A Review Article on Formulation and Evaluation of Fast Dissolving Telmisartan Tablet

Pankaj Gajanan Navghare[1], Rohit Laxman Futankar[2], Dr.Nilesh P. Sawadadkar[3], Dr. Nandu Kayande[4]
[1,2]*Student of Bachelor of Pharmacy, Dr. R. N. Lahoti Institute of Pharmaceutical Education and Research Centre, Sultanpur Tq. Lonar, Dist. Buldhana, Pin Code- 443302.*
[3]*Professor, Dr. R. N. Lahoti Institute of Pharmaceutical Education and Research Centre, Sultanpur Tq. Lonar, Dist. Buldhana, Pin Code- 443302.*
[4]*Principal, Dr. R. N. Lahoti Institute of Pharmaceutical Education and Research Centre, Sultanpur Tq. Lonar, Dist. Buldhana, Pin Code- 443302.*

***Abstract*— Telmisartan is an ACE inhibitor antihypertensive drug. That is use for control the blood pressure and release the pressure of heart. Telmisartan which is use in trompement of hypertension with a view to improve the one set of action, therapeutic efficacy, patient compliance and convenience. Telmisartan is insoluble in water hence the the drug may be slowly or incompletely dissolved in gastro intestine tract. Hence the bioavaibility of telmisartan is less. At that present time to prepare fast dissolving telmisartan tablet use super disintegrants. The tablet was evaluated by their physicochemical properties. Optimizing formulation evaluate for their thickness, tensile strength, weight, friability, hardness, disintegration and dissolution.**

***Index Terms*— Telmisartan, Fast dissolving Tablet, superdisintigrants**

I. INTRODUCTION

Telmisartan is the antihypertensive drug that use for the treatment of the high blood pressure that release the pressure from the heart and that maintain the blood pressure and stable the body on their condition which is helps to regulate normal blood flow. High blood pressure reduction helps prevent stokes, heart attacks and kidney problem. Telmisartan is an angiotensin receptor blocker [ARB] shows high affinity for the angiotensin II type 1 Receptor, has a long duration of action and has the longest half-life of in angiotensin receptor blocker. The dose of the telmisartan is 20mg ,40mg and 80mg and sometime it does is very high that is 160 mg that is very risky and that cause of the kidney failure. Telmisartan belongs to class II drug BCS classification i.e low solubility and high permability and it is practically insoluble in water and it shows low dissolution profile and poor absorption and reduce oral bioavaibility. It is insoluble in water and hence the drug may be slowly or incompletely dissolved in the gastro intestinal tract. The bioavailability of TLM is poor about 45%, which is due to extensive first pass hepatic metabolism. The telmisartan is the oral dosage form that easy to convenient for the patient and the patient easy to consume the tablet. The telmisartan is only in solid dosage form and that tablet is in uncoated form.

The maintenance of drug content at the site of action is the primary concern with any formulation design. Some a solid dosage form that dissolves or disintegrates quickly in the oral cavity, resulting in solution or suspension without the need for the administration of water, is known as an oral fast-dispersing dosage form. Difficulty in swallowing (dysphasia) is common among all age groups, especially in elderly, and is also seen in swallowing conventional tablets and capsules. Conventional dosage forms can provide poor management of plasma drug concentrations. The available formation of TLM in market is an immediate release tablet. Conventional TLM tablet are not suitable where quick onset of action is required. To provide nthe patient with the most convenient mode of administration, a need to develop rapidly dissolve doses form, perticulary one that disintegrants and dissolves/disperse in can be admis rate without need of water. Fast dissolving film are usefull in patient such as pediatric, geriatric, bedridden or developmentally disable who my face difficultly in swallowing conventional tablet.

Telmisartan (TLM) is an antihypertensive agent which is a nonpeptide angiotensin receptor II antagonist, that cause inhibition of the action of angiotensin II on vascular smooth muscle in the symptomatic treatment of hypertension. Seventy-six percent of patients achieve a full response to treatment (Diastolic BP ≤ 90mm Hg or ≥ 10mm Hg reduction) and 22% had an inadequate response to telmisartan therapy (Diastolic BP > 90mm Hg or < 7mm Hg reduction). Overall, heart rate was reduced from 78.0 to73.8 beats/min after 6 months of treatment

II. MATERIAL AND METHODS

Material

Telmisartan, sorbitol, calcium hydrogen phosphate, sodium hydroxide, meglumine, Polyvidone, magnesium stearate, ethanol or water. All reagent and solvent are used for the preparation of telmisartan.

Method

Preparation of Telmisartan

By Wet Granulation

1. Preparation of binder solution: - A key step for telmisartan in ensuring solubility. Sodium hydroxide and meglumine are dissolved in purified water and povidone is added to from the granulation liquid.
2. Dry mixing: - Telmisartan is mixed with fillers/diluents such as microcrystalline cellulose and mannitol in high shear mixture
3. Wet massing: -The binder solution is added to the dry mixture to create a damp, cohensive mass.
4. The granulation and drying: -The wet mass is passed through a screen [16-20 mash] and dryied often in a fluid bed dryer a 50- 60 C untill a specific loss on drying value is achieved.
5. Dry sizing [Milling]: - The dried granules are passed through screen to achieve a uniform size.
6. Lubrication and final blending: - The granules are blend with additional lubricant and disintegrant.
7. Compression: - The final blend is compressed into tablet.

III. EVALUATION OF TELMISARTAN

A) Thickness: - The thickness of films was measured by digital Vernier calipers with least count 0.001mm. The thickness uniformity was measured at five different sites and average of five readings was taken with standard deviation.

B) Folding endurance: - World Journal of Pharmacy and Pharmaceutical Sciences Folding endurance of the film was determined by repeatedly folding a small strip of film at the same place until it broke. The number of times that the film could be folded at the same place without breaking gives the value of folding endurance.

C) Percent elongation: - The percent elongation at break was measured by formula given below.

Strain (E) = TOTAL ELONGATION/ORIGINAL LENTH×100=L-Lo/Lo×100

Were,

L = length after force was applied.

L0 = original length.

D) Drug content: -The Film of area 2x2 cm2 was cut and dissolved in distilled water. Then solvent ethanol and water, to make polymer soluble, were added to the mixture and the remaining volume was made up with distilled water to 100ml in 100ml volumetric flask. Then 1 ml was withdrawn from the solution and diluted to 10ml. The absorbance of the solution was taken at 226nm and concentration was calculated. By correcting dilution factor, the drug content was calculated.

E) Weight variation: - The three films of 2*2 cm 2 was cut and weighed on electronic balance for weight variation test. The test was done to check the uniformity of weight and thus check the batch- to-batch variation.

F) Invitro Disintegration: -

2ml of water was placed in a petrIplates with a film on the surface of water the time taken for the disintegration of the film was measured.

G) Invitro Dissolution: -

900ml of phosphate buffer(pH6.8) was used as a media, and was maintained at 37±0.50c while the basket was set at 100 rpm a film sample of 4cm2(2*2cm) was cut and taken in to the basket. 5ml of the sample were taken every 2 minutes and the same amount was replaced with fresh buffer. the withdrawn

samples were filtered and analysed using a U.V Spectrophotometer at a wavelength of 231nm.

H) Moisture determination: - The granulation moisture content was determined using Sartorius moisture analyzer. Amount of 1g of granules were exposed for 3 min in quick drying mode at 105oC and percentage of moisture was noted for each case.

I) Bulk density and Tap density: - An accurately weighed quantity of the granules was carefully poured into the graduated cylinder and the volume (Vo) was measured. Then the graduated cylinder set into the density determination apparatus. The density apparatus was set for 100 taps and after that, the volume (VF) was measured and continued operation till the two consecutive readings were equal. The bulk density and tapped density were calculated using the following formulas

Bulk density=W/ Vo

Tapped Density= W/VF

Were,

W = weight of the powder

Vo = Initial volume

VF = Final volume.

Carr's Index (I): - Carr's index is an important parameter to measure that can be obtained from the bulk and tapped densities. According to the theory, the less compressible material is more flowable. A material having values less than 20 to 30% is defined as the free-flowing material, based on the apparent bulk density and tapped density, the percentage compressibility of the granules was determined by using the following formula. It is expressed in percentage and is expressed by

I = Dt - Db / Dt x 100

Were,

Dt = Tapped density of the granules

Db = Bulk density of the granules

Hausner's ratio: -

It indicates the flow properties of the powder and the ratio of Tapped density to bulk density of the granules is called Hausner's ratio. It is expressed in percentage and is expressed by-

H= Dt / Db

Were,

Dt = Tapped density of the granules

Db = Bulk density of the granules

J) Hardness: - Hardness or tablet crushing strength (the force required to break a tablet in a diametric compression) was measured using Monsanto tablet hardness tester. It is expressed in Newtons.

K) Friability: - Friability of the tablet determined using Roche friabiltor (Erweka, Germany). This device subjects the tablet to the combined effect of abrasion and shock in a plastic chamber revolving at 25rpm and dropping a tablet at l height of 6 inches in each revolution. Preweighted sample of tablets was placed in the friabilator and were subjected to the 100 revolutions. Tablets were de-dusted using a soft muslin cloth and reweighed. The friability (F) is given by the formula.

F= (W0-Wf) /W0* 100

Were,

W0 = Initial weight

Wf = Final weight

IV. RESULTS AND DISCUSSION

In the present work inclusion complexes of Telmisartan were prepared with β-cyclodextrin by physical mixture, kneading method and Solvent evaporation method. The complexes were prepared in different molar ratios of drug and cyclodextrin namely 1:1 and 1:2. All the prepared inclusion complexes

were white and fine without any stickiness. the concentration of sucralose was increased and menthol was incorporated as coolant. The incorporation of potassium hydroxide did not adversely affect appearance, peelablity and flexibility of the film.

Telmisartan is a BCS class II drug which traditionally results in poor dissolution and reduced, variable bioavaibility. Fast dissolving forms, using super disintegrants like cosmovision, croscarmellose sodium or sodium starch glycolate, rapidly break down in saliva to improve this. These formulations typically disintegrate within 13-60 seconds allowing for quicker absorption, crucial for managing sudden rises in blood pressure. By dispersing saliva and avoiding the initial slow dissolution in the gastrointestinal tract, the drug is more immediately available. Studies show that optimized fast dissolving tablets.

REFERENCES

[1] C. Liang and L. H. Chen, "Fast-dissolving intraoral drug delivery systems," *Expert Opinion on Therapeutic Patents*, 2001.

[2] S. Borsadia, D. O'Halloran, and J. L. Osborne, "Quick dissolving films—A novel approach to drug delivery," *Drug Delivery Technology*, 2003.

[3] J. Klancke, "Dissolution testing of orally disintegrating tablets," *Dissolution Technologies*, 2003.

[4] S. R. Parakh and A. V. Gothoskar, "Review of mouth dissolving tablet technologies," *Pharmaceutical Technology*, 2003.

[5] W. Wienen *et al.*, "A review on telmisartan: A novel, long-acting angiotensin II-receptor antagonist," *Cardiovascular Drug Reviews*, 2000, vol. 18, pp. 127–154.

[6] R. E. Dinnebier, P. Sieger, H. Nar, K. Shankland, and W. I. F. David, "Structural characterization of three crystalline modifications of telmisartan by single crystal and high-resolution X-ray powder diffraction," *Journal of Pharmaceutical Sciences*, 2000, vol. 89, pp. 1465–1479.

[7] *Indian Pharmacopoeia*, vol. 2. New Delhi, India: Controller of Publications, Ministry of Health and Family Welfare, Govt. of India, 2010.

[8] P. V. Rao and P. K. Desu, "Formulation development and in vitro evaluation of immediate release tablets of nevirapine cyclodextrin complexes," *The Pharma Innovation*, vol. 5, no. 6, pp. 110–114, 2016.

[9] P. K. Desu, P. M. Rao, A. M. S. S. Babu, K. N. Sree, N. S. V. T. Rameswarapu, and K. L. N. M. Rao, "Formulation development and in vitro evaluation of immediate release tablets of biperiden HCl cyclodextrin complexes," *International Journal of Research in Pharmaceutical and Nano Sciences*, vol. 2, no. 6, pp. 757–767, 2013.

[10] P. K. Desu and M. Sahu, "Formulation and evaluation of rapid dissolving films of zolmitriptan," *International Research Journal of Pharmacy*, vol. 3, no. 5, 2012.

[11] Bonthagarala, S. Nama, and P. K. Desu, "Formulation and evaluation of fast dissolving films of rizatriptan," *International Journal of Pharmaceutical Research and Bio-Science*, vol. 2, no. 3, pp. 298–305, 2013.

[12] Bonthagarala, P. K. Desu, S. Nama, and S. S. Babu, "Formulation and evaluation of extended release mucoadhesive microspheres of simvastatin," *International Journal of Pharmaceutical and Biomedical Research*, vol. 4, no. 1, pp. 57–64, 2013.

[13] L. H. Reddy and B. Ghosh, "Fast dissolving drug delivery system: A review of the literature," *Indian Journal of Pharmaceutical Sciences*, vol. 64, pp. 331–336, 2002.

[14] S. Sharma and G. D. Gupta, "Formulation and characterization of fast dissolving tablet of promethazine theoclate," *Asian Journal of Pharmaceutics*, vol. 57, pp. 70–73, 2008.

[15] P. D. Chaudhari, S. P. Chaudhari, S. R. Kohle, K. V. Dave, and D. M. More, "Formulation and evaluation of fast dissolving tablets of famotidine," *Indian Drugs*, vol. 42, pp. 641–649, 2005.