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Formulation and *In-vitro* evaluation of Orodispersible tablets of Telmisartan

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ABSTRACT

Orodispersible dosage forms are used for accurate dosing, enhanced bioavailability, rapid action, patient compliance, ease of administration, enhanced palatability. Telmisartan is an antihypertensive drug which belongs to the class of Angiotensin Receptor II antagonist. It is a poorly soluble drug (BCS class-II) and the rate of absorption is limited by the dissolution rate. The reported bioavailability of drug is about 42%. In the present study an attempt was made to develop Oral dispersible tablets of Telmisartan formulated with super disintegrating agent with superior dissolution properties. The aim is to formulate various batches of oral disintegrating tablets of Telmisartan by using different superdisintegrants such as Indion 414, Indion 234 and Kyron T 314 with different concentrations individually by using different excipients like Mannitol, magnesium stearate and aspartame. Formulations of P1 to P13 are formulated with different superdisintegrants by wet granulation technique. The tablets were evaluated for the pre-compression parameters such as bulk density, compressibility, angle of repose *etc.* and post compression parameters like hardness, weight variation, friability, disintegration time and in-vitro dissolution profiles. Drug content for all formulation batches i.e. P1-P13 was found to be in the range of 99.76%-102.23%. Based on the evaluation of all parameters, the formulation P5 were found to be best on the basis of following crucial factors like hardness, drug content, disintegration time (14.4 sec) and wetting time.

Keywords: Superdisintegrants, Orodispersible tablet, Wet granulation

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INTRODUCTION

Oral drug delivery has been known for decades as the most widely utilizes route of administration among all the routes that have been explored for the systemic delivery of drugs. Recent advances in novel drug delivery aims to enhance safety and efficacy of drug molecule by formulating a convenient dosage form for ease of administration and to achieve better patient compliance[1]. Fast dissolving tablets are gaining prominence as new drug delivery systems. These dosage forms dissolve or disintegrate in oral cavity within a minute without the need of water or chewing. It has been reported that difficulty in swallowing is common among all age groups and more specific in paedatric, geriatric population and patients with nausea, vomiting and motion sickness complications. Orally disintegrating tablets (ODT) with good taste and flavor increase the acceptability of bitter drugs by various groups of population. Often people experience inconvenience in swallowing conventional tablets and capsules when water is not available, in the case of motion sickness (kinetosis) and sudden episodes of coughing during the common cold, allergic conditions and bronchitis. For these reasons, tablets which can rapidly dissolve or disintegrate in the oral cavity have attracted a great deal of attention. Orodispersible tablet is an orally disintegrating tablet or orodispersible tablet[2,3] (ODT) is a dosage form available for a limited range of over-the-counter (OTC) and prescription medications. Fast dissolve, quick dissolve, rapid melt, quick disintegrating, mouth dissolving, orally disintegrating, orodispersible, melt-in-mouth, tablets etc. are some of the terms which are used to refer to this unique form of drug delivery, which has many advantages over the conventional oral solid dosage forms. ODTs differ from traditional tablets in that they are designed to be dissolved on the tongue rather than swallowed whole. This dosage form was intended for drugs that yield low bioavailability through the digestive tract but are inconvenient to administer parenterally, such as steroids and narcotic analgesics Absorption through the cheek allows the drug to bypass the digestive tract for rapid systemic distribution. Not all ODTs have buccal absorption and many have similar absorption and bioavailability to standard oral dosage forms with the primary route remaining GI absorption. However, a fast disintegration time and a small tablet weight can enhance absorption in the buccal area[4].

Telmisartan is an antihypertensive drug which belongs to the class of Angiotensin Receptor II (Type- ATI) Antagonist. It is a poorly soluble drug (BCS class-II) and its absorption is dissolution rate limited. The poor solubility and dissolution

properties of Telmisartan often results in low and variable oral bioavailability. The oral bioavailability of Telmisartan is 45%. All these suboptimal properties pose significant challenges for the oral absorption of the Telmisartan and for the development of orally bioavailable dosage forms.

The aim of this study was to prepare Orodispersible tablets (ODT) of Telmisartan using different superdisintegrants as a pharmaceutical excipient and evaluate its disintegration properties. Hence an attempt was made to prepare orally disintegrating tablet by wet granulation technique.

MATERIALS AND METHODS

Telmisartan is a gift sample provided by Lupin Pharma. Microcrystalline cellulose, magnesium stearate and mannitol were purchased from LobaChemie Pvt. Ltd., Mumbai. All the chemicals and solvents used in this study are of analytical grade.

Preparation and Evaluation of Orodispersible tablets

In the present study, Telmisartan ODT tablets were prepared by Wet granulation method.

Method of preparation of ODT's tablets

Wet granulation Method

The drug was accurately weighed mixed properly with the super disintegrants and other additives in geometrical mixing to ensure thorough mixing of the ingredients. Then the mixture was subjected to wet granulation by using purified water as a granulating fluid. The cohesive mass is passed through sieve (Sieve No: 40) and the granules was dried. Then other excipients and magnesium state, talc was added and mixed properly in order to avoid demixing problem. Finally the blend was sieved using sieve no 40 and was subjected for compression using Lab Press tablet punching machine to a weight of 150mg.

Evaluation Parameters

Pre compression parameters were evaluated for their flow and compressibility properties. Flow properties of granules were determined by angle of repose method. Compressibility index of granules were determined by Carr's index and Hauser's ratio. Post compression parameters of tablets like thickness, weight variation, hardness, friability, disintegration time, dissolution studies were evaluated.

In-vitro drug release studies

In vitro dissolution studies of Telmisartan ODT formulations prepared were carried in 900 mL of 0.1M HCl as dissolution medium using USP type II dissolution test apparatus (DISSO 2000, LABINDIA) with agitation speed of 50 rpm. The temperature was maintained constantly at 37 ± 0.5°C. 5 ml aliquots were withdrawn at different time intervals and filtered using a 0.45µ nylon disc filters and replaced with 5ml of fresh dissolution medium. The filtered samples were suitably diluted and analyzed at 291.5nm using UV-Visible spectrophotometer.

Wetting time

Two circular tissue papers of 10 cm diameter are placed in a petridish having the same inner diameter. Ten ml of phosphate buffer solution, 1.2 pH containing Eosin, a water soluble dye, is added to petridish. A tablet is carefully placed on the surface of the tissue paper so that complete tablet was not immersed in the solution. Then, the time required for buffer to reach upper surface of the tablet is noted as wetting time.

Differential scanning calorimetry (DSC)

DSC (Perkin Elmer) was used to check the physical, chemical and biological characteristics of drug substance and its combination with superdisintegrants. The sample was placed in a crimped aluminum pan with a reference pan heated at a rate of 20ºC/min over a heating range of 40-300◦ C. Inert atmosphere was maintained with purge of nitrogen gas with a flow rate of 20ml/min.

RESULTS AND DISCUSSION

Tablets prepared by wet granulation method were found to be good without any chipping, capping and sticking. The Angle of repose of the powder blend of drug and excipients was found to be (< 300) indicate good flow properties. Compressibility (%) index or Carr's index values ranged from 12.01 to 16 %. The Hausner's ratio values ranged from 1.20 to 199. The hardness of the prepared tablets was found to be in the range of 4.4 to 4.5kg/cm^2. The friability values were found to be in the range of 0.61 to 0.89%. Prepared tablets were evaluated for weight variation and percentage deviation from the average weight are found to be within (±7.5) the prescribed official limits. The *in vitro* disintegration time of Telmisartan tablets prepared by wet granulation method was found to be in the range of 15 to 36sec.

Formulations of P1 to P13 are formulated with different superdisintegrants such as Indion 414, Indion 234 and Kyron T 314 with different concentrations individually by using different excipients like Mannitol, magnesium stearate and aspartame by wet granulation technique.

It was observed that there was some difference in the disintegration time of the tablets with change in type and concentration of the superdisintegrants and method of addition of superdisintegrant to the formulations. P1-P3 batches comprised of Indion 414 as superdisintegrant at 0.5, 1.25 and 2% w/w respectively and have shown disintegration time in the range of 14.18-21.17sec. P4-P6 batches comprised of the Indion 234 as superdisintegrant alone at concentration of 0.5-5%w/w and disintegration times were found to be in the range of 14.4-24.68sec. Last three batches of P7-P9 comprised of Kyron T 314 at 0.5, 1.25 and 2% w/w and disintegration times were in the range of 13.56-33.72 seconds. P10 batch has shown the highest disintegration time of 244.29 sec as compared to the all other batches since it was devoid of any superdisintegrant and MCC, the disintegrating agent. While P11-P13 batches comprised of MCC PH 102 at concentration levels of 5%, 10%, and 15%w/w without superdisintegrant. The disintegration time values are in the range of 38.27-47.34. These batches has shown the inverted bell shaped graph for disintegration time i.e. at 5%, 10%, and 15%w/w. MCC acts by allowing water to enter the tablet matrix by means of capillary actions. At lowest levels of 5% the water penetration was found to be minimum indicated by more disintegration time required. At highest concentration of 15 %w/w, it result in tablets which have a tendency to stick to the tongue, due to rapid capillary action causing adhesion. Thus, when MCC, used alone it is effective at the concentration of 10 %w/w for rapid disintegration at low hardness. Literature also reveals that it can be used as disintegarnt at a level as low as 10%. But still it was not as effective as the superdisintegrant under study.

Table 1: Evaluation Parameters

Batch code	Evaluation parameters						
	Weight variation (mg)	Hardness (kg/cm²)	Thickness (mm)	Drug content (%)	In vitro DT (Sec.)	Wetting time (Sec)	Friability (%)
P5	150.55	3-3.5	2.67	101.8	14.4	18.30	0.465

Based on the evaluation parameters and in vitro disintegration time among all the formulations, the formulation P5 were found to be best on the basis of following crucial factors like hardness, drug content, disintegration time (14.4 sec) and wetting time. Wetting time of promising formulations was found to be within 15-40 seconds, which facilitates their faster dispersion in the mouth. In vitro dispersion time of promising formulations was found to be within 50sec, which facilitates their faster dispersion in the mouth.

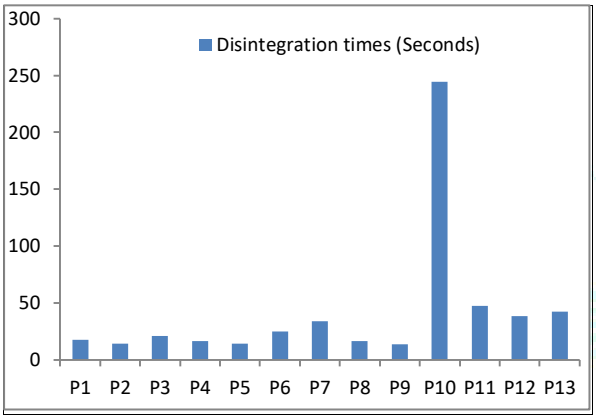

Figure 1: Comparative disintegration time of all batches

CONCLUSION

Faster disintegration characteristics of superdisintegrants can be exploited to formulate ODT of Telmisartan. It can be concluded that fast dissolving tablets of Telmisartan containing Indion 234 can be prepared to obtain faster action of the drug with enhanced solubility characteristics for the effective treatment of hypertension. This approach is effective, economical and industry feasible compared with the use of more expensive adjuvants in the formulation of orodispersible tablets.

REFERENCES

1. Divate S, Kunchu K, Sockan GN, Fast disintegrating tablets - an emerging trend, International Journal of Pharmaceutical Sciences Review and Research, 2011; 6(2):18-22.
2. Hirani JJ, Rathod DA, Vadalia KR, Orally disintegrating tablets: A review, Tropical Journal of Pharmaceutical Research, 2009; 8(2):161-172.
3. Bradoo R, Shahani S, Poojary S. Fast dissolving drug delivery system, JAMA India, 2001; 4(10):27-31.
4. Ghosh T, Ghosh A, Prasad D, A review on new generation orodispersible tablets and its future prospective, International Journal of Pharmacy and Pharmaceutical Sciences, 2011; 3(1):1-7.