Original Research

FORMULATION AND IN VITRO EVALUATION OF LIQUISOLID COMPACTS OF TELMISARTAN

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ABSTRACT:

Telmisartan is Angiotensin receptor blocker, ARB used for the treatment of the Hypertension. This drug is poorly soluble in water that causes slow dissolution rate of the drug and also slow absorption which eventually leads to the inadequate and low oral bioavailability[4] i.e., 43%. To overcome this problem the drug is formulated with the most novel technology the Liquisolid compaction. In this technology, the insoluble drug is made dissolved in the suitable non-volatile water miscible solvent to form the drug solution which is then compressed directly into the Liquisolid tablets by the addition of suitable carrier and coating materials along with the lubricant, glidant, and disintegrants. In this study, Neusilin, the widely accepted multifunctional excipient is used in the formulation of telmisartan compacts .Neusilin is the synthethic granule of magnesium alumina metasilicate.

KEYWORDS: Telmisartan, Neusilin, Liquisolid tablets[10].

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INTRODUCTION:

Among all the enteral routes of drug administration, the oral route is the most prefered route as it has major advantages than all the other routes of administration. But when the drugs that are poorly soluble in water administered orally may result in poor dissolution rate and incomplete bioavailability[6]. There are many techniques developed to increase the dissolution[9] rate of the poorly soluble drugs. The Liquisolid compaction technique is one such. In this technology, the drug is dissolved in the non-volatile liquid to form a drug solution which is then converted into dry, free flowing and readily compressible dry powder using excipients and directly compressed into tablets.

MATERIALS AND METHODS:

Materials:

The materials used are Telmisartan, propylene glycol,Polyethylene glycol-400, Tween 80, Avicel-102, **Neusilin**,

Aerosil, Magnesium stereate, Talc.

Methods:

Preparation of Liquisolid Compacts:

1. A drug was initially dispersed in the non volatile solvent systems (Tween 80, Propylene glycol, PEG 400) termed as liquid vehicles with different drug : vehicle ratio.
2. Then a mixture of carrier and coating materials were added to the above liquid by continuous mixing for a period of 10 to 20 minutes in a mortar. The amount of carrier and coating materials are enough to maintain acceptable flow and compression properties.
3. To the above binary mixture disintegrant like sodium starch glycolate and other remaining additives are added according to their application and mixed in a mortar.
4. The final mixture was compressed to achieve tablet hardness or encapsulated.
5. Characterise the final liquisolid granules for solubility, flowability, compressibility and dissolution.

Preparation of Conventional tablets Telmisartan:

Conventional tablet of Telmisartan was prepared by mixing 20mg of drug with micro crystalline cellulose (Avicel pH 102), Aerosil-200 and Superdisintegrant (i.e. sodium starch glycolate etc.) and mixed for 10 minutes. Mg. stearate &Talc is added and then filled into a tablet.

Composition of Telmisartan Tablets

S.NO.	Ingredient	C	F1	F2	F3	F4	F5	F6	F7	**F8**	F9
1	Telmisartan	20	20	20	20	20	20	20	20	**20**	20
2	Poly ethylene glycol-400	----	10	----	----	20	----	----	----	**----**	----
3	Propylene glycol	----	----	10	----	----	20	----	----	**----**	----
4	Tween-80	----	----	----	10	----	----	20	20	**20**	20

5	AVICEL- PH 102 (Microcrystalline Cellulose)	120	100	100	100	120	120	120	100	**90**	80
6	Neusilin	----	----	----	----	----	----	----	20	**30**	40
7	Aerosil-200	6	5	5	5	6	6	6	6	**6**	6
8	Sodium Starch Glycolate	10	10	10	10	10	10	10	5	**5**	----
11	Magnesium stearate	2	3	3	3	2	2	2	2	**2**	2
12	Talc	2	2	2	2	2	2	2	2	**2**	2
	Total wt(in mg)	160	150	150	150	180	180	180	180	**180**	180

*R value for all formulations is constant (i.e. 20)

Drug release:

The drug release from the Telmisartan tablets was investigated in a USP-II(paddle) apparatus, 900 ml of Phosphate buffer pH 6.8 (50 rpm, 37°C). At predetermined time intervals, 5-ml samples were withdrawn and diluted to suitable concentration and then analyzed with UV spectrophotometry at λmax=227 nm.

Stability studies:

Selected Formulation was subjected to stability studies[7] as per ICH guidelines.

Following conditions were used for Stability Testing:

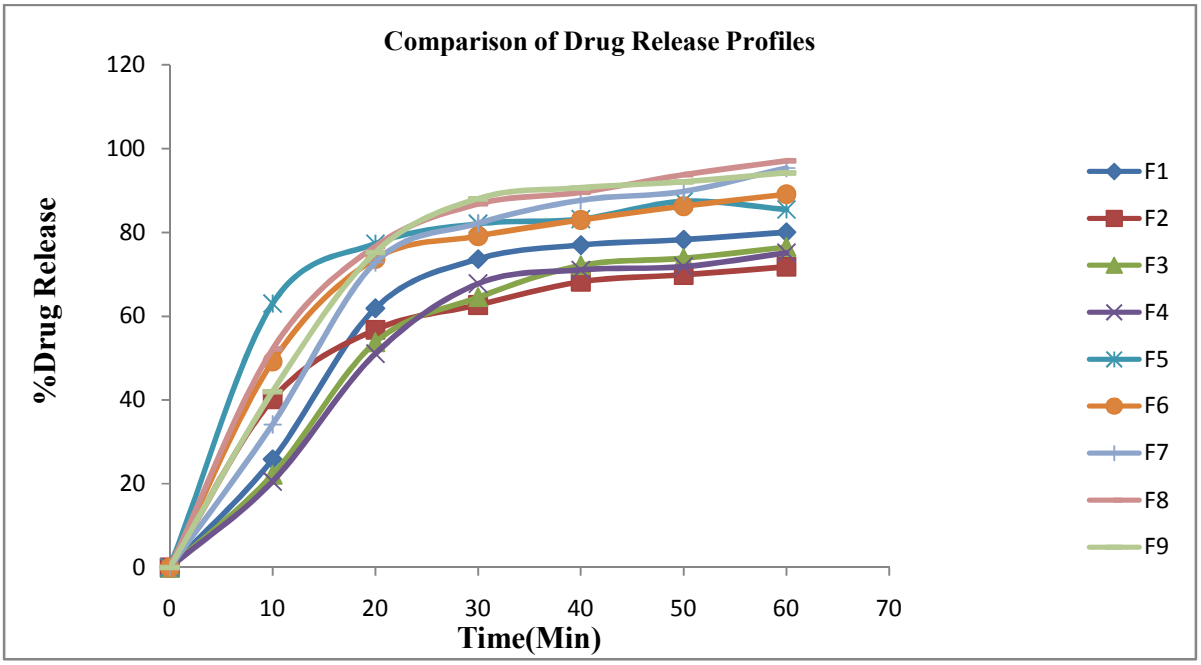
1. 25^0C/60% RH analyzed every month for period of three months.
2. 30^0C/75% RH analyzed every month for period of three months.
3. 40^0C/75% RH analyzed every month for period of three months.

RESULTS:

DISSOLUTION PROFILE OF PREPARED FORMULATIONS

Time	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
10	25.84	40.15	22.15	20.53	63	49.15	34.15	**52.15**	42
20	61.9	56.75	53.78	51.05	77.31	73.69	72.84	**76.73**	75.23
30	73.66	62.68	64.53	67.76	82.08	79.12	82.18	**86.81**	88.06

40	77.01	68.21	72.16	71.05	83.21	82.99	87.69	**89.6**	90.64
50	78.3	69.87	73.87	71.82	87.42	86.27	89.8	**93.8**	92.08
60	80.07	71.78	76.51	75.13	85.5	89.12	95.38	**97.11**	94.23

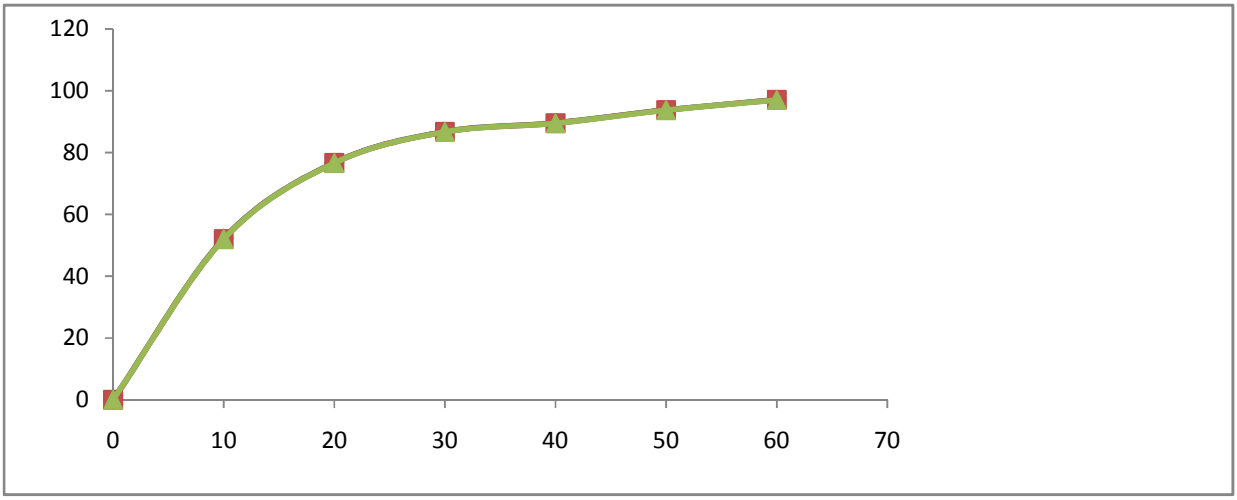


Results of stability studies of optimised formulation F8

Formulation code	Parameters	Initial	1st Month	2nd Month	Limits as per specifications
F8	25˚C/60%RH % Release	97.11	96.87	96.65	Not less than 85%
F8	30˚C/75%RH % Release	97.05	96.89	96.88	Not less than 85%
F8	40˚C/75%RH % Release	97.11	96.88	96.63	Not less than 85%
F8	25˚C/60%RH Assay value	98.16	98.10	98.12	Not less than 90% Not more than 110%

F8	30˚C/75%RH Assay value	98.12	98.11	98.10	Not less than 90% Not more than 110%
F8	40˚C/75%RH Assay value	98.16	98.10	98.10	Not less than 90% Not more than 110%

Stability dissolution profile of F8 for 1st, 2nd months



CONCLUSION

The aim of this study was to improve the dissolution profile of the poorly soluble telmisartan drug.In vitro drug release of Telmisartan compacts showed increase in dissolution rate. So PEG 400, PG, Tween 80 could be economic substitute as dissolution enhancing agent. Stability studies showed that there were no significant changes in physical and chemical properties of formulation F8 after 2 months. Tween 80, Telmisartan, Neusilin in 1:1:1.5 ratios (F8) was showing best release. F8 was compared with marketed and prepared conventional formulation and result shows better dissolution profile.

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References:

1. Charman SA, Charman WN. Oral modified release delivery systems, In: Rathbone MJ. Hadgraftb J, Roberts MS. Modified Release Drug Delivery Technology, New York, 2003, pp.1-9.

2. Darwish AM, El-Kamel Ah. Dissolution enhancement of glibenclamide using liquisolid tablet technology, Acta Pharm. 2001, 51: 173-181.

3. Lbenberg R, Amidon GL. Modern bioavailability, bioequivalence and Biopharmaceutics classification system. New scientific approaches to international regulatory standards. Eur J Pharm Biopharm. 2000; 50: 3-12.

4. Modi A, Tayade P. Enhancement of Dissolution Profile by Solid Dispersion (Kneading) Technique. AAPS Pharm Sci Tech. 2006; 7(3): 2-17.

5. Hiremath SN, Raghavendra RK, Sunil F, Danki LS, Rampure MV, Swamy PV, Bhosale UV. Dissolution enhancement of gliclazide by preparation of inclusion complexes with cyclodextrin. Asian J Pharm. 2008; 2:73-76.

6. Rasenack N, Muller BW. Dissolution rate enhancement by in situ micronization of poorly water-soluble drugs. Pharm Res. 2002; 19: 1894-1900.

7. Papadimitriou SA, Bikiaris D, Avgoustakis K. Microwave-induced enhancement of the dissolution rate of poorly water-soluble tibolone from poly (ethylene glycol) solid dispersions. J Appl Polymer Sci. 2008; 108:1249-1258.

8. Smirnova I, Suttiruengwong S, Seiler M, Arlt M. Dissolution rate enhancement by adsorption of poorly soluble drugs on hydrophilic silica aerogels. Pharm Dev Tech 2004; 9:443-452.

9. Fahmy RH, Kassem MA. Enhancement of Famotidine dissolution rate through liquisolid tablet formulation: In vitro and In vivo evaluation. Eur.J.Pharm. Biopharm. 2008; 69:993-1003.

10. Spireas S. Liquisolid Systems and Methods of Preparing Same. U.S.Patent 6, 423, 339 B1; 2002.

11. Jarowski CI, Rohera BD, Spireas S. Powdered solution technology: principles and mechanism. Pharm Res. 1992; 9: 1351-1358.

12. Barzegar JM, Javadzadeh Y, Nokhodchi A, Siahi-Shadbad MR. Enhancement of dissolution rate of piroxicam using liquisolid compacts. II Farmaco. 2005; 60: 361-365.

13. Nokhodchi A, Hentzschel CM, Leopord CS. Drug release from liquisolid system: speed it up, slow it down. Expert Opin Drug Del. 2011; 8: 191-205.

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