



A review article on Chewable Tablets

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Abstract

Despite various drawbacks compared to alternative techniques, oral dosage forms are the most common way to take medication. One such drawback is the danger of slow absorption of the medication, which can be avoided by giving the medication in liquid form, potentially allowing the use of a lower dosage. Because they are simple to use and improve compliance, fast-dissolving drug delivery systems have recently begun to acquire popularity and acceptance as innovative drug delivery systems. Elderly folks typically have trouble taking the tablet. As an alternative, the effervescent approach, which is typically employed in preparations for quick release, can be used to develop a dosage type that can increase material dissolution and breakdown.

The oral route is currently the industry standard for medication delivery because it is thought to be the safest, most cost-effective, and most practical approach, leading to the most patient compliance. Dispersible drug delivery methods are widely utilized nowadays to increase patient compliance and bioavailability. Dispersible tablets have drawn a lot of attention over the past three decades as a preferred substitute for traditional tablets and capsules because of higher patient compliance, improved solubility, and enhanced stability profiles. Chewable tablets are a flexible dosage form with a number of benefits, including patient-centered medication delivery, ease of swallowing, the stability benefits of solid dosage forms, and oral drug delivery without the requirement for water.

Keywords: Disintegration, Fast-Dissolving, Gas Bubbles. Dispersible tablets, Oral dispersible, Chewable tablets, Effervescent Tablets

1. Introduction

Uncoated tablets are often single-layer tablets made from a single compression of granules or multi-layer tablets made from compression of granules with various compositions into parallel layers. After compression, these tablets receive little care.

Coated pills reduce dust, resulting in less cleaning effort and better worker safety. Because they are more slippery than uncoated tablets, glossy, coated tablets also have the advantage of moving through packaging lines more quickly. Uncoated papers are ideal for pressure-based printing processes like foil stamping, embossing, and letterpress. They offer a pleasing contrast between the impression and the sheet's surface. Below, many uncoated tablet types are listed.^[1,17,18]

- **Chewable tablets** dissolve and are absorbed rapidly in the stomach, offering a quick onset of action. They may come in different flavours.
- **disintegrating tablets** dissolve on the tongue. They go directly into the bloodstream and work the fastest, such as with certain anti-nausea and migraine medications.
- **Sublingual tablets** go under the tongue. They're also quick-acting; one example is nitroglycerin tablets.
- **Effervescent tablets** are dissolved in liquid and then drunk

1) Effervescent tablet: -

Scientists started learning about the chemical composition and physiological advantages of several salts, including Glauber's salt and Epsom salts, in the 17th and 18th centuries. These salts were discovered in mineral springs, which have been utilized as health spas since the Roman Empire^{[2][3]}, when people would travel to take baths in and drink mineral-rich waters for their health. These advancements prompted attempts to make the salt combinations present in these naturally occurring mineral waters using components available at the store^{[1],[4]} Effervescent Tablets explained Effervescent tablets are where the chemical reaction takes place. The acid-base reaction is relevant. Carbon dioxide is released at the conclusion^[5]

The following acids are used: tartaric, malic, fumaric, citric, and adipic. Citric acid is frequently selected for effervescent due to the citrus-like flavor. Malic acid adds a smoother taste but is pricey. Fumaric, malic, and tartaric acids are the low water-soluble substances. They can therefore be consumed in moderation^{[6][7]} Because effervescent pills are simple to take, people prefer them to other oral dose forms.

Advantages of Effervescent Tablets^{8,9}

- Administered as palatable sparkling solution
- Readily absorbed because it has to consume in solution form.
- No need to swallow tablet
- Drugs that are unstable in aqueous solution when stored shows more stable state in effervescent granules or tablets forms.
- Large amount of active ingredients can be easily incorporated

Disadvantages of Effervescent Tablets^{10,11,12}

- Cost is relatively high as compared.
- Large tablets require special packing material.
- May require more time for full dispersion.
- Should have a proper packing to protect it from humidity & temperature.
- Excipients are costly.

2) Dispersible tablet: -

The creative idea behind a quickly dispersible drug delivery system comes from the need to give the patient a traditional way to take the medication. Due to its ease of intake, lack of discomfort, adaptability, and, most importantly, patient compliance, oral administration of the formulation has recently grown in popularity^[13,14] Despite all their benefits, traditional pills rarely prove helpful in some circumstances. Due to hand tremors and dysphagia, older people have trouble swallowing typical oral dose forms^[15,16] Compared to conventional dosage forms, the bioavailability and start of pharmacological effect improve noticeably. Dispersible pills are often referred to as oral dispersible tablets, mouth dissolving tablets, rapid dissolving tablets, and fast disintegrating tablets^[17,18,19,20]

Advantages of dispersible tablets^[21,13]

- Improved patient compliance.
- Improved bioavailability.
- Patients that having difficulty to swallowing (dysphagia) the tablet can easily administered.
- They are lightest and most compact of all oral dosage form.
- Quick absorption from the g.i.t improves bioavailability and reduces unwanted effects caused by the drug. E.g. GI irritation caused by NSAID

Disadvantages of dispersible tablets [23,24]

- Drugs absorbed at specific site cannot be given in these dosage forms.
- These tablets show high friability, less hardness than conventional tablets.
- Hygroscopic properties of formulation require extra moisture protection with special packaging for proper stability and safety of the products.

3) Chewable tablet:-

Sublingual medication administration is easier to administer than other routes, and oral drug delivery allows for more design options. Sublingually administered medications with short half lives are swiftly removed from the systemic circulation. Therefore, frequent administration of these medications is necessary to obtain the intended therapeutic effect. To prevent this, oral sustained/controlled release formulations have been created in an effort to progressively release the medicine into the bloodstream while maintaining a stable drug concentration in the systemic circulation^[25]

Advantages of chewable tablets^[25,26]

- Patient convenience
- Better absorption characteristics
- Enhancing bioavailability coming about because of expanded ingestion rate, because of its disintegration or being bitten in the mouth into the increase dissolution.
- Improved understanding acknowledgment through lovely taste.
- Child friendly version

Disadvantages of chewable tablets^[25,26]

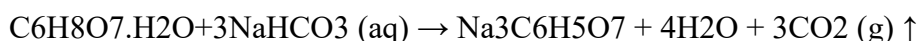
- Bitter tasting drugs are not used for formulation of chewable tablets.
- The use of more quantity flavor enhancing agent in chewable tablet may cause ulcer in the oral cavity.
- Chewing of chewable tablets in prolong times to cause the torment in facial muscles.
- The number of chewable tablets is hygroscopic in nature, so that they are kept in dry place with correct packaging



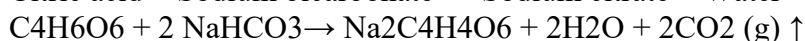
Figure 1: Effervescent Tablet



Figure 2: Dispersible Tablet

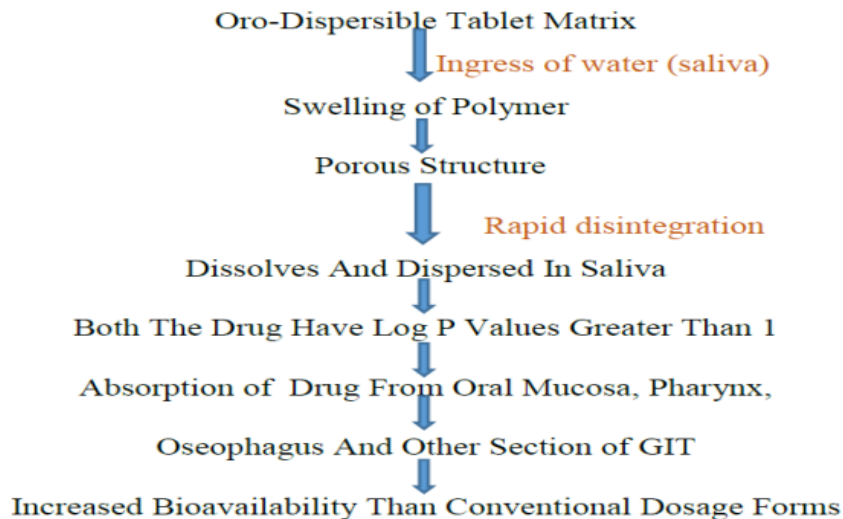
2. Mechanism of uncoated tablet**2.1. Mechanism of effervescence^[5]**

Citric acid + Sodium bicarbonate \rightarrow Sodium citrate + Water + Carbon dioxide



Tartaric acid + Sodium bicarbonate \rightarrow Sodium tartrate + Water + Carbon dioxide

2.2. Mechanism of dispersible tablet [27]



2.3. Mechanism of chewable tablets [26]

Tablets that are intended to be processed by chewing to facilitate the release of the active ingredient(s) are referred to as chewable tablets. Chewable tablets provide advantages over traditional tablets as a dose form in terms of manufacturing, dosing precision, mobility, and long-term durability. Furthermore, chewable pills make swallowing easier because the substance is first broken down into particles in the mouth..

Reason to choose chewable tablets over regular tablets:-

1. **Mechanical Strength and Disintegration time:-** Mechanical strength and Disintegration Time As it is known that by enhancing the mechanical strength of the tablet, the Disintegration Time will also rise. So a perfect collaboration is needed in between these two parameters. Usually the Disintegration Time of one minute is required in orally dispersible tablets. While doing so, holding a good mechanical strength is a major task for the formulator^[30, 31]
2. **Taste making:-** In case of orally dispersible tablets the taste masking is one of the most important factors. So, a suitable taste masking agent should be used in the formulation .Delivery systems disintegrate or dissolve in patients oral cavity, thus releasing the active ingredients which come in contact with the taste buds; hence taste masking of drugs become critical to patient compliance.^[31,32]
3. **Hygroscopicity:-** Several orally disintegrating dosage forms are hygroscopic and cannot maintain physical integrity under normal conditions of temperature and humidity. Hence, they need protection from humidity which calls for specialized product packaging.^[33]
4. **Amount of drug:-** The application of technologies used for ODTs is confined by the quantity of drug that can be added into each unit dose. For lyophilized dosage forms, the drug dose must be less than 400 mg for insoluble drugs and less than 60 mg for soluble drugs. This parameter is particularly challenging when formulating a fast-dissolving oral water or wafers.^[33,34]
5. **Aqueous solubility:-** Water-soluble drugs pose various formulation challenges because they form eutectic mixtures, which result in freezing-point depression and the formation of a glassy solid that may collapse upon drying because of loss of supporting structure during the sublimation process.^[35]
6. **Mouth feel:-** ODTs should not disintegrate into larger particles in the oral cavity. The particles generated after disintegration of the ODTs should be as small as possible. ODTs should leave minimal or no residue in mouth after oral administration. Moreover addition of flavours and cooling agents like menthol improve the mouth feel.^[36]
7. **Sensitivity to environmental conditions:-**ODTs generally should exhibit low sensitivity to environment conditions such as humidity and temperature as most of the materials used in ODTs are meant to dissolve in minimum quantity of water.^[37]

Evaluation of uncoated tablet

- Weight variation: -Twenty tablets from every batch is randomly selected to check their uniformity. These tablets are weighed individually and their avg. weight is calculated. From this average weight, percent deviation each tablet is obtained
- Tablet Thickness and Diameter:- Thickness and diameter of tablets were important for uniformity of tablet size. Thickness and diameter were measured using Vernier Calipers.
- Tablet hardness:- The resistance of tablets to shipping or breakage under conditions of storage, transportation and handling before usage depends on its hardness. The hardness of tablet of each formulation was measured by Monsanto Hardness Tester. The hardness was measured in items of kg/cm². Hardness or tablet crushing strength is the force required to break a tablet in a diametric compression. The force is measured in kg and the hardness of about 3-5 kg/cm² is considered to be satisfactory for uncoated tablets
- Friability (F):- Friability of the tablet determined using Roche friabilator. This device subjects the tablet to the combined effect of abrasion and shock in a plastic chamber revolving at 25 rpm and dropping a tablet at a height of 6 inches in each revolution. Pre weighted sample of tablets was placed in the friabilator and were subjected to the 100 revolutions. Tablets were dusted using a soft muslin cloth and reweighed. USP limit is 0.5 to 1%.
- Measurement of effervescence time:- To measure the effervescence time, one tablet is placed inside the beaker containing 200 ml of water having temperature 20 °C ± 1 °C, while placing the tablet in beaker time should be noted in stopwatch. Final time is noted when the clear solution is obtained or tablet is completely dispersed. About mean of 3 tablets should be measured of each formulation.
- Determination of effervescent solution pH:- pH of solution should be checked immediately after completing the dissolution time of tablet using pH meter. Mean of 3 measurements is taken into consideration.
- Measurement of CO₂ content:- One tablet is placed in 100ml of 1N sulfuric acid and weight changes are determined. The difference obtained is in amount of carbon dioxide (mg) in one tablet. Measurement of 3 tablets is taken into consideration.
- Moisture content:-10 tablets are dried in desiccators which contain activated silica gel and let it remain for 4 hours. Moisture content of 0.5% or less is accepted for effervescent tablets.
- Taste/ Mouth sensation:- Mouth-feel is critical, and patients should receive a product that feels pleasant. One tablet from each batch is tested for the sensation by placing the tablet on the tongue. The healthy human volunteers are used for evaluation of mouth feel. Taste evaluation is done by a panel of 5 members using time intensity method. Sample equivalent to 40 mg i.e. dose of drug is put in mouth for 10 seconds and record taste instantly and then after 10 secs, 1, 2, 4 and 6 minutes. Volunteer's opinion for the taste is rated by giving different score values i.e. 0 = good, 1 = tasteless, 2 = slightly bitter, 3 = bitter, 4 = awful 22^[38]

CONCLUSION AND FUTURE PROSPECTUS

Effervescent tablets are a good alternative to regular tablets as they are easy to administer. Elderly people or people who have swallowing problems can easily have effervescent tablets as they need to be taken after dissolving in water and need not be swallowed. The effervescent tablets have a good therapeutic effect as bioavailability is good. Nowadays supplements are manufactured more in effervescent form as can be taken easily and increase patient compatibility. Effervescent tablets not only increase ease of administration but also mask the taste of some ingredients so flavoring agents are not needed to be used. The use of effervescent tablets may decrease problems with regular tablets such as stomach compatibility. As effervescent tablets have a fast onset of action, the person administered will feel better soon. Effervescent tablets are best to mask the taste of the drug, have a quicker onset of action, good compatibility, good therapeutic effect and the best is it increases patient compliance..

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