation speed of 50 rpm. Aliquots were withdrawn at specific time intervals (5, 10, 15, 20, 25, and 30 minutes) and analyzed spectrophotometrically to determine the percentage of drug dissolved.

MARKETED EXAMPLES:

S.NO	BRAND NAME	COMPANY	STRENGTH	COST
1	Strepsils	Reckett benckiser	Amylmetacresol 0.6mg +Dichlorobenzyl alcohol 1.2mg	35-50 rupees(pack of 6)
2	Vicks cough drops	Procter an gamble	Menthol 1.5mg ,Eucalyptus oil,Flavours	30-40 rupees(pack of 10)
3	Grethers pastllies	Doetsch grether AG	Glycerin, Elderflower or Blackcurrant extracts	700-900 rupees(pack of 60g)
4	Fishermans friend	Lofthouse of Fleetwood ltd	Menthol 10mg, Eucalyptus oil	150-250 rupees(pack of 25g)
5	Vocalzone pastllies	Kestrel medical ltd	Menthol,Myrrh tincture,peppermint oil	300-400 rupees(pack of 24)
6	Ricola herbal pastllies	Ricola AG	Herbal extracts(lemon balm,thyme, peppermint oil,etc)	250-350 rupees(pack of 45g)
7	Niclonz 4mg pastllies	Intas pharmaceuticals ltd	4mg nicotine	67 rupees(pack of 10)

RECENT RESEARCH /ADVANCES:

Pastilles — also called lozenges or medicated lozenges — have been used for local therapy in the throat/oral cavity and for slow-release effective delivery through the buccal mucosa. In the last 3–5 years research has turned from simply making pleasant-tasting making throat sweets to engineering pastilles as uneffectively designed drug-delivery systems: muco adhesive local platforms, controlled-release carriers using nanoparticles or polymer matrices, personalized dosage forms through 3D printing/hot-melt extention and a used in poly herbal and sugar-free formulations to retain modern safety and compliance demands. Recent literature information and experimental studies of the document was going through each of their directions and their practical challenges. [30]

Mucoadhesion and site-targeting:

The intention of making pastilles of mucoadhesion, so it gives long action this increases the drug concentration and reduces system exposure. The research is testing natural and synthetic mucoadhesive polymers like carbomers, chitosan to extend time on vuvval cavity and local release of antimicrobials, and antiseptic. Mucoadhesive can improve conditions like oral and local infections and overcoming salivary wash out. There are various examines on mucoadhesive oral carries meachanism and clinical potential. [31]

Nano- and micro-encapsulation for controlled release:

Another active place is using nanoparticles, microparticles, or solid dispersions are combined inside the pastille matrix to control drug release kinetics, protect sensitivity actives (e.g., peptides, herbal actives) and improve solubility of poorly water-soluble drugs. Studies show liposomes, polymeric nanoparticles, and nanoemulsions can be introduced into chewing or dissolving compound to achieve sustained and enhance release profiles and good bioavailability. This strategy is being used both for local antioxidant/antimicrobial action and to create semi-systemic buccal delivery systems that bypass first-pass metabolism. Patents and experimental documents demonstrate activity for nutrient and drug enhanced-release devices which are using nanoparticulate hydrogels and polymer compounds. [32]

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Advanced manufacturing — HME and 3D printing:

Manufacturing innovation is accelerating formulation possibilities. Hot-melt extrusion (HME) — a free solvent, continuous process — is being owned to produce homogeneous pastille/lozenge intermediates or drug-loaded extracts used to design chewable or slowly dissolving pastilles, particularly for slowly soluble drugs where amorphous dispersions improve drug release. Separately, 3D printing (semi-solid extrusion, selective laser sintering and related methods) has demonstrated from proof-of-concept to freely small-batch production of designed pastllies and gummies: printing allows complex internal geometry, porosity control (which solves dissolution), multi-drug layering and pediatric-friendly shapes/strengths for customised dosing. Recent review demonstrated 3D-printed chewing lozenges and sublingual/sublingual printlets — a clear path towards the on-demand, patient-consumption pastilles. [32]

Polyherbal, sugar-free and taste-masking trends:

The clinal choice of shifting sugar free or low calorie to reduce calories and polyherbal pastilles for respiration and throat relief. The polyherbal pastilles focusing on mixing of traditional actives like tulasi, honey, clove, eucalyptus. Standardization of modern excipients.

Taste masking like bitter APIs coating and complexation is important, because accepting the complications for pediatric and geriatric patients. Different manufacturing balancing the retention with pleasent mouth which should feel fresh by using sweetning agents and excipients. [33]

Regulatory, safety and practical challenges:

Although translations have promising lab outcomes, there are a number of obstacles to translation. Mucoadhesive material should be found to be safe in chronic oral contact or buccal tablets should be found to be totally safe in long-term contact with the oral tissues. These are questioned by local toxicity, absorption and scale-up of manufacture of the embedding nanoparticles. In case of the modern technology such as the Hot Melt Extrusion (HME) 3D printing, dose uniformity, and stability in real life, active research, regulatory issues and process validation are in action. The regulatory reviews, and dedicated articles place an emphasis upon the requirement that the residence time, dissolution in simulated saliva, and the bioadhesion metrics be standardised in testing. [34]

Where research is headed (near future):

Targeted local therapies: They are Clinically tested mucoadhesive pastilles or buccal tablets are being developed for treating throat, oral, and periodontal infections and oral-throat infections to reduce systematic antibiotics. Personalised dosage forms: small-batch 3D-printed in medicated pastilles or in pharmaceutics or hospitals to tune dose, taste and release for geriatrics/ paediatrics. Hybrid controlled-release system: They're Combinations of polymer matrices and gum matrices to achieve multi-phase or nanoparticulate carriers embedded in chewable pastilles for multi-phase or extended drug release. Cleaner and sustainable manufacturing: They are the wider adoption of solvent-free Hot Melt Extrusion (HME) and greener processes for scale-up and reproducibility.

II. CONCLUSION

Pastilles defines as a simple, effective, and patient-friendly dosage form that has derived from ancient herbal methods and advanced pharmaceutical delivery systems. Their ability to provide both local and systemic therapeutic activities through slow dissolution in the oral cavity makes them a refereed choice for treating throat infection, cough, and oral infections, as well as it is used for delivering vitamins and herbal nutrients. The use of natural excipients like gum acacia, gelatin, glycerin, and honey stimulate their texture, taste, and stability, enhancing better patient compliance, especially in pediatric and geriatric populations.

Modern developments in pastille formulation have extended their efficiency more than conventional throat lozenges. With some innovations such as mucoadhesive polymers, nano-encapsulation, and controlled-release technologies, pastilles are now being explored all over the world for targeted drug delivery, providing sustained therapeutic activity and improved bioavailability while bypassing first-pass metabolism. Advanced manufacturing techniques like Hot Melt Extrusion (HME) and 3D printing which gives precise dose design availability, improved uniformity, efficacy and eco-friendly compounds. However, challenges remain effective for the stability of thermolabile drugs, enhancing consistent drug distribution, and proceeding long-term safety for oral contact compounds. Despite the limitations, research

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continues to introduce new pastille formulations to enhance therapeutic activities, patient acceptability, and regulatory activities.

In conclusion, pastilles have successfully improved the gap between traditional medicine and modern pharmaceutical innovation. The versatility, and adaptability of the drug delivery technologies ensure enhancing importance in both the pharmaceutical and nutraceutical industries.

REFERENCES

[1]. Lozenges and Pastilles – Information Sheet" by Royal Pharmaceutical Society: https://www.rpharms.com/Portals/0/MuseumLearningResources/04%20Lozenges%20and%20Pastilles.pdf Royal Pharmaceutical Society

[2]. A Review on Lozenges in Pharmaceutical Field Globally" (Indian Journal of Pharmacy & Pharmacology): https://ijpp.org.in/archive/volume/12/issue/2/article/23524/pdf Indian J Pharmacol.

[3]. Lozenges Formulation and Evaluation: A Review": https://www.researchgate.net/publication/305748457_LOZENGES_FORMULATION_AND_EVALUATION_A_REVIEW.

[4]. Lozenges and Pastilles – Royal Pharmaceutical Society Information Sheet. https://www.rpharms.com/Portals/0/MuseumLearningResources/04%20Lozenges%20and%20Pastilles.pdf?ver=2020-02-06-154121-943.

[5]. History of Grether's Pastilles https://www.grethers.ch/en/grethers/history.

[6]. Hgredients page: https://www.grethers.ch/en/grethers/ingredients — describes use of vegetable glycerine, agar-agar from red seaweed, and natural fruit juices. Grether's.

[7]. Production page: https://www.grethers.ch/en/grethers/production — states production in Altnau on Lake Constance, Switzerland, uses high-quality natural ingredients and that pastilles

[8]. http://en.wikipedia.org/w/index.php?title=Pastille&oldid=1033744702R.

[9]. Modyala D, Aparna C, Srinivas P. Formulation, evaluation and characterization of itraconazole lozenges. IOSR J Pharm Biol Sci. 2014 May;9(3):86-94.

[10]. http://kaiser-pbt.de/en/services/process-technologies/pastillation/

[11]. http://en.wikipedia.org/w/index.php?title=Pastille&oldid=1033744702

[12]. Frank Ridgway, Michael D. Ward, Antifungal pastilles formulation and method, Patent, 1f February 1998

[13]. Suchitra Pundit, Abhay Maruri Lal Verma, Journal der Pharmazie Forchung, Review in Lozenges, Review Article, 01 October 2014

[14]. Dali Shukla, Subhasis Chakraborty, Sanjay Singh, Powder technology, Pastillation: A novel technology for development of oral lipid based multiparticulate controlled release formulation, Research article, may 2010.

[15]. Prof. Dr.-Ing.habil. Joachim UIrich, prof. Dr. habil. Karsten Mader, Manufectured and Characteristics of Pastilles and their coating by crystallization process, Research, 15 December 2003.

[16]. Gupta R, Dayal G. Pastilles: A novel approach in drug delivery system – A Review. Int J Res Anal Rev (IJRAR). 2022; 9(3): 45–52. https://www.ijrar.org/papers/IJRAR22B3180.pd.

[17]. Choursiya S, Andheriya D. Review on Lozenges. J Drug Deliv Ther. 2018; 8(6-A): 17–23.

[18]. H. Vinutha SR, Yoganada NM, Maruthi TS, Nagaraja S, Snehalatha. A comprehensive review on lozenges in healthcare. Int J Pharm Pharm Res. 2024; 14(10): 120–128. https://ijppr.humanjournals.com/wp-content/uploads/2024/10/9.Vinutha-S-R-Yoganada-N-Maruthi-T.S-Nagaraja-Snehalatha-.pdftps://jddtonline.info/index.php/jddt/article/view/2300.

[19]. Gopale O, Jethawa S, Shelke S. Medicated Lozenges: A Review. Asian J Pharm Res Dev. 2022; 10(2): 28–34. https://ajprd.com/index.php/journal/article/view/1055.

[20]. Porwal U, Sharma N. Review on lozenges in pharmaceutical field globally. Indian J Pharm Pharmacol. 2025; 12(2): 67–73. https://ijpp.org.in/archive/volume/12/issue/2/article/23524/pdf

[21]. http://kaiser-pbt.de/en/services/process-technologies/pastillation/

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 4, December 2025 Impact Factor: 7.67

[22]. Prof. Dr.-Ing.habil. Joachim UIrich, prof. Dr. habil. Karsten Mader, Manufectured and Characteristics of Pastilles and their coating by crystallization process, Research, 15 December 2003.

[23]. Pund sopan, Mahajan Nilesh,Gangane purushottam, Journal of Drug Delivery and Therapeutics, Enhancement of solubility of Declofenac Sodium by Pastillation method, Review Article, 05 Jun 2021.

[24]. https://pmc.ncbi.nlm.nih.gov/articles/PMC7009851/Re-evaluation Mortensen A., Re-evaluation of glycerol (E422) as a food additive. EFSA/academic review. 2017.

[25]. Tashkandi H., Honey in wound healing: An updated review. 2021. (Review, PMC full text). https://pmc.ncbi.nlm.nih.gov/articles/PMC8496555/.

[26]. Favela-Hernández JMJ et al., Chemistry and Pharmacology of Citrus sinensis — review. 2016.

[27]. https://pmc.ncbi.nlm.nih.gov/articles/PMC6273684/.

[28]. Pergolizzi Jr JV et al., The role and mechanism of action of menthol in topical analgesia (PubMed summary).2018 https://pubmed.ncbi.nlm.nih.gov/29524352/.

[29]. Rahnama H. et al., Identification of tartrazine adulteration and evaluation studies (2022)

[30]. https://pmc.ncbi.nlm.nih.gov/articles/PMC9632219/.

[31]. M. P. Subash Chandran, G. P. Prasobh, P. Aparna, T. S. Arun, Ninan S. S. Saranya. An overview on medicated chewable lozenges. International Journal of Research in Pharmaceutical and Nano Sciences. 2019; 8(2) 83-89.

[32]. Content available at: https://www.ipinnovative.com/open-access-journals

[33]. Indian Journal of Pharmacy and Pharmacology

[34]. Journal homepage: https://www.ijpp.org.in/.

[35]. Control Release. Author manuscript; available in PMC: 2023 Feb 25.Published in final edited form as: J Control Release. 2022 Sep 30;351:504–559. https://pmc.ncbi.nlm.nih.gov/articles/PMC9960552/?utm_source=chatgpt.com.

[36]. https://pubmed.ncbi.nlm.nih.gov/35644865/?utm_source=chatgpt.com

[37]. M. Chen, G. Quan, Y. Sun, D. Yang, X. Pan, C. Wu, J. Controlled Release 2020, 325, 163-175.

[38]. Z. Chen, J. He, J. Qi, Q. Zhu, W. Wu, Y. Lu, Drug Discovery Today 2020, 25, 1462-1468.

[39]. Anshul Kumar, Manish Kumar Mishra, Afeefa, K. S. Chandrashekar, Girish Pai, Vasudev Pai

[40]. https://www.ijpsjournal.com/article/Formulation%2Band%2BEvaluation%2Bof%2BPolyherbal%2BLozenges?utm_source=chatgpt.com

[41]. https://www.frontiersin.org/journals/drug-safety-and-regulation/articles/10.3389/fdsfr.2023.1227763/full?utm_source=chatgpt.com

[42]. "Mucoadhesive polymers in substance-based medical devices: functional ingredients or what else?" are: Barbara Vigani, Silvia Rossi, Giuseppina Sandri, and Carla M. Caramella. It was published in 2023.