Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Der Pharmacia Lettre, 2010, 2(6): 212-216
(http://scholarsresearchlibrary.com/archive.html)

Der Pharmacia Lettre
Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

Formulation of Oro-dispersible tablets containing drug-resin complex

Swapnil Umakant Wani[1], Prashant Shamkuwar.[2], Ashwini Nagnath Yerawar.[3]

[1]*Saint John Institute of Pharmacy & Research. Palghar, Thane. Maharashtra. India*
[2]*Government College of Pharmacy, Aurangabad. Maharashtra. India*
[3]*Saint John Institute of Pharmacy & Research. Palghar, Thane. Maharashtra. India*

ABSTRACT

The purpose of this research was to formulate tasteless complexes of Fexofenadin Hydrochloride with Doshion P547 and to formulate tasteless complex into Oro-Dispersible tablets (ODT). Drug resin complexes (DRC) were characterized by suitable method. Fexofenadin Hydrochloride release from ODT is obtained at salivary and gastric pH. Infrared spectroscopy revealed complexation of –NH (drug) with Doshion P547. Drug release from ODT in salivary pH was insufficient to impart bitter taste. Complete drug release was observed at gastric pH in 2 hours. Doshion P547 is inexpensive, and the simple technique is effective for bitterness masking of Fexofenadin Hydrochloride.

Keywords: Fexofenadin Hydrochloride, Doshion P547, tasteless complex, Characterization, Oro-dispersible tablet.

INTRODUCTION

As every pharmacist knows, many pharmaceutical drugs have an unpleasant taste, often intense bitter. The major consequence of the bitter taste is to restrict greatly the further development of oral preparations and clinical applications of these drugs. Along with the continuing improvement in the social standard of living, it is no longer acceptable for useful medicines to taste bitter especially where infants, children and elderly are concerned [1]

In case of tablets, the problem of bitter taste of the drug is often encountered due to release of the active ingredients in the mouth. However it is necessary to investigate taste-masking method before preparation of rapidly disintegrating or mouth dispersible tablets of drugs with bitter taste. Various techniques could be used to mask the bitter taste of drug. But one of the most economical methods for taste masking is the use of ion exchange resin. Weak ion exchange resins are interesting hydrophobic polymers for the taste masking of bitter drugs because of its complex forming ability, non toxicity and economy as compared to other methods. Other methods are quite tedious and require a long time for processing. It has been evident that ion

exchange resin complex doesn't release drug in the saliva and releases the drug immediately in the stomach without affecting its intrinsic bioavailability. [2]

In the present work Fexofenadine Hydrochloride was preferred as a model drug for complexation because of its intense bitter taste. It is indicated for the relief of symptoms associated with seasonal allergic rhinitis in adults and children 2 years of age and older and for treatment of uncomplicated skin manifestations of chronic idiopathic urticaria in adults and children 6 months of age and older. These conditions are commonly found in pediatric patients, where palatability is of main concern. Fexofenadine is available in tablet as oral dosage form. [3], [4]

Fexofenadine Hydrochloride contain tertiary amino group and terminal carboxyl group which has potential for forming complex with cationic exchange resin. In the present work, taste masking of Fexofenadine hydrochloride was performed by using weak cation exchange resin DOSHION P547. Further Drug-Resin complex is formulated in Oro-Dispersible tablet.

MATERIALS AND METHODS

Fexofenadin Hydrochloride was a gift sample from Khandelwal laboratory, Thane. The resin, Doshion P547 was procured from Doshion, Ahmadabad & other chemicals & excipient were procured from vendors.

Preliminary Evaluation of Resin

Loading capacity of resin, Ion exchange capacity [5], Effect of Resin Activation [6], Selection of Resin, Formation of Fexofenadin Hydrochloride-Doshion P547Complexes [7], optimization of Drug-Resin complex formation, Molecular Properties of Drug Resin Complex, Decomplexation of drug-resin complexes [8], Decomplexation procedure, Drug release at salivary pH (6.8) & gastric pH (1.2) were carried out as per procedure given by Swapnil Wani et.al. [12]

Formulation of Oro-dispersible tablet containing drug: resin complex

Formulation Design

Oro-dispersible tablets of Fexofenadine Hydrochloride: DOSHION P547 complex was prepared using direct compression method after incorporating superdisintegrant such as Sodium Starch Glycolate in different concentrations. Nine formulations of each Fexofenadine Hydrochloride: DOSHION P547 complex was prepared and formulations were varied in two variables viz. Disintegrant SSG (Primogel) and Filler MCC PH 102(Avicel PH 102) in different concentration. Resinate, and Avicel PH 102 were mixed thoroughly in a glass mortar using a pestle. Superdisintegrant was incorporated in the powder mixture; Aspartame (Sweetening agent), Flavor (Strawberry flavor), Aerosil 200 were added to enhance the palatability and flow property of tablets & finally Magnesium Stearate was added as lubricant.

Blend containing Fexofenadine Hydrochloride: DOSHION P547 complex along with excipients was compressed by using 10 mm diameter flat-faced punches. Compression force was kept constant for all formulations.

In the given formulations Avicel PH102 was used as directly compressible diluent. It has high swelling index which facilitates the rapid disintegration. Aspartame was selected as sweetening agent due to its intense sweetness. So, it has been used in very small proportion. Strawberry flavor was selected due to its popularity in pediatrics formulation. Sodium Starch Glycolate used, as a superdisintegrant. The different formulations prepared were shown in Table No.1

Table I: Composition of Oro-Dispersible tablet.

Ingredient	Quantity of ingredients (In %)								
	F-1	**F-2**	**F-3**	**F-4**	**F-5**	**F-6**	**F-7**	**F-8**	**F-9**
Drug: resin complex	Eq.60 mg	Eq. 60 mg	Eq. 60 mg	Eq. 60 mg	Eq. 60 mg	**Eq.60 mg**	Eq. 60 mg	Eq. 60 mg	Eq. 60 mg
Avicel PH102	18	20	22	24	26	**26**	26	26	-----
SSG	2	2	2	2	2	-----	1	3	------
Aerosil 200	1	1	1	1	1	**1**	1	1	------
Aspartame	0.25	0.25	0.25	0.25	0.25	**0.25**	0.25	0.25	------
Strawberry flavor	0.25	0.25	0.25	0.25	0.25	**0.25**	0.25	0.25	------
Magnesium stearte	1	1	1	1	1	**1**	1	1	1

RESULTS AND DISCUSSION

Fexofenadin Hydrochloride, prescribed extensively in both solid and liquid dosage forms, is extremely bitter resulting in poor patient compliance. Complexation with ion exchange resin is a simple and efficient technique of masking the bitterness

Evaluation of the Formulated Tablets

Tablet weight variation, drug content uniformity, and friability were measured using the IP methods and criteria. Drug content was analyzed using a UV spectrophotometer (Shimadzu, UV-1700) at λmax 259 nm. Tablet friability was measured using friability tester (Roche friabilator). Hardness of tablet was measured by Monsanto hardness tester. Weight variation, drug content and hardness of tablet were represented as mean ± SD. The data obtained was shown in Table No. 2, the method reported by Kuchekar. et.al. was followed to measure tablet-wetting time.

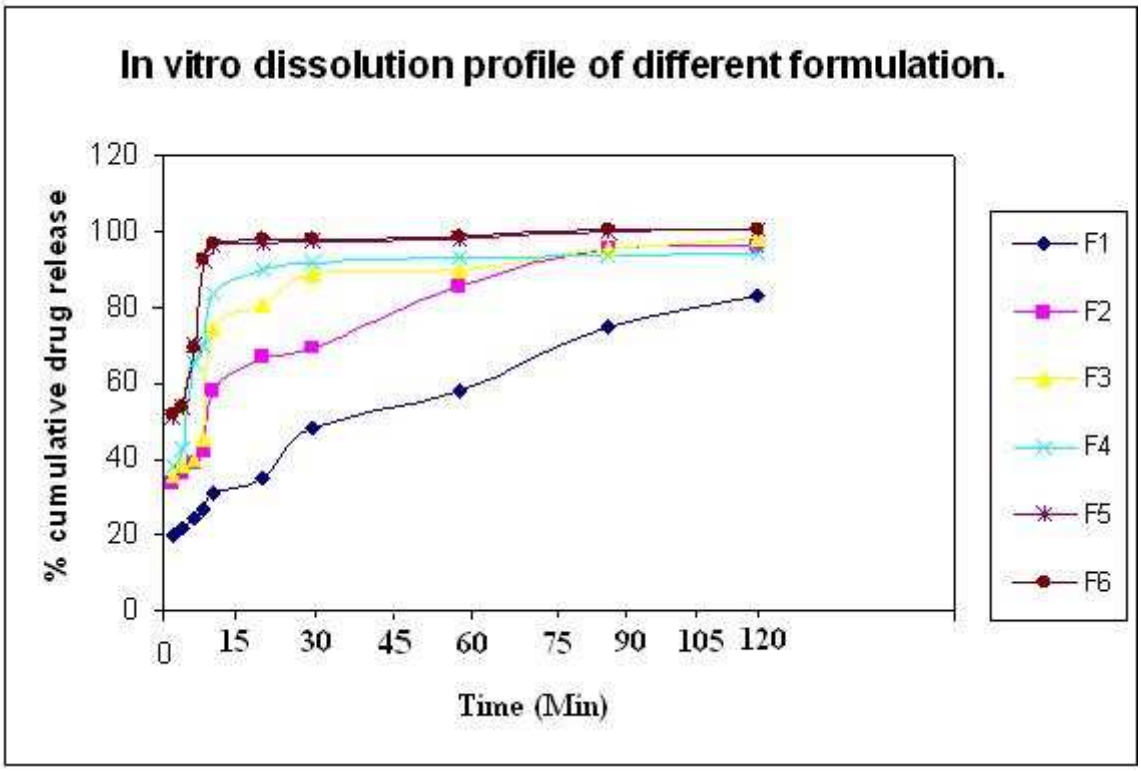

Figure 1: Cumulative Drug release from ODT

***In vitro* release profile of formulated tablets:**

Dissolution test of tablets was performed using acidic buffer pH 3 (0.001 N HCl) with USP dissolution type II apparatus at 50 rpm and 37.50C ± 0.50C temperature. Aliquots (5 ml) were withdrawn at specified time interval and replaced with fresh dissolution media maintained at 37.50C ± 0.50C. The test sample was filtered through whatman filter paper No 41 and analyzed using UV spectrophotometer at λmax 258.50 nm. Cumulative percent drug released from tablets was plotted against time as shown in Fig No. 1.

Optimization of formula:

The data obtained from the evaluation of formulations suggested that the Formulations F-6 which contains Avicel PH 102, at concentration level of 26 % has comparable ***In vitro*** disintegration time with that to F-5 which contained the Avicel PH 102, at concentration level of 26% as well as SSG, at concentration level of 2%.

Table II: Evaluation of Oro-Dispersible tablet

Test	Formulations							
	F-1	**F-2**	**F-3**	**F-4**	**F-5**	**F-6**	**F-7**	**F-8**
Weight variation test	350.25 ±1.23	359.68 ±2.08	370.56 ±1.45	380.95 ±1.98	392.78 ±1.48	382.88 ±1.32	386.85 ±1.48	398.25 ±1.48
Hardness (Kg/cm^2)	4.8± 0.65	4.7 ±0.28	4.8 ±0.28	4.7 ±0.19	4.7 ±0.18	4.8 ±0.15	4.7 ±0.12	4.8 ±0.16
Friability (%)	0.88	0.85	0.82	0.84	0.80	0.72	0.78	0.76
Drug content (%)	98.23 ± 0.59	97.56 ±0.65	98.28 ±0.35	95.8 ±0.20	98.47 ±0.56	99.90 ±0.10	99.25 ±0.18	95.25 ±0.25
Wetting time (Seconds)	120.67±1 .53	118.33 ±1.15	112.67 ±3.21	108 ±1.00	95.56 ±1.53	96.30 ±2.00	97.25 ±0.18	95.25 ±0.18
***In vitro* disintegration time (Seconds)**	**49.23 ±0.53**	**45.47 ±0.83**	**37.81 ±1.23**	**28.95 ±0.59**	**22.02 ±1.58**	**22.24 ±1.11**	**22.22 ±0.86**	**21.43 ±0.78**

But, results of formulation F5, F6, F7 and F8 showed that there was not a significant difference in *In vitro* disintegration time as the concentration of SSG was increased. But when we compared result of formulation F-6, in which SSG at 0% concentration level was used, it demonstrated comparable *In vitro* disintegration time to that of F-5,F-7 and F-8 having SSG at 2%, 1% and 3% concentration level respectively. On the other side as the concentration level of Avicel PH102 gets increased from Formulation F1 to F6, *In vitro* disintegration time gets decreased. We conclude that, there is not a significant change in *In vitro* disintegration time with respect to the concentration of SSG where as there was significant change in *In vitro* disintegration time with respect to the concentration of Avicel PH102. The optimization of the Formulation F-6 further supported by its In vitro release profile

CONCLUSION

Complete taste masking of model drugs was achieved with selected ion exchange resin (P547). Studies of molecular property revels formation of complex where as, study of release kinetics through a light on the drug release pattern from DRC. Drug: P547 complex was successfully formulated into Oro-dispersible tablet by direct compression method. Formulation F-6 containing MCC (Avicel PH102) at concentration level of 26 % show optimum result among all formulation along with successfully masked taste of Fexofenadine Hydrochloride. The various formulations were compared with respect to in vitro disintegration time and in vitro release profile. Formulations F-6 was found to be palatable with in vitro disintegration time of 22.24 s Dissolution studies showed complete release of F-6 within 120 min.

Acknowledgements
We would like to thank Dr.V. K. Mourya Principal of Government College of Pharmacy, Aurangabad and khandelwal Laboratories, Thane for providing necessary facilities.

REFERENCES

[1] Nanda, A.; Kandarpu, R.; Garg, S. *Indian J. Pharm. Sci*, **2002**, *64(1)*, 10-13
[2] Patel, P.; Chaudhary, A.; Gupta, G. *Pharmainfonet* **2006**.
[3] Moffat, A.; David, M.; Widdop, B. Clarke's Analysis of Drug and Poisons; 3rd ed.; Pharmaceutical press: USA, **2000**; pp 1033-1034.
[4] Redkar, M.; Gore, S.; Devrajan, P. D-Zolv. *Ind. J. Pharm. Sci*. **2002**, 64(3), 291-292
[5] Jeffery, G.; Denney, R. Eds. Vogel's Textbook of Quantitative Chemical Analysis. Addison Wesley Longman Pvt. Ltd: USA. **2001**.pp 478-485
[6] Pisal, S.; Zainnuddin, R.; Nalawade, P.; Mahadik, K.; Kadam, S. *AAPS PharmSciTech*. **2004**, 5(4), 182-186
[7] Kouchak, M.; Atyabi F. *Iranian Journal of Pharmaceutical Research*. **2004**, 2, 93-97.
[8] Pisal, S.; Zainnuddin, R.; Nalawade, P.; Mahadik, K.; Kadam, S. *AAPS PharmSciTech*. **2004**, 5(4), 196-203.
[9] Anand, V.; Kandarapu, R.; Garg, S.; *Drug del Today*, **2001**, 6, 905-914.
[10] Ion Exchange Resin and Sustained Release. Encyclopedia of pharmaceutical technology, Marcel Decker INC: New York. **1996**; Vol- IX, pp-203-215.
[11] http://www.doshion.com
[12] Wani, S., Shamkuwar, P., Yerawar, A., Bedi, R., *Der Pharmacia Lettre*, **2010**, 2(5): 155-164