Available online on 30.08.2019 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Review Article

Fast Dissolving Tablets: Better Option for Pediatrics and Geriatrics

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ABSTRACT

Fast dissolving tablets are getting more importance as it has advantages over conventional tablets and liquid dosage form. Problems like dysphasia, swallowing, shocking are not seen with fast dissolving tablets. As it mixes rapidly as comes in contact with saliva. Direct compression method is the most common, simple, less step and low cost methods. Fast dissolving tablets preparation i.e based on many techniques like spray drying, sublimation, melt granulation, lyophilization, mass extrusion etc and by addition of superdisintegrant. In the review paper we are going to discuss regarding fast dissolving tablets, their preparation and evaluation methods.

Keywords: Fast dissolving tablets, Direct compression, first pass metabolism

Article Info: Received 13 July 2019; Review Completed 10 Aug 2019; Accepted 21 Aug 2019; Available online 30 Aug 2019

Cite this article as:

Santosh Kumar R, Neethu Sankar B, Fast Dissolving Tablets: Better Option for Pediatrics and Geriatrics, Journal of Drug Delivery and Therapeutics. 2019; 9(4-A):831-834 **http://dx.doi.org/10.22270/jddt.v9i4-A.3689**

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Introduction[1,2]:-

In most cases a fast dissolving drug delivery system is a tablet which dissolves or disintegrates in the oral cavity, which can be taken without water or chewing. To mask the taste of the active ingredient substances must be included in 90% of fast dissolving delivery system. The masked active ingredient is swallowed by patient's saliva along with the soluble and insoluble ingredients. Others are also known as melt-in-mouth tablets, reprimelts, porous tablets, oro-dispersible, quick dissolving or rapid disintegrating tablets.

Ideal properties of fast dissolving tablets [3]:-

Does not require water when administered orally but dissolve or disperse or disintegrate in the mouth within seconds.

- Has a good feeling of the mouth.
- This has properties of fast masking which is acceptable.
- These are harder and are less friable.
- After administration they leave a small amount of residue or do not leave anything in the mouth after administration.
- They exhibit less sensitive to environmental conditions like temperature and humidity.
- Manufacturing of tablet is allowed using conventional processing and packaging equipment's.

Advantages of fast dissolving tablets[4,5,6] :-

a) There is no requirement of water for the swallowing of tablets.

b) This can be administrated easily for pediatric, elderly and mentally disabled patients.

c) When compared to liquids, this gives correct dosing.

d) Quick on set of action is offered which is due to rapid dissolution and absorption.

e) There is an increase in the bioavailability of drugs.

f) When compared to liquid medication it is advantages in specification to administration and also transportation.

g) There is a reduction of first pass metabolism which offers improvement in bioavailability and so there is a decrease in the dose.

h) There is a gratuitous exposure of suffocation which is caused due to physical obstruction when swallowed.

i) It grant loading of high drug.

Disadvantages[7,8]:-

a) Fast dissolving tablets must be kept in dry place as it they are hygroscopic in nature.

b) If maintains the mouth feeling periodically.

c) For proper stabilization & safety fast dissolving tablets require special package.

d) Careful handling of the tablet is required as the tablet consistently have insufficient mechanical strength.

e) If the tablets formulation is not preformed properly, the tablets may leave unpleasant taste or grittiness in the mouth.

Objection in formulation fast dissolving tablets:

1)Palatability[9]:-

Fast Dissolving Tablets are generally taste mask the drug form 90% of the drugs are unpalatable it when they disintegrate or dissolve in patients oral cavity on administration the drug, comes in contact with taste buds, so masking of the taste of the drugs becomes derogatory to patient amenability.

2) Mechanical strength:-

Fast dissolving tablets are made of either permeable and soft molded matrices or pressed into tablets with decreased compression force which causes the tables friable or brittle, difficulty in handling and generally requires specialized peel of blister packing which causes increase in the cost. These are done in order to allow Fast Dissolving Tablets to disintegrate in the oral cavity.

3) Amount of drug:-

The technologies applied which are used for Fast Dissolving Tablets are narrowed by the amount of drugs which can be incorporated into each unit dose. The dose of the drug for insoluble drugs and soluble drugs are respectively less than 400 mg and being for lyophilized dosage forms.This guideline particularly challenges during the formulation of fast dissolving oral films or wafers. Aqueous formulation challenges are presented by water soluble drugs as they form eutectic mixtures which develops in freezing point depression and a glassy solid is formed which collapse on drying during sublimation process due to the loss of supporting structure. These collapses can be intereputed sometimes with the help of diverse matrix forming excipients like mannitol which induces crystallinity and thus transmit rigidity to the amorphous composite.

Size of tablets [10]:

The comfort of tablets administration depends on its size. For swallowing uncomplicated size of the tablets is 7-8mm where as the accessible size to handle was the one which is larger than 8mm has been reported .

Conventional techniques[11,12]:

1)Disintigrates addition:

For the formulation of fast dissolving tablets disintegrates additional technique is one of the most prominent techniques as its implementation is easy and cost effectiveness.

2)Molding:

With the help of water soluble ingredients, molded tablets are prepared in the molding method in which the tablet dissolved effectively and quickly. The blended powder is drenched with a hydro-alcoholic solvent and is constructed into tablets under the pressure which is lower than that used in the compression of conversional tablets.By air drying process the solvent is then removed .When compared to compressed tablets molded tablets are very less condensed. These consists of a porous structure which enhances the dissolution.

3)Freeze drying:

This is a process which is done after freezing where the water is sublimated from the product. Drying of heat sensitive drug and biologicals at a very less temperature under certain conditions in which water is removed by sublimation is called lyophilization. Lyophilization forms products which are highly porous, with a good specific surface area which rapidly dissolve and enhances absorption and bioavailability.

4)Sublimation:

The compressed tablets which has decreased dissolution contains eminently water soluble ingredients because of the less porosity of the tablets. Urea, ammonium carbonate, ammonium bicarbonate hexa methylene tetraamine, camphor which are volatilized readily are the inert solid ingredients are combined joined to the other tablet ingredients are then the, mixture is pressed into tablets. Then the removal of volatile material by sublimation is performed which provokes the structures which are porous. In addition to this, several solvents such as cyclohexane, benzene are also used as pore forming agents.

5)Spray drying:

Production of highly porous and fine powders which dissolve quickly is designed by spray drying.The alignment is done by assimilation of supporting agents which are done by hydrolyzed and non-hydrolyzed gelatins ,bulking agent which is mannitol, sodium starch glycolate, disintegrating such as cross carmellose and an acidic material to augment disintegration and dissolution. Compression of the tablets from the spray dried powder will disintegrate within a time period of 20 seconds when engrossed in aqueous medium.

6)Mass extrusion:

Softening the active blend with the help of solvent mixture of poly ethylene glycol which is water soluble, using methanol and ejected of the softened mass through the syringe to obtain a cylinder of the product into stable segments with the help of heated blade in order to produce tablets is involved in this technology. Coating of the granules of drugs which are bitter in taste can be done by the dried cylinder which masks their bitter taste.

7)Direct compaction:

For the manufacturing of tablets, this is the easiest way. In direct compression, conventional equipment ,commonly available excipients and a limited no. of processing steps are involved. High doses can be domiciled and concluded weight of the tablet can easily outpace than other production methods. Solubilization and disintegration of directly compressed tablets depends on single/combined action of disintegrate, excipients which are water soluble and effervescent agent.

Patented technology [13,14,15]:

a) Flash tab technology:

This was patented by prographarm laboratories active ingredients is present in the prepared tablets by using the convectional technique like coacervation micro encapsulation and extrusion spheronisation drug micro granules may be prepared.

b) Wow tab technology:

Wow means without water Yamanouchi pharmaceutical company patented wow tab technology. In this mechanism there is a usage of combination of low and high mouldability saccharides is done to attain promptly melting strong tablets.

The process of preparation is done as follows:

The active ingredient blended with a low mouldability saccharides which is future granulated which is then constricted into tablets which is followed by moisture treatment. The obtained tablets does exhibited competent hardness and fast disintegration.

c) Orasolv technology:

CIMA labs have developed orasolv technology. The active medicament is taste disguised. Effervescent disintegrating agent is also done at low compression force by the method of direct compression technique in order to reduce the time of oral dissolution. For the production of tablets, conventional blenders and tablets machine is used. The obtained tablets are soft and friable which are packed in specifically designed pick and place system.

d) Durasolv technology:

This technology is also patented by CLMA labs. The manufactured tablets by this technology comprises of drug, filers and lubricant. For the preparation of tablets, conventional tableting equipment is used which has good rigidity. Packing the products can be done into blisters which are conventional packing system. For the products which require minor quantity of active ingredients, durasolv is the pertinent technology. The method involved in this technology engage in the emollient active blend with the help of solvent mixture of water soluble Poly ethylene glycol, using methanol and displacement of softened mass through the extruder to obtain a cylinder of bitter tasting drugs which masks their bitter taste.

Criteria for drug selection[16]:

For fast dissolving tablets, the optimal characteristics of the drug for in vivo dissolution comprise:

1) There should be no astringent taste
2) Dose should be lesser than 200mg
3) Molecular weight which ranges from small to moderate.
4) Stability should be there in water and saliva
5) At the pH of oral cavities it is moderatly non-ionized
6) Capability of diffusion and partition into the epithelium of upper part of gastro intestinal tract.
7) Capability of penetration through tissues of oral mucosa

Unsuitable drug characteristics for fast dissolving tablets :

Intermittent dosing is required and its half life is precise. As taste masking cannot be accomplished, these are very bitter in taste or otherwise inadmissible.

Super disintegrants used in fast dissolving tablets[17]:

Faster disintegration formulation demand is are in great in modern days. Therefore, there is a need of pharmacists to develop disintegrant development i.e super disintegrant at low concentration which are effective and has disintegrating efficacy. These super disintegrates perform by swelling and as a result of swelling pressure is exerted in the outer or radial direction which causes tablet explosion or elevated water absorption which leads to increase in the granule volume to improve the disintegration . Microcrystalline cellulose, sodium starch glycolate, sodium carboxy methylcellulose, pregelatinized starch are distinct types of super disintegrates which are used.

Factors to be considered for selection of super disintegrants:

When the tablets accommodates with saliva in the mouth it should have a capacity to produce mouth dissolving. In order to produce less friable tablets they should be compactable enough. It gives pleasant mouth feel to the patient. As it improve the flowability of the total blend it should have adequate flow.

Promising drugs to be incorporated in fast dissolving tablets[18]:

Aloxiprin, benorylate, fenuben, fenoproten, calcium, ibuprofen, me fenamic with etc are the drugs to be incorporated as analgesics and anti-inflammatory agents. Albendazole, cambendazole, ivermectin, oxtendazole are the antihelmentic drugs which are to be incorporated in fast dissolving tablets. Amiodarone, flecainide acetate, disopyramide are the example anti-arrythmic agents. Clonazepam, methoin, beclamide, methusuximide, ohenobarbilone, are the examples of antiepileptics which are incorporated in fast dissolving tablets. Amphotericin, econazole nitrate, ketoconazole, natamycin are the example of antifungal agents. Atropine, ethopropazine, hyoscyarine, orphenadrine, tropicamide are the anti muscarinic agents. azathiopnne, bisulphan, chlorambucil, cyclosporin toposide, mitotane, tamoxifen citrate are the incorporated as anti-neoplastic agents and immunosuppresants.

Future prospects of fast dissolving tablets[19]:

Numerous biopharma centrical benefits are offered by mouth dissolving tablets which are improved efficiency over conventional dosage forms for instance, to be effective they desire lesser amounts of active ingredients, better absorption profiles and offer improved bioavailability of the drug than formal tablets and capsules. In addition to this, fast dissolving tablets are convenient for the delivery of oral drugs like protein and peptide based therapeutics which have narrowed bioavailability when administered via conventional tablets there products are generally dissolved promptly in the stomach. As the delivered drugs in fast dissolving tablets are absorbed in the pregastric sites of highly permeable buccal and mucosal tissues of oral cavity which are suitable for the delivery of approximately low molecular weight and drugs which are penetrable the possibilities for betterments in fast dissolving tablets in

future are luminous although the technology is still comparatively new numerous drug delivery technologies which cause profit upon betterment of drug therapy from fast dissolving tablets have still to be completely executed.

Conclusion:

Fast dissolving tablets are novel approach in market having property to enhance the release of drugs within 5-15 minutes. Fast dissolving tablets have advantage over conventional tablets and liquid dosage. Due to case of administration, they are first preference of doctors for patients of any age group .We can conclude that fast dissolving tablets can be used safely and effectively over conventional tablets.

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