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Mouth Dissolving Tablet (MDT): A Review

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Abstract:-

Oral route of drug administration is more accepted as 50-60% of drugs are administered via this route. Mouth disintegrating tablet is a solid dosage form containing a medicinal substance that dissolves rapidly, usually within seconds, when placed on the tongue. Orally dissolving tablets are a well-established dosage form available on the market. The many benefits it offers to patients in terms of compliance and to manufacturers in terms of enormous revenue from expanding his product line are well known. New technologies are encouraging both science and industry to develop new formulations and technological approaches in this field. The purpose of this article is to review development, benefits and challenges in prescribing, evaluation methods, and future prospects.

Keywords :- Mouth dissolving tablet (MDT) , Super disintegrants , Spray drying, Sublimation, Oral route, Direct Compression, Absorption

INTRODUCTION:-

Mouth dissolving tablet (MDT) is defined as a tablet that disintegrates and dissolves rapidly in the saliva within a few seconds without the need of drinking water or chewing. A mouth dissolving tablet usually dissolves in the oral cavity within 15 seconds to 3 min. Most of the MDTs include certain super disintegrates and taste masking agent. The oral route of administration of is the most preferred route due to the many advantages of including ease of administration, precise dosing, self-medication, pain avoidance, versatility and patient compliance. This review provides a detailed overview of the scores available in the literature to characterize MDT. These scores were developed considering the unique properties of these new drug delivery systems.

Ideal properties of mouth dissolving tablets[1,2] :-

- MDT allows a high drug load and is very well compatible.
- It also hides the taste.
- Since it dissolves easily in saliva after oral administration, it does not remain in the mouth.
- Very low cost of tablet processing and packaging.
- MDT should be insensitive to temperature and humidity.
- Not require water or other liquid to swallow

Advantages of mouth dissolving tablets[3,4,5,6,7]

- You don't need water to swallow the pills.
- With rapid drug dissolution and absorption, provides rapid onset of action.
- Pediatrics are also paying attention to the good taste.
- Safety is ensured to minimize the risk of suffocation.
- Good long-term stability.
- Rapid drug intervention.
- Accurate dosing as compared to liquids.
- Beneficial in motion sickness, sudden episodes of allergic attacks, or coughs requiring a very rapid onset of action.
- More rapid drug absorption from the pre-gastric area i.e. mouth, pharynx and esophagus which may produce rapid onset of action.

- Dissolving Oral Drug Delivery Systems' Superior Mouth feel Properties are helping to change the fundamental view of drugs.

LIMITATIONS OF MOUTH DISSOLVING TABLETS [8,9,10,11,12] :-

- Tablets usually have insufficient mechanical strength. Therefore, they should be handled with care.
- If not properly formulated, tablets may leave an unpleasant taste or grittiness in the mouth.
- Mouth dissolving tablet is inherently hygroscopic, so it should be stored in a dry place.
- Mouth dissolving tablet requires a special package for proper stabilization and security of stable products.
- Patients who continue to take anticholinergic drugs are also excluded.
- There are also additional restrictions. If the patient is suffering from a disorder such as her dry mouth, it is difficult for the patient to administer her low saliva-producing orally dissolving tablets.
- There is another problem with wording. The main feature of orally disintegrating tablets is rapid disintegration, so large doses of tablets are not properly prescribed.

Formulation of Mouth Dissolving Tablets:-

- Super Disintegrants
- Sugar Based Excipients
- Lubricants
- Flavours
- Sweeteners

Super Disintegants[13,14] :-

The use of explosives is a fundamental approach in the development of MDT. Explosives play an important role in the disintegration and dissolution of MDT choosing the right disintegrant at the optimum concentration is critical to ensure rapid disintegration and high dissolution rates. Super disintegrants provide rapid disintegration through the combined effects of swelling and water absorption by the formulation.

Example:-

- Croscarmelose sodium
- Crospovidone
- Sodium starch glycolate

Sugar Based Excipients[15,13] :-

Sugar-based excipients are used as taste-masking and bulking agents. Most bargains have an unpleasant or bitter taste. And a basic requirement for MDT development is that the drug must not have an unpleasant taste. Therefore, taste masking is required in most cases. Sorbitol, mannitol, xylitol, dextrose, fructose, etc. are mainly used. Soluble and Sweet Provides pleasant mouth feel and delicious masking. However, not all sugar-based materials have fast dissolution rates and good compressibility or compressibility. Being developed. Other commonly used ingredients are water-soluble diluents, lubricants, antistatic agents, plasticizers, binders, colorants and fragrances.

Lubricants:-

Lubricants prevent ingredients from clumping and sticking to the tablet punch or capsule filling machine. The lubricant also ensures tablet formation and ejection with low friction between the solids and the die wall.

Flavours:-

Flavorings can be used to mask bad-tasting medications and increase the patient's chances of completing the medication. Flavors can be either natural (eg. fruit extract) or artificial.

Example , Too sweet products - Vanilla may be use

Sweetners:-

Sweetners are added to make ingredients more palatable, especially in chewable tablets like for antacids and liquids like cough syrup. Therefore, tooth decay may be associated with abuse of cough syrup. Sugar can be used to mask unpleasant tastes and odors.

Manufacturing techniques of mouth dissolving tablets

- Direct Compression
- Freeze-drying or lyophilization
- Molding
- Sublimation
- Mass extrusion
- Nano ionization
- Spray drying

Direct Compression[16,17] :-

Direct compression technology is considered one of the simplest and is also inexpensive. Excipients are readily available and play an important role in improving the physical properties of, such as improving flow properties, compressibility and disintegration. This his technology has many advantages as the tablet granules are directly compressed.

Advantages:-

It can handle high doses, has finite steps, and uses simple devices. This is a practical method, an inexpensive technique, and the auxiliary materials used are readily available on the market. The process consists mainly of three steps: grinding excipients, then sieving through suitable sieves, mixing the sieved drug particles, and finally compressing into tablets.

Freeze drying [18,19,20,21] :-

This is one of the first generation techniques for manufacturing MDT that involves sublimating the water from the product after freezing. Formulations exhibit improved dissolution properties due to the appearance of the shiny amorphous structure of the filler and possibly drug.

Here, we describe a typical process for preparing MDT using this technique. The active drug is dissolved or dispersed in the carrier/polymer aqueous solution. The mixture is made up into by weight and poured onto the walls of preformed blister packs. Pass the tray containing the blister pack through the Liquid Nitrogen Tunnel Freezer to freeze the drug solution or dispersion. The frozen blister packs are then placed in the refrigerator to continue the freeze drying. After freeze-drying, apply aluminum foil to the blister sealing machine. Finally, the blister is packed and shipped. Freeze-drying technology has been shown to improve absorption and increase bioavailability.

Molding[22,23] :-

There are two types of molding processing: solvent method and thermal processing. In the solvent process, the powder mixture is wetted with hydro alcoholic solvent, followed by low pressure compression of the molded plaque to form a wet mass (compression molding). Air dry to remove the solvent. Tablets produced in this manner are less compact than compressed tablets and have a porous structure that facilitates dissolution of the thermoforming process produces a suspension containing drug, agar, and sugar.

Taste-masked drug particles were prepared by spraying and solidifying a molten mixture of hydrogenated cottonseed oil, sodium carbonate, lecithin, polyethylene glycol, and the active ingredient into a lactose-based crushed tablet form. Compared to freeze-drying technology, tablets made with molding technology are easier to scale up for industrial manufacturing

Sublimation[24] :-

This technology involves volatiles such as naphthalene, camphor, urea, ammonium bicarbonate and urethane. All of these substances are incorporated into the excipients of tablets. Sublimation then occurs to remove these volatiles from the mixture. Forms a more porous structure within the matrix. Therefore, decomposition can be faster. B. It takes 10-15 seconds for to dissolve in saliva. Other solvents such as benzene and cyclohexane have also been incorporated to improve porosity.

This process increases the mechanical strength of the tablet and improves the disintegration rate.

***Mass extrusion*[25] :-**

This technique is primarily used to mask the bitter taste of tablets. Some hydrophilic alcohols such as polyethylene glycol, methyl alcohol are added to the formulation to soften the mixture. The mixture is then passed through a syringe or extruder to obtain a cylindrical shape. Tablets are formed from the mixture in a cylindrical shape using a heated blade cutter. Therefore, it can be used to mask the bitterness of tablets.

***Nano ionization*[26] :-**

The recently developed Nano melt technology involves reducing the particle size of the drug to nano size by wet milling technology. Drug nano crystals are surface-adsorbed to selected stabilizers, stabilized against aggregation, and incorporated into MDT. This approach is particularly advantageous for drugs that are poorly water soluble and for wide dose ranges (up to 200 mg drug per unit).

***Spray drying*[27] :-**

Allen et al. Spray drying is used in the manufacture of MDT. Formulations contained hydrolyzed and non-hydrolyzed gelatin as matrix proppant, mannitol as bulking agent, and sodium starch glycolate or croscarmellose as disintegrant. Addition of acid (such as citric acid) or alkali (such as sodium bicarbonate) further accelerates disintegration and dissolution. Porous powder was obtained by spray drying the above suspensio , which was compressed into tablets. Tablets prepared in this manner exhibit a disintegration time of less than 20 seconds in aqueous media

Evaluation of Mouth Dissolving Tablets:-

1) **Tablet Thickness**[28,29] :-

Tablet thickness is an important characteristic for appearance reproduction and also for counting using the Filler. Some bottling plants use the uniform thickness of the tablets as a counting mechanism. Ten tablets were taken and their thickness was recorded using micrometer.

Thickness of the tablet is measured by using vernier callipers. It is expressed in mm

2) **Tablet Hardness**[28,30] :-

Tablet hardness is defined as the force applied to the tablet diameter to break the tablet. A tablet's resistance to chipping, abrasion or breakage depends on its hardness under storage and handling conditions prior to use. Tablet hardness of each formulation was measured using a Monsanto hardness tester or a Pfizer hardness tester. It is when expressed in kg/cm2.

3) **Uniformity of weight**[31]:-

Following the IP procedure for weight uniformity, 20 tablets were removed and weighed individually and collectively on a digital scale. The average weight of tablets was determined from the collected weights. The weight variation test is a satisfactory method for determining drug content uniformity.

4) **In-vitro dispersion time test**[32] :-

In vitro dispersion hours was measured by dropping the tablets into a beaker containing 50 ml of Sorenson's buffer pH 6.8. His three tablets of each formulation were randomly selected and an in vitro dispersal time was performed.

5) **Friability Test**[33]

Friability of the tablet determined using Roche friabilator or Electro lab 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 I 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. The friability (F) is given by the formula.

Formula:- $F=(1-W_0/W)\times 100$

6) **Wetting time**[34] :-

Wetting time is closely related to the inner structure of the tablets and to the hydrophilicity of the excipient. According to the following equation proposed by Washburn E.W (1921), the water penetration rate into the powder bed is proportional to the pore radius and is affected by the hydrophilicity of the powders.

$$dl/dt = ricosq/(4hl)$$

CONCLUSION:-

Mouth dissolving tablet can improve patient compliance, provide a rapid onset of action and increase bioavailability. Therefore, the therapeutic effect on the patient's body can be improved. MDT can readily absorb through the buccal cavity or buccal mucosa. Ideal for children and elderly patients who

suffer from dysphagia. Mouth-dissolving tablets are often used to treat allergies and asthma attacks because they dissolve quickly and are useful in emergencies. MDT requires less active ingredient and has an improved absorption profile for , resulting in better drug bioavailability than regular tablets and capsules

REFERENCES :-

1. Fu Y, Yang S, Jeong SH, Kimura S, Park K. Orally fast disintegrating tablets: Developments, technologies, taste-masking and clinical studies. Crit Rev Ther Drug Carrier Syst. 2004;21(6):433–75.
2. . Indurwade NH, Rajyaguru TH and Nakhat PD. Novel approach: Fast dissolving tablets. Indian Drugs 2002; 39(8): 405-41.
3. Reddy LH, Ghosh B and Rajneesh. Fast dissolving drug delivery system: A review of literature. Indian J Pharm Sci 2002; 64 (4): 331-336.
4. Habib W, Khankari R and Hontz J. Fast-dissolving drug delivery systems: Critical review in therapeutics. Drug Carrier Systems 2002; 17(1): 61-72.
5. Nagar P, Singh K, Chauhan I, Verma M, Yasir M, Khan A. Orally disintegrating tablets: Formulation, preparation techniques and evaluation. J Appl Pharm Sci. 2011;1(4):35–45.
6. Joshi R, Pradesh M. Fast Dissolving Tablets: A Review. Int J Pharm Sci Res. 2020;11(4):1562–70.
7. Madgulkar AR, Bhalekar MR, Padalkar RR. Formulation Design and Optimization of Novel Taste Masked Mouth-Dissolving Tablets of Tramadol Having Adequate Mechanical Strength. AAPS PharmSciTech. 2009;10(2):574–81.
8. Dutta S, De P. Formulation of fast disintegrating tablets. Int J Drug Formulation & Res 2011; 2: 45-51.
9. Dinesh V, Sharma I, Sharma V. A comprehensive review on fast dissolving tablet technology. J Applied Pharma Sci 2011; 1: 50-58.
10. Kumari S, Visht S, Sharma PK. Fast dissolving drug delivery system: Review article. J Pharma Res 2010; 3: 1444-1449.
11. Hartesi B, Sriwidodo, Abdassah M, Chaerunisaa AY. Starch as Pharmaceutical Excipient. Int J Pharm Sci Rev Res. 2016;41(2):59–64.
12. Reddy PV, Roy SD, Vasavi G, Sriram N. Oral Dispersible Tablets - A Review. Int J Pharm Anal Res. 2014;3(1):22–9.
13. . Gissinger D, Stamm A. A comparative evaluation of the properties of some tablet disintegrants. Drug Dev Ind Pharm 1980; 6(5): 511–536.
14. Gorman EA, Rhodes CT , Rudnic EM. An evaluation of croscarmellose as a tablet disintegrant in direct compression systems. Drug Dev Ind Pharm1982; 8: 397–410.
15. Rockville. MD, United States Pharmacopoeia: 27 th revision. USP Convention, Inc. 2004;2302.
16. Advankar A, Maheshwari R, Tambe V, Todke P, Raval N, Kapoor D, et al. Specialized tablets: Ancient history to modern developments. In: Drug Delivery Systems. Elsevier; 2019. p. 615–64.
17. De Focatiis DSA. Tooling for near net-shape compression moulding of polymer specimens. Polym Test. 2012 Jun 1;31(4):550–556.
18. Rishi R. K., The Pharma Review, 2004, 2, 32.
19. Kuchekar S. B., C. A. Badhan, S. H. Mahajan, Pharma Times, 2003, 35, 7-14.
20. Sreenivas SA, Dandagi PM, Gadad AP, Godbole AM, Hiremath SP, Mastiholimath VS et al. Orodispersible tablets: New-fangled drug delivery system – A Review. Indian J Pharma Edu Res 2005; 39: 177-181.
21. Bhatu P, Mundada AS. The technologies used for developing orally disintegrating tablets: A review. Acta Pharm 2011; 61: 117–139 .
22. Kamal Saroha, Pooja Mathur, Surender Verma, Navneet Syan and Ajay Kumar Mouth dissolving tablets: An overview on future compaction in oral formulation technologies Der Pharmacia Sinica, 2010, 1 (1): 179-187
23. Bhowmik D, Chiranjib B, Krishnakanth , Pankaj, Chandira RM. Fast Dissolving Tablet: An Overview. J Chemical Pharma Res 2009; 1: 163-177.
24. Rajasthan J, Sharma SK, Rajasthan J, Consideration B. Fast Dissolving Tablets: Method and Technology Review. Adv Res Pharm Biol. 2013;3(Iv):487–93.
25. Datta N, Pal M, Roy U, Mitra R, Pradhan A. Orodispersible Tablets: A Systematic Review. World J Pharm Res. 2014;13(April):152–165.
26. Shukla D, Chakraborty S, Singh S, Mishra B. Mouth Dissolving Tablets I: An Overview of Formulation Technology. Sci Pharm. 2009; 77: 309–26.
27. Gupta A, Mittal A, Jha KK. Fast Dissolving Tablet-A Review. The Pharma Innovation 2012; 1: 1-7.
28. Ratnaparkhi MP, Mohanta GP, Dr. Upadhyay L. Review on: Fast dissolving tablet. J Pharmacy Res 2009; 2: 5-12.

29. Sivakranth.M, Althaf Abdul S, Rajasekhar S. Formulation and evaluation of oral fast dissolving tablets of sildenafil citrate. Int J Pharm and Pharma Sci 2011; 3: 112-121.

30. Bhowmik D, Jayakar B, Kumar SK. Design and characterisation of fast dissolving tablet of telmisartan. Int J Pharma Recent Res 2009; 1: 31-40.

31. Lachman Leon, Liberman Herbert A, Kanig Joseph L. The Theory and Practice of Industrial Pharmacy. 3rd edn., Varghese publishing house, 1987, 296-303.

32. Bikshapathi D, Kandikonda S, Uppuluru AK, Gade S, Bhupathi S. Fast dissolving tablets: An update. Int Res J Pharmacy 2011; 2: 45-53.

33. Shailendra kumar singh, Dina nath mishra, Rishab jassal, Pankaj soni fast disintegrating combination tablets of omeprazole and domperidoneasian journal of pharmaceutical and clinical research vol.2 issue 3, july-september 2009, 1-9.

34. Mohanachandran.P.R.Krishnamohan.P.R., Fels saju, Bini.k.b, Beenu babu, Shalina k.k. Formulation and evaluation of mouth dispersible tablets of amlodipine, International Journal of Applied Pharmaceutics Vol 2, Issue 3, 2010.