IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Review Article
June 2023 Vol.:27, Issue:3

A Review on Mouth Dissolving Tablet

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Nayankumar Dayma[1*], Dhananjay Landge[1], Sunil Nirmal[1]

Dept. of Pharmaceutics, HSBPVT's, GOI, Faculty of Pharmacy, Kashti Tal- Shrigonda Dist. – Ahmednagar, 414701 Maharashtra, India.

Submitted: 22 May 2023
Accepted: 29 May 2023
Published: 30 June 2023

Keywords: Mouth Dissolving Tablet, Saliva, and Disintegration.

ABSTRACT

Recent advances in Novel Drug Delivery System (NDDS) aims to improve safety and efficacy of drug molecule by preparing a suitable dosage form for administration and to achieve improved patient compliance. Various techniques employed to formulate Orodispersible tablets include direct compression method, freeze drying, spray drying, and tablet molding, sublimation and mass extrusion. The unique property of mouth-dissolving tablet is that they are quickly disintegrating or dissolving and release the drug as soon as they get in touch with saliva, thus there is no need for water for administration of drug.

HUMAN JOURNALS
www.ijppr.humanjournals.com

INTRODUCTION:

Oral route of drug administration has wide spread up to 50-60% of any other dosage forms. Oral dosage forms are popular because of ease of administration, precise dosage, self-medication, pain evasion and most importantly the patient conformity [1]. The most popular solid dosage forms are tablets and capsules, one important negative aspect of these dosage forms for some patients, is the trouble to swallow [2]. Drinking water plays a vital role in the swallowing of tablets. A lot of times people experience inconvenience in swallowing conventional dosage forms such as tablet when water is not available, in the case of motion sickness and rapid episodes of coughing during the common cold, allergic condition [3]. Orodispersible tablets are not only indicated for people who have swallowing problems but also are ideal for normal people [4]. "Fast dissolving tablets are also called as mouth-dissolving tablets, melt-in-mouth tablets, Orodispersible tablets, porous tablets, quick dissolving etc.". Fast dissolving tablets are those when put in mouth disintegrate directly releasing the drug which dissolves in the saliva [5]. The faster the drug into solution, more rapidly the absorption of drug and onset of action. Their increasing importance was underlined recently when European pharmacopoeia adopted the term "Orodispersible tablet" as a tablet that to be placed in the oral cavity where it distributes rapidly before swallowing." "According to European pharmacopoeia, the orally dissolving tablet should disperse/disintegrate in less than three minutes".

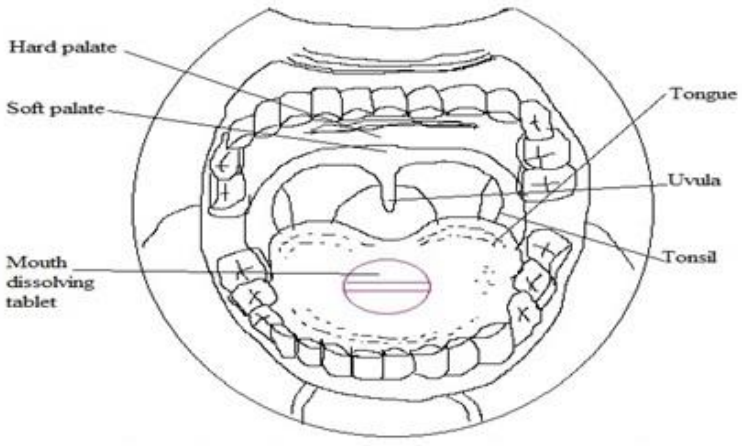


Fig 1: A**dministration of mouth dissolving tablets**

MOUTH DISSOLVING TABLET:

Mouth dissolving tablet is a tablet that disintegrates and dissolves quickly in the saliva, there is no need of chewing the tablet or no need of water to swallow the tablet. The mouth dissolving tablet is normally dissolved within mouth or in saliva in 15 sec to 3 min [7]. In Mouth Dissolving Tablet the super disintegrant is used. Mouth dissolving tablet is also known as fast dissolving tablet, because when you put tablet into the oral cavity it rapidly gets dissolve into the mouth with help of saliva. For this tablet, there is no need of water to disintegrate the tablet. It requires less time than other tablets to disintegrate. This tablet is used for those patients who are mentally ill, Parkinsonism patient, child, elderly patients. In this type of tablet, the bitter taste of drug is also masked by some sweeteners.

Ideal Properties of Mouth Dissolving Tablet:

The ideal properties of mouth dissolving tablet are as follows;

1. No need of water for swallow the tablet [6].

2. It should be dissolved within in second [6].

3. Must have pleasing taste [6].

4. trouble-free to transport and transferable.

5. Leave fewer residues in oral cavity after administration [6].

6. Have modest half-life drug with numerous dosing

7. Sustain and controlled release of drugs

8. Able to produce in easy conventional manner at low cost

9. Less sensitive to environmental conditions like heat and wetness

10. Network within drug molecule must be porous

Advantages of Mouth Dissolving Tablet [7]**:**

1. No need of water for swallow these tablets

2. It can be easily taken by pediatrics, older person, and mentally bothered patients.

3. Disintegration and absorption of drug is rapid, and have fast onset action.

4. Bioavailability of drug is amplified as some of the drugs are immersed in mouth, pharynx, esophagus through saliva passing down into the stomach.

5. Beneficial over liquid medicines in terms of administration

6. Easy for transportation from one place to another place

7. First-pass metabolism is reduced or avoided

8. Offering safe medication

9. Precise dosing is done

10. Overcome intolerable taste of drug

Disadvantages of Mouth Dissolving Tablet:

1. It is hygroscopic in nature so it must be placed in waterless places.

2. Packing of tablets is required particular equipment and it is complex to pack.

3. Eating and drinking anything is restricted while taking this medicine.

Criteria for Mouth Dissolving Tablets [8]**:**

The tablets should

1. No requirement of water to swallow, but it is supposed to disintegrate in the oral cavity in matter of seconds.

2. It should be well-suited with taste masking.

3. It should be portable without fragility distress.

4. Have a pleasant opening feel.

Salient Feature of Mouth Dissolving Tablets [8]:

1. Ease of Administration to the patient who can't consume, such as the older, stroke sufferers, confined to bed patients, patients affected by renal malfunction and patients who refuse to swallow such as pediatric, geriatric & psychiatric patients.

2. No need of water to swallow the dose of drug, which is highly suitable for patients who are traveling and don't have urgent contact with water.

3. Rapid closure and absorption of the drug, which will produce sudden feature onset of action.

4. Some drugs are absorbed from the oral cavity, pharynx and esophagus as the saliva passes down into the abdomen. In such cases, bioavailability of drug is increased.

5. Pregastric absorption can result in better bioavailability and as a result of reduced dosage; improve clinical performance through a lessening of unnecessary effects.

6. Good oral cavity feel property helps to change the perception of medication as bitter pill mainly in pediatric patients.

7. The risk of suffocation during oral administration of conventional formulation due to physical barrier is avoided, thus providing improved safety.

8. New industry opportunities like product differentiation, product promotion, patent extensions and life cycle management.

9. Advantageous in cases such as motion sickness, sudden episodes of allergic attack or coughing, where an even more rapid onset of action is necessary.

10. An increased bioavailability, particularly in cases of insoluble and hydrophobic drugs, due to rapid disintegration and dissolution of these classes of tablets.

11. Stability for longer period of time, since the drug remains in solid dosage form till it is taken in orifice.

Super Disintegrants [9]:

Disintegrates are molecules or mixture of substances added to the drug formulation that facilitates the breakup or breakdown of tablet or capsule content into minor particles that dissolve faster than in the lack of disintegrates.

Types of Super Disintegrants [9]:

1. Crospovidone

2. Microcrystalline cellulose

3. Sodium starch glycolate

4. Sodium carboxymethyl cellulose or croscarmellose sodium

5. Pregelatinzed starch

6. Calcium carboxymethyl cellulose

7. Modified corn starch Sodium starch glycolate has good flow ability than croscarmellose sodium.

Factors consideration for super-disintegrants selection [9]:

1. It should create mouth dissolving when tablet meets saliva in the oral cavity.

2. It should be compactable enough to produce less brittle tablets.

3. It should have excellent flow since it improves the flow ability of the total blend.

Selection of super-disintegrants [9]:

1. The ideal super-disintegrants should have

2. Poor solubility.

3. Poor gel formation.

4. Good hydration capacity.

5. Good molding and flow properties

6. No tendency to form complexes with the drugs.

Mechanism of Super disintegrates:

There are five major mechanisms for tablets disintegration as follows,

1. Swelling

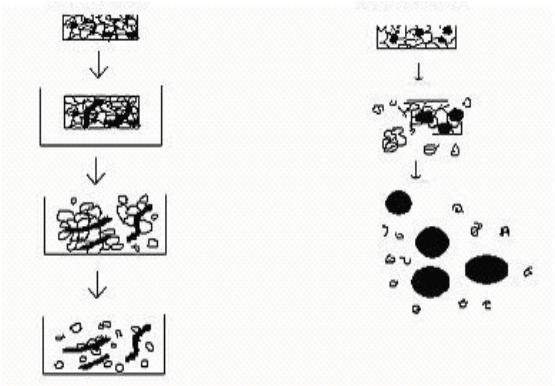
Possibly the most commonly accepted general mechanism of action for tablet disintegration is swelling. Tablets with high porosity show reduced disintegration due to be short of adequate swelling force. On the other hand, sufficient swelling force is exerted in the tablet

with little porosity. It is worthwhile to note that if the packing fraction is very high, fluid is unable to break through in the tablet and disintegration is again slows down [7,10].

2. Porosity and capillary action (Wicking):

Dissolution by capillary action is always the first step. When we put the tablet into appropriate aqueous medium, the medium penetrates into the tablet and replaces the air adsorbed on the particles, which weakens the intermolecular bond and breaks into the fine particles. Water uptake by tablet depends upon hydrophilicity of the drug and on tableting situation. This type of disintegrant preservation of porous structure and short interfacial tension towards aqueous fluid is necessary which helps in disintegration by creating a hydrophilic network around the drug particles [7, 10].

WICKING **SWELLING**



Water is pulled by disintegrants Particles swell and break up

And reduced the physical the matrix form within

Bonding force between particles

Fig 2: Wicking and Swelling

3. Due to disintegrating particle/particle repulsive forces:

Another mechanism of disintegration attempts to give details of the swelling of tablet prepared with ‘nonswellable’ disintegrants. Guyot-Hermann has proposed a particle repulsion theory based on the observation that non-swelling particles also cause breakdown of tablets. The electric repulsive forces among particles are the mechanism of disintegration and water is required for it. Researchers establish that repulsion is secondary to wicking [7, 10].

4. Due to deformation:

During tablet compression, disintegrated particles get collapsed and these collapsed particles get into their normal structure when they come in and get in touch with aqueous media or water. Occasionally, the swelling capacity of starch was enhanced when granules were extensively deformed during compression. This enhances in size of the deformed particles produces a breakup of the tablet. This may be a mechanism of starch and has only recently begun to be studied [7, 10].

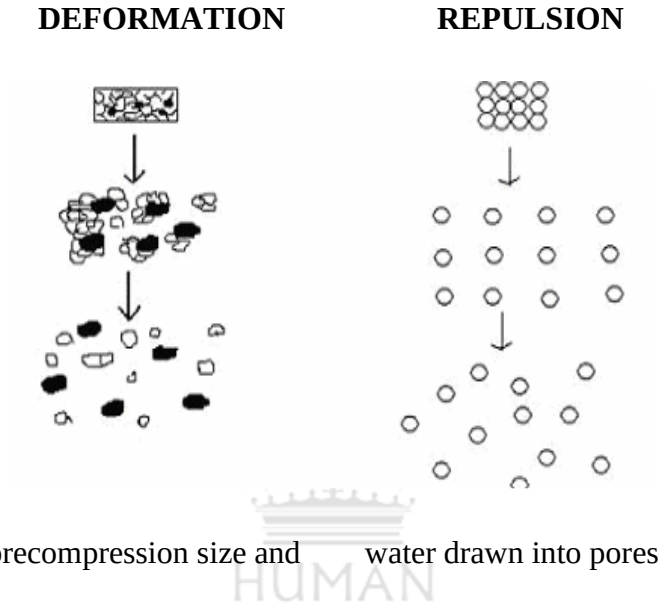


Fig 3: Deformation and Repulsion

5. Due to release of gases:

Carbon dioxide is released within tablets on wetting due to contact between bicarbonate and carbonate with citric acid or tartaric acid. The tablet disintegrates due to production of pressure within the tablet. This effervescent mixture is used when pharmacist needs to formulate very fast dissolving tablets or rapidly disintegrating tablets. As these disintegrants are extremely sensitive to small changes in humidity level and temperature, severe control of environment is required during manufacturing of the tablets. The effervescent blend is either added instantly prior to compression or can be added into two separate fractions of formulation. [11]

6. Enzymatic action:

Enzymes present in the body act as disintegrants. These enzymes demolish the binding action of binder and help in disintegration. Due to swelling, pressure exerted in the external direction it happened because tablet to rupture or the accelerated absorption of water leading to enormous increases in the volume of granules to promote disintegration. [11]

Techniques for preparing Mouth Dissolving Tablets [12]:

Many techniques have been reported for the formulation of mouth dissolve tablets or Fast dissolving tablets, are as follows,

1. Freeze drying

2. Tablet Molding

3. Spray drying

4. Sublimation

5. Direct compression

6. Mass extrusion

1. Freeze-Drying:

Freeze drying is the process during which water is sublimed from the merchandise after it's frozen. This system creates an amorphous porous structure that will dissolve rapidly. A typical procedure involved in the manufacturing of ODT using this system is mentioned here. The active drug is dissolved or dispersed in a solution of a polymer. The mixture is completed by weight and poured within the walls of the preformed blister packs. The trays holding the blister packs are skilled nitrogen freezing tunnel to freeze the drug solution or dispersion. Then the frozen blister packs are placed in refrigerated cabinets to continue the freeze-drying. After freeze-drying the aluminum foil backing is applied on a blister-sealing machine. Finally, the blisters are packaged and shipped. The freeze-drying technique has demonstrated improved absorption and increase in bioavailability. The main disadvantages of lyophilization technique are that it's expensive and time consuming; fragility makes conventional packaging unsuitable for these products and poor stability under stressed conditions [13].

2. Tablet Molding:

Molding process is of three type's i.e. solvent method and heat method and vacuum method. Solvent method involves moistening the powder blend with a hydro-alcoholic solvent followed by compression at low pressures in molded plates to make a wetted mass. The solvent is then removed by air-drying. The tablets manufactured in this way are less compact than compressed tablets and posses a porous structure that hastens dissolution. The heat molding process involves preparation of a suspension that contains a drug, agar and sugar (e.g. mannitol or lactose) and pouring the suspension within the blister packaging wells, solidifying the agar at the specific temperature to make a jelly and drying it at 30ºC under vacuum[10].

Disintegration time, drug dissolution rate and mouth feel will depend upon the sort of dispersion. Different molding techniques are often wont to prepare mouth-dissolving tablets:

a. Compression molding: The powder mixture previously wetted with a solvent like ethanol/water is compressed into mould plates to form a wetted mass [7].

b. Heat molding: A molten matrix in which drug is dissolved or dispersed can be directly molded into Mouth dissolving tablets [14].

c. No vacuum lyophilization: This process involves evaporation of solvent from a drug solution or suspension at a typical pressure [15].

Molded tablets possess porous structure, which facilitates rapid disintegration and straightforward dissolution. Molded tablets offer improved taste thanks to water-soluble sugars present in dispersion matrix. But molded tablets lack good mechanical strength and may undergo breakage or erosion during handling and opening of blister packs. However, adding sucrose, acacia or polyvinyl pyrrolidone can increase mechanical strength.

3. Spray Drying:

In this technique, gelatins are often used as a supporting agent and as a matrix, mannitol as a bulking agent and sodium starch glycolate or croscarmellose or Crospovidone are used as superdisintegrants. The formulation contained bulking agents like mannitol and lactose, a superdisintegrants like sodium starch glycolate & croscarmellose sodium and acidic agent (citric acid) or alkaline ingredients (e.g. sodium bicarbonate). This spray-dried powder, which compressed into tablets showed rapid disintegration and enhanced dissolution [16]. A highly

porous and fine powder is prepared by spray drying an aqueous composition containing support matrix and other components. This is often then mixed with active ingredient and compressed into tablet. Allen and Wang used this system to organize mouth-dissolving tablets, which disintegrated within 20 seconds [17].

4. Sublimation:

To generate a porous matrix, volatile ingredients are incorporated within the formulation that's later subjected to a process of sublimation. Highly volatile ingredients like ammonium bicarbonate, carbonate, carboxylic acid, camphor, naphthalene, urea, urethane and anhydride could also be compressed alongside other Excipients into a tablet. This volatile material is then removed by sublimation leaving a highly porous matrix. Tablets manufactured by this technique have been reported to usually disintegrate in 10-20 sec. Even solvents like cyclohexane; benzene are often used as pore forming agents [8].

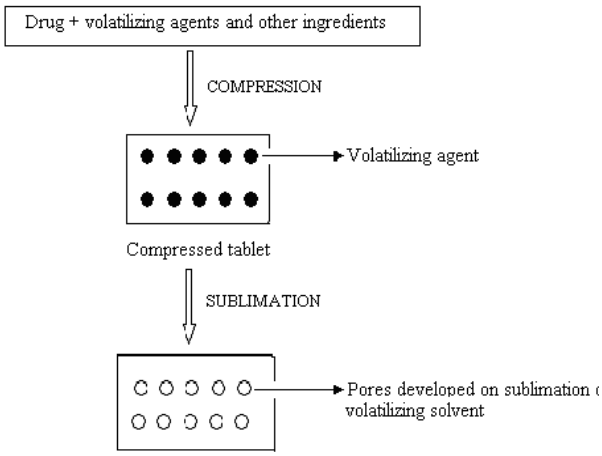


Fig 4: Schematic Diagram of Sublimation Technique for Preparation of MDT

5. Direct compression:

The disintegrant addition technology (direct compression) is the most preferred technique to manufacture tablets thanks to certain advantages [18, 19];

a. High doses are often accommodated and final weight of the tablet can exceed that of other methods.

b. easiest method to manufacture the tablets.

c. Conventional equipment and commonly available Excipients are used.

d. A limited no. of processing steps is involved.

e. Cost-effectiveness.

Tablet size and hardness strongly affect the disintegrant's efficacy. Hard and enormous tablets have more disintegration time than normally required. Very soft and little tablets have low mechanical strength. So, an optimum kind and concentration of disintegrant should be chosen to realize quick disintegration and high dissolution rates. Above the critical concentration level, however, disintegration time remains approximately constant or maybe increases [20].

6. Mass extrusion:

This technology involves softening of the active blend use the solvent mixture of water soluble polyethylene glycol and methanol. This softened mass is extruded through the extruder or syringe and a cylindrical shaped extrude is obtained which are finally cut into even portion using heated blade to form tablets. Granules of bitter drugs can be covered using this method to mask their taste [21].

7. Nanonization:

A recently developed Nanomelt technology involves reduction within the particle size of drug to nano size by wet-milling technique. Surface adsorption of the nano crystals of the drug is completed on selected stabilizers for stabilizing them against agglomeration, which are then incorporated into MDTs. This system is especially advantageous for poor water soluble drugs and also for a good range of doses (up to 200 mg of drug per unit) [6].

Preformulation studies mouth dissolving tablet [10]:

Preformulation study relates to pharmaceutical and analytical examination carried out proceeding and supporting formulation development efforts of the dosage form of the drug material. Preformulation yields basic knowledge necessary to expand suitable formulations for the toxicological use. It gives information required to define the nature of the drug substance and give frame work for drug mixture with pharmaceutical Excipients in dosage form. Hence, the following preformulation studies were performed on the obtained test of drug.

1. Bulk Density

2. Tapped Density

3. Hausner'S Ratio

4. Angle of Repose

5. Carr's Index

1. Bulk Density (Db):

It is the ratio of entire mass of powder to the bulk volume of powder. It was measured by pouring the weight powder passed through standard sieve # 20 into a measuring cylinder and initial weight was taken. This is first volume is called the bulk volume. From this the bulk density is calculated according to the formula given below. It is expressed in g/ml and is given by;

$$Db = M / Vb$$

Where, M is the mass of powder

Vb is the bulk volume of the powder.

2. Tapped Density*:*

Tapped density is the ratio of mass powder to tapped volume of powder. The volume of powder is measured by tapping powder 750 times and volume has noted the difference in between is not exceed 2%. If it is more than 2% then tapping is continued for 1250 times then tapped volume is noted and it must continue until the difference differ less than 2%. It is expressed in g/ml and is given by;

$$Dt = M / Vt$$

Where,

M is the mass of powder

Vt is the tapped volume of the powder

3. Hausner ratio:

Hausner's ratio is an indirect index of ease of powder flow. It is calculated by the following formula.

$$\text{Hausner's ratio} = \frac{Dt}{Db}$$

Where,

Dt is the tapped density.

Db is the bulk density.

Lower Hausner's ratio (<1.25) indicates better flow properties than higher ones (>1.25).

4. Angle of Repose (θ):

"It is defined as maximum angle possible between the surface of the pile of powder and the horizontal plane".

The friction between loose powder particles can be calculated by Angle of Repose.

In angle of repose, the powder mix is passed funnel from the precise height. Angle of repose was calculated by measuring the height and the radius of powder base. The precaution must be taken during this is that the flow of powder particle must be fall and roll over on each other through walls of funnel.

$$\tan(\theta) = h / r$$

$$\theta = \tan^{-1}(h / r)$$

Where, θ is the angle of repose.

h is the height in cms

r is the radius in cms.

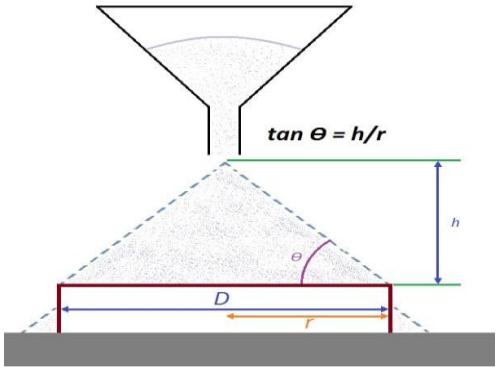


Fig 5: Angle of Repose

Table 1: Angle of Repose as an Indication of Powder Flow Properties

Sr. Number	Angle of Repose	Type of flow
1	<20	Excellent
2	20-30	Good
3	30-34	Passable
4	>34	Very Poor

5. Carr's index or % Compressibility:

A volume of powder is filled into graduated glass cylinder and repeatedly tapped for known duration. Powder volume after tapping is measured**.** It indicates powder flow properties. It is expressed in percentage and is given:

$$I = \frac{Dt - Db}{Dt} \times 100$$

Where,

Dt is the tapped density of the powder

Db is the bulk density of the powder.

Table No.2: Relationship between % compressibility

Sr. Number	% compressibility	Flow Ability
1	5-12	Excellent
2	12-16	Good
3	18-21	Fair Passable
4	23-35	Poor
5	33-38	Very Poor
6	<40	Very Very Poor

Evaluation of mouth dissolving tablets:

The evaluation of Mouth Dissolving Tablet is carried out by following methods;

1. Weight variation

2. Hardness

3. Friability

4. Mechanical Strength

5. Crushing Strength

6. Wetting time

7. In vitro dispersion time

8. In-vitro disintegration time

9. Thickness Variation

1. Weight Variation Test [22]:

20 tablets were selected randomly from the lot and weighed individually to check for weight variation. Weight variation specification as per I.P. is shown in Table 3.

.

Table 3: Weight Variation Specification as per IP

Sr. Number	Average weight of Tablet	% Deviation
1	80 mg or less	±10
2	More than 80 mg but less than 250 mg	±7.5
3	250 mg or more	±5

2. Hardness [22]:

Hardness or tablet crushing strength (fc), the force required to break a tablet in a diametric compression was measured by using tablet hardness testers like Monsanto hardness tester, Pfizer hardness tester etc. The pressure required to break the tablets is measured as a function of hardness (kg/ cm2). The values obtained must meet the standard value. The hardness of the tablet was found to be 2.5 to 3.0 kg/cm^2.

3. Friability [23]:

Friability of the tablet was calculated using Roche friabilator. This apparatus subjects the tablet to the combined effect of abrasion and shock in a plastic chamber rotating at 25 rpm for 4 min and dropping a tablet at height of 6 inches in every revolution. Preweighed sample of tablets was added to the friabilator and was subjected to 100 revolutions. Tablets were dusted using a soft muslin cloth and reweighed. The friability (F) is given by the formula,

$$F = \frac{W_{initial} - W_{final}}{W_{initial}} \times 100$$

4. Mechanical Strength [23]:

Tablets should possess sufficient strength to withstand mechanical shocks of handling in manufacturing, packaging, and shipping. Crushing strength and friability are two important parameters to evaluate a tablet for its mechanical strength.

5. Crushing Strength [23]:

It is the strength required to break a tablet by compression in the radial direction, it is a main parameter in formulation of mouth dissolve tablets because excessive crushing strength significantly reduces the disintegration time. In the present study, the crushing strength of the

tablet was measured using Pfizer hardness testers. An average of three observations is reported.

6. Wetting time [24]:

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

$$dl/dt = r¡cosq/(4hl)$$

Where l is the length of penetration, r is the capillary radius, ¡ is the surface tension, h is the liquid viscosity, t is the time, and q is the contact angle. It is obvious that pores size becomes minor and wetting time enhances with an increase in compression force or a decrease in porosity. A linear relationship exists between wetting time and disintegration time. Thus, wetting is the essential step for disintegration process to take place. A piece of tissue paper folded double was placed in a Petri plate (internal diameter is 6.5 cm) containing 6ml of water. The tablet was placed on the paper and the time for complete wetting of the tablet was calculated in seconds. The method was slightly modified by maintaining water at 37o. Wetting time corresponds to the time taken for the tablet to disintegrate when kept immobile on the tongue.

7. In vitro dispersion time [25]:

Tablet was placed in 10 ml phosphate buffer solution, pH 6.8±0.5°C. Time required for complete dispersion of a tablet was measured.

8. In-vitro disintegration time [25]:

“The process of breakdown of a tablet into smaller particles is called as disintegration”. The in-vitro disintegration time of a tablet was determined by using disintegration test apparatus as per I.P. specifications. One tablet was put in each of the 6 tubes of the basket. Add a disc to each tube and run the apparatus using pH of simulated saliva fluid is 6.8 maintained at 37±2˚C as the immersion liquid. The assembly should be going upwards and downwards between 30 cycles per minute at pH 6.8 maintained at 37±2ºC. The time in seconds taken for complete disintegration of the tablet with no palpable residue remaining in the apparatus was measured and recorded.

9. Thickness Variation [26]:

Ten tablets were taken from each formulation and measured the thickness by using digital screw gauge micrometer. The mean standard deviations were calculated.

CONCLUSION:

Nowadays these tablets are in advance more important in industry targeting pediatrics, geriatrics and all age groups. The mouth dissolving tablets have potential advantages over predictable dosage forms, with their improved patient compliance; convenience, bioavailability and rapid onset of action had drawn the attention of many manufacturers over a decade. To provide the patients with the most convenient mode of administration, there was a need to develop quickly disintegrating dosage form, particularly one that disintegrants and dissolves/disperses in split and can be administered without need for water, anytime, anywhere, such tablets are called as mouth dissolving tablets.

Expected Outcomes:

1. Mouth dissolving tablet disintegrate or dissolve in saliva and are swallowed without the need for water.

2. They offer an advantage over swallowing tablets and capsules.

3. Difficulty to swallow is particularly experienced by pediatric and geriatric patients.

4. They offer an advantage over oral dosage form.

5. It disintegrates more rapidly and shows onset of action.

6. It avoids first-pass metabolism and enhances bioavailability of drug.

REFERENCES:

1) Allen, L.V, Wang, B., Process for making a particulate support matrix for making rapidly dissolving tablets. US Patent No. 5,587,180, 1996.
2) S. S. Biradar, S. T. Bhagavati and I. J. Kuppasad, Fast Dissolving Drug Delivery Systems: A Brief Overview, Internet J. Pharmacology, 2006, 4(2).
3) Lachmann, L., Liebermann, H.A., Kiang, J.L., The theory and practice of Industrial Pharmacy, 3rd Ed., Varghese Publishing House, Bombay, 1998, 430-440.
4) Kaushik, D, Dureja, H, Saini, T. R., Mouth Dissolving Tablets: A review. Indian Drugs, 2004, 41(4), 187-193.
5) Yarwood, R.J., Kearny, K., Thomson A.R., Process for preparing solid dosage form for unpalatable pharmaceuticals, US Patent No. 5,738,875, 1998.

6) Prashant B Pawar, Avinash G Mansuk, Kuldip H Ramteke, Y P Sharma, Sagar N Patil., MOUTH DISSOLVING TABLET: A REVIEW**,** International Journal of Herbal Drug Research, Vol I, Issue II, 22-29, 2011
7) Tejvir Kaur, Bhavandeep Gill, Sandeep Kumar, G.D. Gupta**,** MOUTH DISSOLVING TABLETS: A NOVEL APPROACH TO DRUG DELIVERY**,** International Journal of Current Pharmaceutical Research Vol 3, Issue 1, 2011 ISSN- 0975-7066 .
8) M.R.Chandira, Debjit Bhowmik, Chiranjib,N.S.Gosh, S.R.Sahu, RESENT ASPECT OF MOUTH DISSOLVING TABLET- AN OVERVIEW, Rajiv Gandhi College of Pharmacy, Nautanwa, Maharajganj, Uttar Pradesh.
9) Rewar S, Singh C J, Bansal B K, Pareek R, Sharma A K, ORAL DISPERSIBLE TABLETS: AN OVERVIEW; DEVELOPMENT, TECHNOLOGIES AND EVALUATION, International Journal of Research and Development in Pharmacy and Life Sciences, page no 1251.
10) Debjit Bhowmik, Chiranjib.B, Krishnakanth, Pankaj, R.Margret Chandira, Fast Dissolving Tablet: An Overview, Journal of Chemical and Pharmaceutical Research, 2009, 1(1): 163-177
11) Waghmare P.V., Bhusnure O.G., Chinchole A.S., Usnale S.V.,Chavan D.V., REVIEW ONMOUTHDISSOLVING TABLETS: A NEW VENTURE IN DRUG DELIVERY, Master of pharmacy, Department of Quality Assurance Maharashtra College of Pharmacy, Nilanga, Dist. Latur (MS) 413521, India
12) Bagul Udhav S, Bagul Nitish S, Kulkarni Minal S, Dr Sawant SD, Dr Gujjar KN and Bidkar AA. Manufacturing technologies for mouth dissolving tablets. www.pharmainfo.net
13) Mishra, D.N., Bindal, M., Singh, S.K., Kumar, S.G.V., Rapidly disintegrating tablets of valdecoxib, Indian drugs 2005, 42, 685-687.
14) Shangraw R, Mitrevej A and Shah M. A new era of tablet disintegrants. Pharm Technol 1980; 4(10):49-57.
15) Dobeti L. Fast disintegrating tablets. PCT Patent 1999; No. 44580-Ai.
16) Shirwaiker, A.A., Ramesh, M., Fast disintegrating tablets of Atenolol by dry granulation method, Indian J. Pharm. Sci., 2004, 66, 422-426.
17) Mizumoto T, Masuda Y and Fukui M. Intrabuccally dissolving compressed moldings and production process thereof. US Patent 1996; No. 5576014.
18) Patel BP. Fast dissolving drug delivery systems: An update. pharmainfo.net.
19) Bi Y, Sunanda H, Yonezawa Y, Danjo K and Lido K. Preparation and evaluation of a compressed tablet rapidly disintegrating in oral cavity. Chem Pharm Bull 1996; 44(11):2121-2127.
20) Watanabe Y, Koizumi K, Zama Y, Kiriyama M, Mastumoto Y and Mastumoto M. New compressed tablet rapidly disintegrating in saliva in the mouth using crystalline cellulose and a disintegrant. Bio Pharm Bull 1995; 18(9):1308.
21) Panigrahi D, Baghel S and Mishra B. Mouth dissolving tablets: An overview of preparation techniques, evaluation and patented technologies. J Pharm Res 2005; 4(3):35-38.
22) Basawaraj S Patil, Upendra Kulkarni, Parik Bhavik, Srinivas R Soodam, Prakash G Korwar , Formulation and evaluation of mouth dissolving tablets of nimesulide by new coprocessed technique Research Journal of Pharmaceutical, Biological and Chemical Sciences ISSN: 0975-8585,587-592. 26
23) 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. 27
24) 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. 28
25) Hindustan Abdul Ahad, Chitta Suresh Kumar, Kishore Kumar Reddy B, Anil Kumar B, Chandra Sekhar A, Sushma K, Sairam T, Sivaji S, A Novel Technique in Formulation and Evaluation of Mouth Dissolving Nimesulide Tablets,Journal of Advanced Pharmaceutical Research 2010, 1(2), 101-107. 29
26) Bhupendra G. Prajapati, and Satish N. Patel formulation, evaluation and optimization of orally disintegrating tablet of cinnarizine e-Journal of Science & Technology, 9-21. 30