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Formulation, Design and Evaluation of Loratadine Orally Disintegrating Tablets

Mohammad Irfan Babla*[1], OP Agrawal[2]

***[1]Research Scholars, Sunrise University, Alwar, Rajasthan**

[2]Professor, Sunrise University, Alwar, Rajasthan

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Corresponding author: Mohammad Irfan Babla

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Abstract:

The current study established the formulation and evaluation of orally disintegrating tablets (ODT), for different age groups of patients, including children, geriatric patients, and adults. These dosage forms contained an antihistaminic drug and a nasal decongestant drug that were intended to treat allergic rhinitis. Using the appropriate super disintegrants and unique tablet excipients, the bioavailability research for orodispersible tablets for the widely used anti-allergic drugs, Loratadine will be carried out.

Keywords: Loratadine, oral dispersible tablet, MCC, Sodium CMC, Flavoring agent.

INTRODUCTION

An oral dispersible tablet (ODT) of loratadine is a type of medication used primarily to treat allergies. Loratadine is an antihistamine that helps alleviate symptoms like runny nose, sneezing, itchy eyes, and hives by blocking histamine, a substance in the body that causes allergic reactions.

The oral dispersible form means that the tablet can dissolve quickly in the mouth without the need for water, making it convenient for people who have difficulty swallowing pills. This can be especially useful for children or individuals with swallowing difficulties.

When using an oral dispersible loratadine tablet, you generally place the tablet on your tongue, and it will start to dissolve, allowing you to swallow it easily. Always follow the dosing instructions provided by your healthcare provider or those on the medication packaging to ensure effectiveness and avoid potential side effects.

Materials and Method:

The orally dispersible tablet of Loratadine was prepared using Micro crystalline cellulose as diluent and binder, Pearlitol 200SD as directly compressible diluent, Croscarmellose Sodium as super disintegrant and Starch 1500LM as binder and disintegrant, Maltodextrin (Glucidex IT 12) as diluent, Citric acid as salivating agent, Colloidal silicon dioxide as glidant, Aspartame as sweetener, Mint flavour as flavouring agent, Sodium stearyl fumarate as lubricant.

All components were sifted and blended for 15 minutes in an octagonal blender with the

exception of colloidal silicon dioxide, aspartame, mint flavour, and sodium stearyl fumarate. The aforementioned mixture was added to, and then Aspartame, Mint flavour, and Colloidal silicon dioxide were sifted and added. Finally the blend was lubricated using Sodium stearyl fumarate and compressed by using 8 mm flat punches with breakline on upper punch and plain on lower punch in Kambert eight station rotary compression machine to produce ODT tablets

Ingredients	Quantity Per Tablet (mg)								
	Trial 001	Trial 002	Trial 003	Trial 004	Trial 005	Trial 006	Trial 007	Trial 008	Trial 009
Loratadine (Micronised)	10	10	10	10	10	10	10	10	10
Pearlitol flash	----	----	----	----	----	----	----	----	103
Mannitol (Pearlitol 200SD)	50	50	55	55	----	40	40	40	----
Maltodextrin (Glucidex IT 12)	----	----	----	----	55	20	20	----	----
Micro crystalline cellulose (Avicel-102)	78.6	77.0	77.5	78	77.5	79	76.5	89.5	20
Croscarmelose Sodium (Ac-Di-Sol SD-711)	12	12	12	12	12	12	12	12	15
Sodium bi-Carbonate	----	----	----	----	----	----	----	----	6
Starch 1500 LM	7	7	7	7	7	----	----	7	----
Citric acid (Anhydrous)	3	1.5	0.5	----	0.5	0.5	0.5	1	3
Colloidal silicon dioxide	2	3	2	2	2	2	3	3	5.2
Strawberry Flavour	----	----	----	----	----	----	----	----	1
Aspartame	4	2	2	2	2	2	2	2	4.8
Mint flavor	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	----
Lubrication									
Sodium stearyl fumarate	3	7	3.5	3.5	3.5	3.5	5	5	2
Tablet weight (mg)	**160**	**163**	**170**	**170**	**170**	**170**	**170**	**170**	**170**

Evaluation Of ODT Tablets

When the European Pharmacopoeia introduced the name "Orodispersible tablets" and set the time restriction for oral dispersion in the mouth at three minutes, it obscured the rising significance of orally dispersible tablets.

These formulas, which were created using the direct compression approach, are adaptable, straightforward, and very simple to use. Regarding release patterns and

allowable disintegration times, the results are quite positive.

Croscarmellose Sodium (Ac-Di-Sol SD-711) and PEARLITOL flash, a combination of Mannitol and Starch used as direct compressible diluents along with Sodium bicarbonate and Citric acid showed good results with 99.98% drug content, 35 Seconds disintegration time, 0.13% friability, and 99% drug release in 10 minutes (Table 4), along with very good mouth feel.

About all of the formulations had good hardness. In experiment 005, it was found that using more maltodextrin enhanced the wetting and disintegration times.

The standard deviation for the compressed pills was 1.16, which was the highest of all the experiments and indicated reduced weight variance. Weight variation was found to be least in trial 009.

Friability test (British Pharmacopoeia, Vol.-2, 2007; State Pharmacopoeia-30, 2007)

The Roche Friabilator was used to assess the friability of tablets (Electrolab, Mumbai). The tablets were dropped from a height of six inches in each rotation while being exposed to the combined effects of abrasions and shock in a Friabilator at a speed of 25 rpm. A friabilator was filled with a pre-weighed sample of tablets and rotated 100 times. A delicate muslin cloth was used to dust the tablets, and they were reweighed. The following formula determines the friability:

$$F = (1 - Wo/W) \times 100$$

Where, Wo is the weight of the tablets before the test and W is the weight of the tablet after the test.

Hardness (British Pharmacopoeia, Vol.-2, 2007; United State Pharmacopoeia-30, 2007)

Tablets need to be strong enough to endure mechanical manipulation during production, packing, and delivery. They also need to be resistant to friability. The strength of a tablet's crushing is often measured by hardness. Different properties of disintegration and dissolution are brought by by changes in hardness. Using a Schleuniger hardness tester, the tablet's crushing strength was ascertained.

Drug content (British Pharmacopoeia, Vol.-2, 2007; United State Pharmacopoeia-30, 2007)

A total of 20 pills were chosen at random and ground. In 500 mL of SGF without enzyme, an amount of this powder equal to 55 mg of Loratadine was dissolved, agitated for 60 minutes, and filtered. SGF without enzyme was used to dilute 10 mL of the filtrate to 100 mL. With 0.1N hydrochloric acid serving as a simulated stomach fluid without enzyme as the blank, the absorbance of this solution was measured using a UV spectrophotometer (SHIMADZU 1700), and the concentration of loratadine was determined. (Fig.2).

Measurement of wetting time (British Pharmacopoeia, Vol.-2, 2007; United State Pharmacopoeia-30, 2007)

A tablet was placed on top of a band of filter paper supported by a glass slide in a glass petri dish that had some water in it. Water was taken in via the tablet's lower surface. Wetting time is the length of time it takes for water to completely cover the tablet's upper surface.

Water absorption ratio (British Pharmacopoeia, Vol.-2, 2007; United State Pharmacopoeia-30, 2007)

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

weighed. Water absorption ratio R, was determined using the following equation: = 100 × Wb

Where Wb is weigSSht of the tablet before absorption and Wa is weight of tablet after water absorption.

Disintegration time (British Pharmacopoeia, Vol.-2, 2007; United State Pharmacopoeia-30, 2007)

The time required for disintegration of six tablets, placed in each tube of disintegration apparatus USP (Electrolab ED-2L), was measured at 37±2°C using 900mL of distilled water.

In Vitro Dissolution Studies

The USP Type-I (Basket) dissolving equipment (LABINDIA DISSO2000) was used to conduct in-vitro dissolution investigations on the tablet samples at 37°C and 50 rpm speed. As per the USFDA's official guidance, 900 mL of enzyme-free simulated stomach fluid was employed as the dissolving medium. At sampling intervals of 2, 4, 6, 8, and 10 minutes, aliquots of 10 mL were taken, and new, equivalent volumes of blank media were added to the dissolving medium. The quantity of Loratadine released from the tablet samples was assessed spectrophotometrically at a wavelength of 278 nm by comparing with the standard calibration curve after the aliquots were filtered and scanned with the appropriate dilution.

Stability Studies

A three-month accelerated stability study at 400°C and 75% RH was performed on a subset of loratadine orally disintegrating tablets. The goal of stability testing is to establish a retest period for the drug substance or a shelf life for the drug product as well as recommended storage conditions. It also aims to provide evidence on how the quality of a drug substance or drug product changes over time under the influence of various environmental factors, such as temperature, humidity, and light. 1996 ICH guideline

Results and Discussion

When the European Pharmacopoeia adopted the name "Orodispersible tablets" and set the time restriction for oral dispersion at 3 minutes, it obscured the rising significance of orally dispersible tablets.

These formulas, which were created using the direct compression approach, are adaptable, straightforward, and very simple to use. Regarding release patterns and allowable disintegration times, the results are quite positive.

A combination of mannitol and starch used as a direct compressible diluent along with sodium bicarbonate and citric acid showed good results with 99.98% drug content, 35 seconds disintegration time, 0.13% friability, and 99% drug release in 10 minutes along with very good mouth feel. These super disintegrants include croscarmellose sodium (Ac-Di-Sol SD-711) and PEARLITOL flash.

About all of the formulations had good hardness. A greater amount of maltodextrin was used in experiment 005 to produce the enhanced wetting and disintegration times (Table 5.3), as indicated in (table 5.3).

The compressed tablets showed less weight variation with standard deviation of 1.16 in trial 005 being the maximum amongst all the trials. Weight variation was found to be least in trial 009.

Formulation	Friability (%)	Hardness[α] ±S.D(N)	Weight[α] ± S.D (mg)	Disintegration time (sec)	Water absorption ratio (%)	Wetting time[β] (sec)	Drug content (%)
Trial 001	0.28	54.7±3.26	170.44±1.03	20-21	33.80	42	99.84
Trial 002	0.29	58.3±3.59	170.36±0.71	25-30	34.02	48	99.67
Trial 003	0.25	59.2±3.59	170.7±0.88	15-20	43.98	35	100.29
Trial 004	0.32	52.5±2.99	170.49±1.11	15-20	47.36	35	100.62
Trial 005	0.18	61.6±4.19	170.9±1.16	135-150	46.36	100	98.24
Trial 006	0.2	61.4±4.19	170.72±0.76	25-30	48.75	38	99.96
Trial 007	0.20	57.8±5.21	170.66±0.92	25-30	48.87	34	101.84
Trial 008	0.27	61.5±3.05	170.72±0.79	15-20	51.08	32	100.5
Trial 009	0.13	52.6±2.83	170.05±0.25	30-35	50.9	32	99.98

α = Average of ten determinations

β= Average of three determinations

In vitro dissolution studies

The dissolution data reveals that drug release was within acceptable limits.

Maltodextrin (Glucidex IT 12) was used instead of mannitol (Pearlitol 200SD), which lengthened the wetting and disintegration times. The best release profiles among the three excipients, maltodextrin (Glucidex IT 12), mannitol (Pearlitol 200SD), and pearlitol flash, are exhibited in the in vitro dissolution profiles of trials 005, 007, and trial 009, respectively (Figure 5.3). Pearlitol Flash, sodium bicarbonate, and citric acid were added, and the results indicated extremely quick disintegration, decreased friability, and good hardness. With pearlitol flash and mannitol in the formulation, the wetting time was the shortest. Maltodextrin was used as a diluent, which decreased the amount of medication present while increasing the wetting and disintegration times.

Overall trial 009 findings, taking into account medication release and weight fluctuation, were positive and met all requirements for orally disintegrating tablets (Table 5.4). All nine of the aforementioned formulas were created and tested. The data on medication disintegration shows that drug release was within permissible bounds. The best release profiles among the three excipients, maltodextrin (Glucidex IT 12), mannitol (Pearlitol 200SD), and pearlitol flash, were compared in the in vitro dissolution profiles of trials 005, 007, and trial 009. The addition of citric acid, sodium bicarbonate, and pearlitol flash resulted in extremely rapid disintegration, decreased friability, and good hardness.

Percentage of cumulative drug release of all formulations

Time (min)	% Cumulative Drug Release								
	Trial 001	Trial 002	Trial 003	Trial 004	Trial 005	Trial 006	Trial 007	Trial 008	Trial 009
0	0	0	0	0	0	0	0	0	0
2	73	73	77	79	68	72	70	78	79
4	77	78	86	87	76	78	77	87	87
6	85	85	92	93	82	85	83	93	95
8	90	90	93	95	92	94	92	95	98
10	94	93	97	98	94	96	96	98	99

Stability studies The ideal batch of Loratadine orodispersible tablets is packaged appropriately and kept in storage for the duration specified by ICH recommendations (40°C 2°C and 75 5%RH). During a 6-month withdrawal period, the ODT pills were examined for chemical characterisation, including the dissolving profile.

PRODUCT: Loratadine orally disintegrating tablets 10mg PACK: HDPE Container with 40 tablets (60cc with 1g silica bag) Batch No: Trial no 9

Description: White coloured, flat circular uncoated tablets with scored on one side and plain on the other side

Test parameter	Limit	initial	1 month 40° C/ 75%RH	2 month 40° C/ 75%RH	3 month 40° C/ 75%RH	6 month 40° C/ 75%RH	3 month 25° C/ 60%RH	6 month 25° C/ 60%RH
Description	As above	As above	As above	As above	As above	As above	As above	As above
Loss on drying(%w/w)	NMT 4.0% (w/w)	1.40	1.82	2.14	2.46	2.68	2.20	2.50
Assay	95-105%	99.98%	99.10%	98.75%	97.40%	96.80%	98.20%	97.40%
Dissolution	Time(min)							
Condition: 900ml, SGF without enzyme, 50 rpm , USP Type I	2	79.20±2.40	76.26±2.20	75.20±2.20	74.00±2.21	72.02±2.41	75.02±2.30	74.00±2.20
	4	87.02±2.62	86.02±2.40	85.01±2.26	84.02±2.20	82.20±2.41	83.20±2.50	82.40±2.50
	6	95.10±2.61	94.10±2.41	93.02±2.40	92.00±2.42	91.00±2.21	93.00±2.41	92.00±2.41
	8	98.20±3.46	97.02±3.10	96.00±2.80	95.00±2.40	94.02±2.30	95.62±2.02	94.00±2.41
	10	99.10±2.40	98.10±2.20	97.00±2.21	96.02±2.41	95.00±2.41	96.00±2.21	95.02±2.20

References

1. Alberto García-González, Eduardo Ramírez-San Juan. Comparison of Fasting Bioavailability Among 100-mg Commercial, 100-mg Generic, and 50-mg Chewable Generic Sildenafil Tablets in Healthy Male Mexican Volunteers: A
2. British Pharmacopoeia, Vol.-2, The Stationary Office, London,U.K.,2007; pp.1384.
3. Felix Joe V et al., Formulation and evaluation of Pseudoephedrine hydrochloride and Loratadine extended release tablet, J. Ph. Res. 2011;4 (2):507-508.
4. United State Pharmacopoeia -30: National Formulary -25, Vol.3, Asian edition. United State Pharmacopoeia Convention, Inc; 2007; p. 2647.