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Original Article

COMPARATIVE FORMULATION, EVALUATION AND OPTIMIZATION OF IMIDAPRIL MOUTH DISSOLVING TABLETS USING DIFFERENT SYNTHETIC SUPERDISINTEGRATING AGENTS

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ABSTRACT

Objective: The aim of this work was preparing once daily mouth disintegrating tablets to handle easily for adult hypertensive patients who have difficulty in swallowing.

Methods: Imidapril mouth dissolving tablets (MDTs) were prepared by direct compression method using different concentrations of synthetic super disintegrants namely Sodium starch glycolate, Croscarmellose sodium & Kyron T-314. The prepared tablets were evaluated for weight variation, thickness, hardness, friability, content uniformity, disintegration time and *In-vitro* dissolution studies.

Results: The micropolitics study indicates that all formulations were of acceptable to good flowability. Tablet hardness and friability indicated that the prepared formulations were having good mechanical strength. The most satisfactory formulation F5 containing Sodium starch glycolate showed minimum disintegration time of 19 s and released a maximum amount of drug in 30 min in phosphate buffer 6.8pH, by an appropriate combination of excipients. The optimized F5 formulation containing Sodium starch glycolate was found to be stable during stability studies conducted for 3 mo as per International Conference on Harmonization (ICH) guidelines.

Conclusion: The present study conclusively proved that Imidapril MDTs could be successfully developed using various super disintegrants. The prepared tablets gave promising results with respect to the faster release of Imidapril. Further clinical studies are suggested to confirm the ability of the best-achieved system to avoid the first pass metabolism of Imidapril and improve patient compliance.

Keywords: Imidapril, Mouth dissolving tablets, Sodium starch glycolate, Croscarmellose sodium, Kyron T314.

INTRODUCTION

For the past one decade, there has been an enhanced demand for more patient-friendly and compliant dosage forms. As a result, the demand for developing new technologies has been increasing annually [1]. One study showed that approximately 26% of 1576 patients do not take their prescribed medication as they encountered problems when swallowing conventional tablets. To develop a chemical entity, a lot of money, hard work and time are required. So the focus is rather being laid on the development of new drug delivery systems for already existing drugs, with enhanced efficacy and bioavailability, thus reducing the dose and dosing frequency to minimize the side effects [2]. Recently the European Pharmacopoeia adopted the term oro-dispersible tablet as a tablet to be placed in the mouth where it disperses rapidly before swallowing and which disintegrates in less than 3 min [3]. When put in the mouth, these dosage forms disintegrate instantly to release the drug, which dissolves or disperses in the saliva. Thereafter, the drug may get absorbed from the pharynx and esophagus or from other sections of the gastrointestinal tract (G. I. T) as the saliva travels down. In such cases, bioavailability is significantly greater than that observed from conventional tablet dosage form [4-6]. The target populations for MDTs are pediatric, geriatric, and bedridden or developmentally disabled patients. Patients with persistent nausea, who are traveling, or who have little or no access to water are also good candidates. The performance of MDTs depends on the technology used in their manufacture. The orally disintegrating property of these tablets is attributable to the quick ingress of water into the tablet matrix, which creates porous structure and results in rapid disintegration. Hence, the basic approach to developing MDTs include maximizing the porous structure of the tablet matrix, incorporating the appropriate disintegrating agent and using water soluble excipients highly in the formulation [7].

Imidapril is an angiotensin-converting enzyme (ACE) inhibitor, used to treat hypertension and congestive heart failure. Imidapril lowers the production of angiotensin II, therefore relaxing arterial muscles while at the same time enlarging the arteries, allowing the heart to pump blood more easily, and more blood is pumped into and through larger passageways due to increasing blood flow. Imidapril has attaining various problems like difficulty in swallowing, less bioavailability, first pass metabolism in conventional dosage forms. Imidapril have a poor bioavailability of 28%-30%, the extent of absorption is not affected by the presence of food. However, the rate of absorption is reduced.

The oral bioavailability of Imidapril can be enhanced by decreasing its extent of first pass effect. Mouth dissolving tablet formulation has been widely and successfully applied to improve the dissolution, solubility, and consequently the bioavailability of poorly water-soluble drugs. Because of its poor aqueous solubility, Imidapril may pose dissolution related absorption problem. The oral bioavailability of Imidapril can be enhanced by decreasing its extent of first pass effect.

In the present study, an attempt had been made to prepare MDTs of Imidapril in the oral cavity with enhanced dissolution rate & hence improved patient compliance using different synthetic super disintegrants like Sodium starch glycolate, Cross carmellose sodium & Kyron T314 by applying direct compression technique which enhances the bioavailability of the drug by decreasing the disintegrating time and increase in drug release, and also to reduce the manufacturing cost, increase safety and reduces toxicity. From the literature survey, it was concluded that there is no formulation was made by using different synthetic super disintegrants in the formulation of Imidapril MDTs.

MATERIALS AND METHODS

Materials

Imidapril was gifted by Hetero Drugs, Hyderabad. Sodium starch glycolate, Croscarmellose sodium was procured from Sanofi-Aventis Pvt. Ltd., Goa, Kyron T-314 was gifted by Corel Pharma Chem. Avicel pH101, Lactitol, Sodium Stearyl Fumarate, Talc, Neotame, Aerosil,

Orange Flavour were procured from S. D. Fine Chemicals, Mumbai, India. Remaining all other ingredients used was of analytical grade.

Methods

Calibration curves for the estimation of Imidapril

Accurately weighed amount (100 mg) of the drug was dissolved in phosphate buffer of pH 6.8 in 100 ml volumetric flask and the volume was made up to 100 ml. From this stock solution 10 ml is withdrawn into a volumetric flask, made the volume up to 100 ml with phosphate buffer of pH 6.8. From this 2nd stock solution (100mcg/ml), concentrations of 5, 10, 15, 20, 25, 30, µg/ml solutions were prepared and the corresponding absorbance was measured at 231 nm in Ultraviolet-visible (UV-Visible) spectrophotometer.

Precompression parameters for powder blend of Imidapril

The powder blend of Imidapril were evaluated for various pre-compression parameters such as angle of repose, bulk density, tapped bulk density, compressibility index & hausner's ratio [8].

Preparation of Imidapril tablets

Imidapril MDTs were prepared by direct compression method using super disintegrants like Sodium starch glycolate, Croscarmellose sodium& Kyron T314 in different proportion and in different combination. All the ingredients were accurately weighed and sifted through sieve no. #100.

The drug, super disintegrants, avicel pH101, lactitol were triturated well in a mortar using pestle for 10 to 15 min. Then sodium stearyl fumarate, talc, aerosol, neotame and orange flavor were passed through sieve no. #100 blended well with the initial mixture. The final powder blend was compressed using 12 station tablet compression machine to produce oval-shaped tablets of Imidapril weighing 150 mg having a diameter of 8.5*3 mm.

Post compression parameters of Imidapril tablets

Size and shape

The size and shape of the tablet can be dimensionally described, monitored and controlled [9].

Tablet thickness

Tablet thickness is an important characteristic in reproducing appearance and also in counting by using the filling equipment. 10 tablets were taken and their thickness was measured using Vernier calipers [10].

Weight variation

Twenty tablets are taken and their weight is determined individually and collectively on an electronic weighing balance. The average weight of one tablet was determined from the collective weight. The weight variation test would be a satisfactory method of determining the drug content uniformity.

Table 1: Formulation design of Imidapril mouth dissolving tablets

Formula Code	Imidapril (mg)	SSG (mg)	CCS(mg)	Kyron T134 (mg)	Avicel pH101(mg)	Lactitol(mg)	SSF (mg)	Talc(mg)	Aerosil (mg)	Neotame (mg)	Orange flavor (mg)
F1	10	1.5			75	56.5	2	2	1.5	0.5	1
F2	10	3			75	55	2	2	1.5	0.5	1
F3	10	4.5			75	53.5	2	2	1.5	0.5	1
F4	10	6			75	52	2	2	1.5	0.5	1
F5	10	7.5			75	50.5	2	2	1.5	0.5	1
F6	10		1.5		75	56.5	2	2	1.5	0.5	1
F7	10		3		75	55	2	2	1.5	0.5	1
F8	10		4.5		75	53.5	2	2	1.5	0.5	1
F9	10		6		75	52	2	2	1.5	0.5	1
F10	10		7.5		75	50.5	2	2	1.5	0.5	1
F11	10			1.5	75	56.5	2	2	1.5	0.5	1
F12	10			3	75	55	2	2	1.5	0.5	1
F13	10			4.5	75	53.5	2	2	1.5	0.5	1
F14	10			6	75	52	2	2	1.5	0.5	1
F15	10			7.5	75	50.5	2	2	1.5	0.5	1

Tablet hardness

The hardness of the tablet of each formulation was determined using Monsanto hardness tester or Pfizer hardness tester [11].

Friability

The Friability of tablets was performed in a Roche Friabilator. It consists of a plastic chamber that revolves at 25 rpm. About ten tablets were weighed together and then placed in the chamber. The friabilator was operated for 100 revolutions, and the tablets were subjected to the combined effects of abrasion and shock because the plastic chamber carrying the tablets drops them at a distance of six inches with every revolution. The tablets are then dusted and re-weighed.

$$\% \text{ Friability} = \frac{(W1 - W2)}{W1} \times 100$$

W1 = Initial weight of the 20 tablets, W2 = Weight of the 20 tablets after testing.

Wetting time of tablets

Five circular tissue papers of 10 cm diameter are placed in a petri-dish with a 10 cm diameter. Ten millimeters of water-containing Eosin, a water-soluble dye, is added to petri-dish. A tablet is carefully placed on the surface of the tissue paper. The time required for water to reach the upper surface of the tablet is noted as a wetting time [12].

Water absorption ratio

A piece of tissue paper folded twice was placed in a small petri-dish containing 6 ml of water. A tablet was put on the paper and time required for complete wetting was measured.

The wetted tablet was then weighed. Water absorption ratio, R was determined using following equation [13].

$R = 100 (Wa–Wb)/Wb$

Wb–weight of tablet before absorption

Wa–weight of tablet after absorption

***In-vitro* dispersion time**

One tablet was placed in a beaker containing 10 ml of pH 6.8 phosphate buffers at 37±0.5 °C and the time required for complete dispersion was determined [14].

Disintegration time

The disintegration test was carried out using disintegration test apparatus. Six tablets were placed individually in each tube of disintegration test apparatus and discs were placed over each tablet. Distilled water was used as the medium maintained at 37 °C±0.5 °C and the time taken for each tablet to disintegrate completely was recorded.

Uniformity of drug content

Twenty tablets from each batch were weighed accurately and powdered. An amount of powder equivalent to 50 mg of the drug was transferred into a 100 ml volumetric flask. The volume was made with 6.8 pH phosphate buffer and sonicated for 10 min. The resulting solution was filtered and assayed at 231 nm using Ultraviolet spectrophotometer and drug content per tablet was determined.

***In-vitro* dissolution profile**

In-vitro drug release study was performed at 37±0.5 °C using United States Pharmacopeia (USP) type-II apparatus with paddle rotating at 50 rpm. The drug release study was carried out in saline Phosphate buffer pH 6.8 by taking about 500 ml of the dissolution medium. About 5 ml of sample was withdrawn at specified time intervals from the dissolution medium and replaced with equal volume of fresh medium. Samples were filtered through Whatman filter paper and analyzed using Ultraviolet spectrophotometer (UV-1700, Shimadzu Corporation, Japan) at 231 nm.

Kinetics of drug release

In order to examine the release mechanism of the drug from the tablets, the In-vitro drug release data of the mouth dissolving tablets were subjected to following release models zero order, first order models.

Accelerated stability studies

Stability studies were carried out on optimized formulation. The tablets were stored at 40 °C and 75% (relative humidity) RH for a duration of three months. After every one-month samples were withdrawn and tested for various parameters like hardness, drug content and *in vitro* drug release.

RESULTS

A successful attempt has been made to formulate Mouth dissolving tablets of Imidapril using three different super disintegrants namely Sodium starch glycolate, Croscarmellose sodium & Kyron T314 in five different concentrations (1%, 2%, 3%, 4% and 5%). A total fifteen formulations were prepared. The effect of type and concentration of super disintegrants on the *in-vitro* release of the drug were studied and promising formulations were tested for *in-vivo* efficacy.

Calibration curves for Imidapril

Calibration curve For Imidaprilat 231 nm in 6.8 pH phosphate buffer was shown in fig 1.

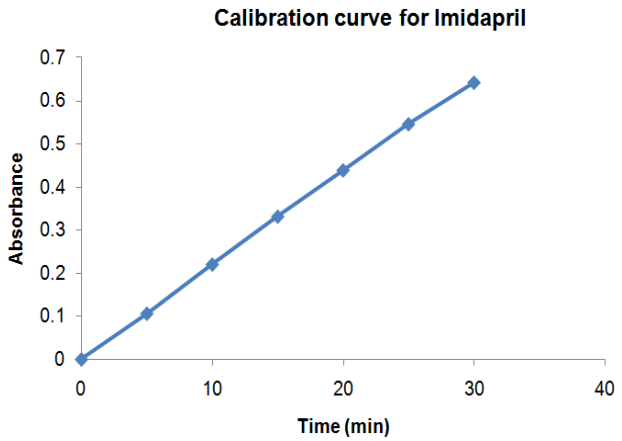

Fig. 1: Calibration curve for Imidapril

Pre-compression parameters

Angle of repose

The frictional forces in loose powder or granules can be measured by the angle of repose. The angle of repose values lies in the range of 24 °.44'±0.01 to 30 °.09'±0.06. The outcomes were tabulated and data demonstrated in table 2.

Bulk density and tapped density

Both bulk density (BD) and tapped density (TD) were determined. Bulk density and tapped density showed values in the range of 0.43±0.10g/cm^3 to 0.58±0.45g/cm^{3}and 0.48±0.12g/cm^3 to 0.67±0.14g/cm^3 respectively. The tabulated results were shown in table 2.

Carr's Index

Carr's Index was found to be in the range of 10.34±0.08% to 15.09±0.02%. The outcomes were tabulated, and data demonstrated in table 2.

Table 2: Flow properties of the blend

Formula	Bulk density (g/cm^3)	Tapped density (g/cm^3)	Angle of repose (θ)	Carr's index (%)	Hausners ratio
F1	0.45±0.01	0.53±0.05	26°.81'±0.30	15.09±0.02	1.17±0.06
F2	0.48±0.12	0.55±0.04	29°.30'±0.12	12.72±0.08	1.14±0.02
F3	0.43±0.10	0.48±0.12	29°.71'±0.23	10.41±0.06	1.11±0.04
F4	0.56±0.01	0.63±0.13	27°.55'±0.01	11.11±0.04	1.12±0.10
F5	0.53±0.05	0.62±0.09	28°.47'±0.02	14.51±0.05	1.16±0.03
F6	0.48±0.02	0.56±0.08	27°.63'±0.03	14.28±0.02	1.16±0.04
F7	0.49±0.06	0.57±0.02	28°.45'±0.01	14.03±0.01	1.16±0.08
F8	0.56±0.06	0.65±0.08	26°.31'±0.06	13.84±0.09	1.16±0.11
F9	0.52±0.08	0.58±0.04	30°.04'±0.02	10.34±0.08	1.11±0.01
F10	0.55±0.07	0.62±0.08	24°.44'±0.01	11.29±0.03	1.12±0.06
F11	0.52±0.45	0.61±0.14	26°.32'±0.06	14.75±0.04	1.17±0.05
F12	0.49±0.45	0.57±0.14	28°.01'±0.02	14.03±0.02	1.16±0.07
F13	0.56±0.45	0.65±0.14	29°.05'±0.01	13.84±0.08	1.16±0.02
F14	0.58±0.45	0.67±0.14	30°.09'±0.06	13.43±0.10	1.15±0.01
F15	0.54±0.45	0.61±0.14	28°.89'±0.01	11.15±0.04	1.12±0.03

All the values are expressed as mean±Standard deviation; n=3

Hausner's ratio

Hausner's ratio was found in the range of 1.11±0.01 to 1.17±0.06. The results were tabulated and data shown in table 2.

Post compressional parameters for Imidapril

Hardness

The hardness of the prepared tablet varied from 3.56±0.31to 4.99±0.05 kg/cm^2 and the results were tabulated in table 3.

Friability

Friability was in the range of 0.36±0.05to 0.79±0.047 %. The outcomes were tabulated, and data demonstrated in table 3.

Thickness

The thickness of all the tablets was found to be between 2.24±0.037 mm to 3.98±0.024 mm shown in table 3.

Weight variation

Weight variation of all the MDTs formulations were ranged from 148±0.019 to 150±0.06 mg and the results were shown in table 3.

Water absorption ratio and wetting time

The Water absorption ratio founded between 58.2±0.1to 72.2±0.3 & wetting time of tablets were found between 22±0.6 s to 65±0.7 s. The outcomes were tabulated and shown in table 4.

Dispersion time

The dispersion time of all formulations was ranged from 1 min 2s to 4 min 25s which were shown in table 4.

Disintegration studies

In-vitro disintegration time was done by the USP dissolution apparatus. The disintegration rate has a correlation with water absorption capacity of disintegrate and the *In-vitro* disintegration time was found between 19 s to 52 s. The outcomes were tabulated and data demonstrated in table 3.

Drug content

The percentage of drug content for all formulation was found to 97.01±0.64% to 99.97±0.12 % as shown in table 4. Comparison of water absorption ratio, dispersion time & disintegration time of formulations for F5, F10 & F15 were shown in fig. 2.

***In-vitro* dissolution studies**

In vitro dissolution studies of all the formulation were done for all formulations.

Formulations F1, F2, F3, F4 & F5 which contained Sodium starch glycolate 1%, 2%, 3%, 4% and 5%w/w respectively, showed drug release of 35.47±0.02, 55.00±0.02, 73.34±0.01, 84.42±0.01 & 98.14±0.01% and depicted in fig 3.

Formulations F6, F7, F8, F9 & F10 which contained Croscarmellose sodium 1%, 2%, 3%, 4% and 5%w/w respectively, showed drug release of 43.00±0.02, 55.49±0.03, 67.69±0.0, 75.00±0.03, & 92.15±0.04% and depicted in fig 4.

Formulations F11, F12, F13, F14 & F15 which contained Kyron T314 1%, 2%, 3%, 4% and 5%w/w respectively, showed drug release of 42.58±0.02, 56.89±0.03, 67.37±0.03, 81.58±0.03 & 94.25±0.04% and depicted in fig 5.

Comparison of dissolution profiles for formulations F5, F10& F15 were shown in fig 6.

Kinetic study

Kinetic results revealed that the selected formulations followed first order kinetics as correlation coefficient (r^2) values are higher than that of zero order release kinetics.

Table 3: Post compressional parameters of different formulations of Imidapril

Formula	Hardness kg/cm^2	Friability (%)	Thickness (mm)	Weight variation (mg)
F1	4.99±0.05	0.38±0.01	2.97±0.041	150±0.027
F2	4.96±0.08	0.61±0.02	3.08±0.019	148±0.019
F3	4.01±0.09	0.49±0.05	3.98±0.024	149±0.029
F4	3.94±0.03	0.36±0.05	3.05±0.031	150±0.059
F5	4.05±0.08	0.50±0.002	2.24±0.037	150±0.047
F6	3.56±0.31	0.41±0.012	3.04±0.025	149±0.032
F7	3.99±0.42	0.45±0.021	2.96±0.022	150±0.060
F8	3.85±0.41	0.56±0.031	3.01±0.031	148±0.024
F9	4.40±0.49	0.71±0.024	2.94±0.037	149±0.039
F10	4.12±0.35	0.58±0.012	2.96±0.025	150±0.025
F11	4.23±0.39	0.39±0.012	3.09±0.031	149±0.044
F12	4.19±0.29	0.68±0.024	3.04±0.031	150±0.034
F13	3.98±0.31	0.55±0.031	2.99±0.041	150±0.014
F14	3.91±0.42	0.79±0.047	2.95±0.016	150±0.016
F15	4.31±0.41	0.62±0.023	3.02±0.041	150±0.024

All the values are expressed as mean±Standard deviation; n=3

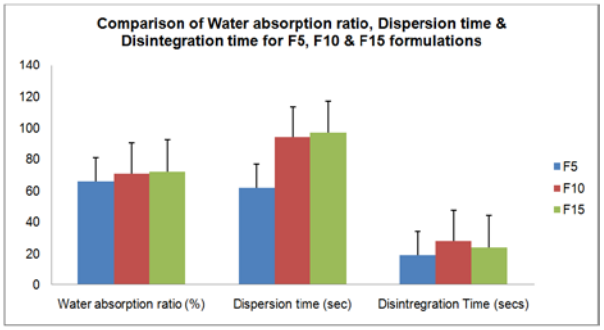

Fig. 2: Comparison of water absorption ratio, dispersion time & disintegration time of formulations F5, F10 & F15, All values are expressed as mean±SD; (n=3)

Table 4: Results of wetting time, water absorption ratio, dispersion time, disintegration time and drug content

Formulation code	Wetting time (sec)	Water absorption ratio (%)	Dispersion time (min: sec)	Disintegration time (sec)	Drug content (%)
F1	48±0.1	58.2±0.1	3 min32 sec	52	98.16±0.25
F2	45±0.3	60.5±0.6	2 min 55 sec	45	98.65±0.13
F3	39±0.2	64.1±0.2	2 min 20 sec	36	97.01±0.64
F4	29±0.3	66.5±0.7	1 min 48 sec	28	98.18±0.12
F5	22±0.6	66±0.1	1 min 2 sec	19	99.97±0.12
F6	58±0.5	60.4±0.9	4 min 25 sec	50	97.05±0.25
F7	62±0.5	61.5±0.01	3 min 55 sec	42	99.16±0.31
F8	60±0.7	64.7±0.4	3 min 59 sec	38	98.71±0.21
F9	63±0.6	68.5±0.3	1 min 57 sec	31	99.40±0.41
F10	59±0.7	70.8±0.1	1 min 34 sec	28	98.67±0.17
F11	60±0.04	58.3±0.5	4 min 15 sec	48	99.12±0.19
F12	62±0.03	61.0±0.7	3 min 16 sec	39	98.99±0.13
F13	64±0.01	64.3±0.2	2 min 58 sec	33	99.55±0.12
F14	63±0.2	65.1±0.05	2 min 15 sec	27	97.25±0.43
F15	65±0.7	72.2±0.3	1 min 37 sec	24	98.99±0.25

All the values are expressed as mean±Standard deviation; n=3

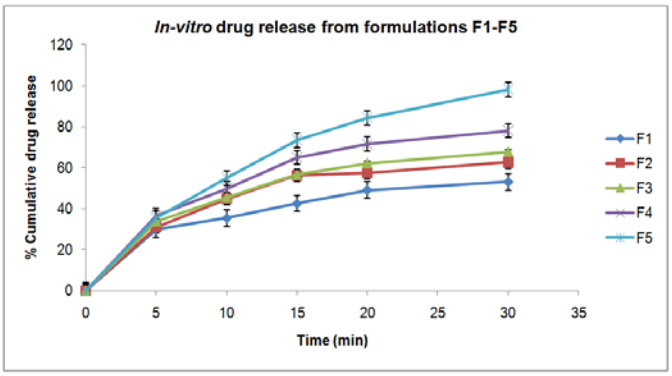

Fig. 3: *In-vitro* drug release of Imidapril formulations from F1-F5, All values are expressed as mean±SD; (n=3)

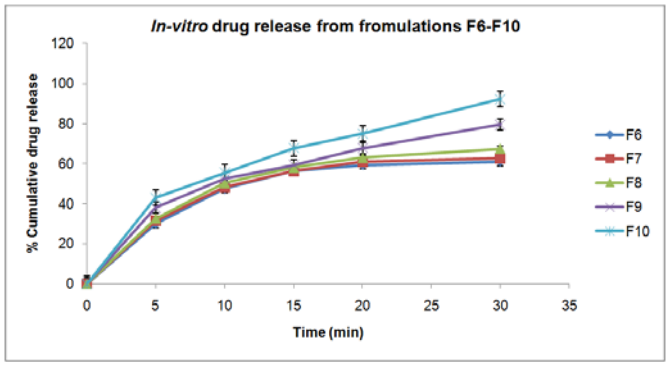

Fig. 4: *In-vitro* drug release of Imidapril formulations from F6-F10, All values are expressed as mean±SD; (n=3)

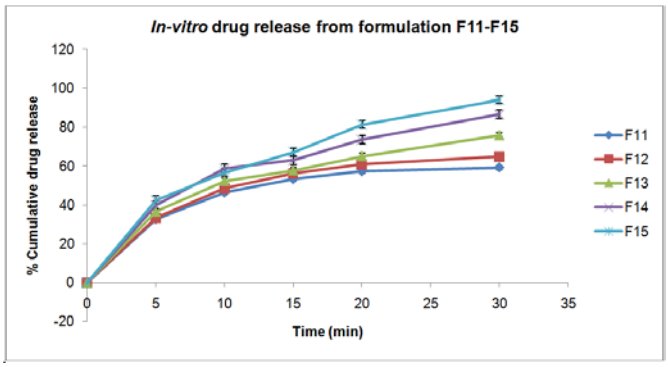

Fig. 5: *In-vitro* drug release of Imidapril formulations from F11-F15, All values are expressed as mean±SD; (n=3)

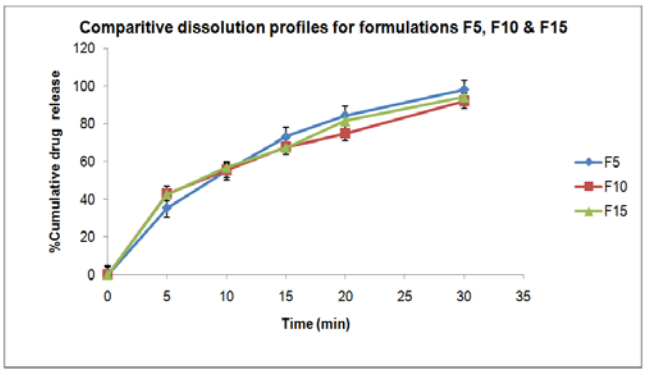

Fig. 6: Comparison of dissolution profiles for formulations F5, F10 & F15, All values are expressed as mean±SD; (n=3)

Table 5: Stability study results for F5 formulation

Parameters tested	Storage conditions			
	Initial	40 °C±2 °C/75%±5% RH		
		1st month	2nd month	3rd month
Description	White oval shaped tablets	No change	No change	No change
Average weight (mg)	150±0.047	150±0.046	150±0.035	150±0.013
Thickness (mm)	2.24±0.037	2.24±0.031	2.24±0.020	2.24±0.002
Hardness (kg/cm^2)	4.05±0.08	4.05±0.02	4.05±0.02	4.05±0.00
% Friability	0.50±0.0002	0.50±0. 0002	0.49±0.009	0.48±0.012
Disintegration time (sec)	19s	17s	17s	17s
Assay	99.85±0.12	99.25±0.18	99.20±0.21	99.00±0.12

All values are expressed as mean±SD; (n=3)

Stability studies

The formulation F5 was selected for stability studies on the basis of high wetting time, absorption ratio, *in vitro* disintegration time and high cumulative % drug release. The accelerated stability studies were carried out at 40 °C/75 % RH for the selected formulation up to 90 d. For every 30 d time interval the tablets were analyzed for drug average weight, thickness, hardness, friability, assay, and *in vitro* disintegration time for up to 90 d. The formulations did not show much variation in any of the parameters. F5 was loaded for accelerated stability study at 40±2 °C/75±5 % RH. The results of stability data for 1st and 2nd month and 3rd month (40±2 ° C/75±5 % RH) were found to be good shown in table 5.

DISCUSSION

In this work MDTs were prepared by direct compression method by using different synthetic super disintegrants. The angle of repose values falling in the official limit range of 24 to 30 which indicates that all the formulation blend have good flow property. The bulk density of the formulation blend plays an important role in the compression of the powder. It was noted that the tapped density of all the formulation were greater than their respective bulk density thus indicating that all the powder formulation had a good compressibility. Carr's index was calculated on the basis of the bulk and tapped density and the results showed good flow properties. Hausner's ratio is a ratio between tapped and bulk density thus indicating that formulation blend has a free flowing property which is ideal for MDTs.

All the formulated tablets passed weight variation test as the percent weight variation was within the pharmacopoeial limits [2]. The percent weight deviation was in between 5% of the average weight. The weights of all the tablets were found to be uniform with low standard deviation values. The crushing strength of the tablets of ensures good handling characteristics of all batches. The percent friability of all the formulation was less than 1% ensuring that the tablets were mechanically stable. Wetting time is closely related to the inner structure of the tablet and hydrophilicity of its excipients. Out of all the formulations, sodium starch glycolate containing formulations F1, F2, F3, F4, F5 showed less wetting time 48±0.1s, 45±0.3s, 39±0.2s, 29±0.3s, & 22±0.6 s respectively, its disintegration action is by rapid wicking, swelling followed by disintegration. In all formulations, it was observed that wetting time decreased with increase in the concentration of super disintegrants. Water absorption ratio, which is an important criterion for understanding the capacity of disintegrants to swell in the presence of a little amount of water, was calculated. It was found to be in the range of 58.2±0.1 to 72.2±0.3. The water absorption ratio increased with increase in the concentration of super disintegrant from 1-5%. This increase was due to the water up-taking ability of the super disintegrants. More the super disintegrant concentration, greater was the water uptake and hence, an increase in water absorption. The percentage of drug content for all formulation lies in the USP limit for MDT formulation of 90 to 110 % which was taken into consideration [7].

The internal structure of the tablets that is pore size distribution, water penetration into tablets and swelling of disintegrants are suggested to be the mechanisms of disintegration. Among the three super disintegrants used, sodium starch glycolate showed less disintegration time followed by Croscarmellose sodium and finally Kyron T314. It was also observed that the tablets with the least wetting time showed minimum disintegration time indicating a correlation between wetting time and disintegration time.

The dissolution rate was found to be increased linearly with increase in the concentration of super disintegrant. The investigated super disintegrants can be ranked based on the overall *in-vitro* release profile of Imidapril Mouth dissolving tablet i.e. Sodium starch glycolate>Kyron T314>Croscarmellose sodium.

CONCLUSION

In the current study, a successful attempt was made to formulate mouth dissolving tablets of Imidapril by direct compression method using super disintegrants like Sodium starch glycolate, Croscarmellose sodium & Kyron T314. Preformulation studies of Imidapril were performed. Precompression parameters showed good flow property. The formulated tablets showed compliance for various physicochemical properties such as thickness, hardness, friability, content uniformity and *in-vitro* disintegration test.

The tablets containing synthetic super disintegrants have shown improved *in-vitro* disintegration time and drug release. The disintegration time for the optimized formula F5 was found to be 19s. *In-vitro* release of the optimized formulation of Imidapril MDTs of F5 was found to be 98.14% drug release within 30 min. Data analysis for the order of drug release revealed formulations followed first order release. Accelerated stability studies for best-selected formulation F5 showed good physicochemical stability for a period of 90 d at 40 °C±2 and 75%RH. Selected MDTs were found to be stable with respect to physicochemical and release characteristics. Hence, MDTs containing Imidapril showed promising results. Further investigation can be made by using suitable animal model.

CONFLICT OF INTERESTS

All authors have none to declare

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