Int. J. Chem. Sci.: 7(3), 2009, 1915-1920

FORMULATION AND EVALUATION OF ROXATIDINE FLOATING TABLETS

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ABSTRACT

Floating tablets are the systems, which are retained in the stomach for a longer period of time and thereby improve the bioavailability of drugs. Roxatidine is an anti-ulcer drug; having bio-availability 80-90% and protein binding 5-7%. The purpose of present investigation was to prepare formulation and evaluate the floating tablets of roxatidine. The floating tablets were evaluated for uniformity of weight, hardness, friability, drug content etc.

Key words : Roxatidine, Polymers, Formulation, Evaluation

INTRODUCTION

Floating systems are one of the important categories of drug delivery systems with gastric retentive behavior. Drugs that could take advantage of gastric retention include : furosemide, cyclosporine, allopurinol ciprofloxacin and metformin. Drugs whose solubility is less in the higher pH of the small intestine than the stomach (e. g. chlordiazepoxide and cinnarizine, the drugs prone for degradation in the intestinal pH (e. g. captopril) and the drugs for local action in the stomach (e. g. misoprostol) can be delivered in the form of dosage forms with gastric retention[1, 2], Roxatidine acetate is a new H2-receptor antagonist with a novel chemical structure. It is a piperidine derivative unlike cimetidine, ranitidine and famotidine, which are imidazole, furan and thiazole derivatives, respectively[3]. It is well tolerated in healthy volunteers in single[4] as well as multiple[5] doses. It effectively inhibits both day-time and night-time secretion of gastric acid[6] and has been shown to be

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twice as potent as ranitidine in inhibiting gastric acid production[7, 8]. The present work was conceived by us to formulate and evaluate the roxatidine floating tablets.

EXPERIMENTAL

Material and methods

Following methodology was adopted, while carrying out the present study.

Determination of melting point

Evaluation of powder blend[9, 10]

- Angle of repose
- Bulk density
- Compressibility Index
- Total Porosity

Preparation of gastro retentive floating tablets

Evaluation of tablets[11, 12]

- Weight variation test
- Drug content
  - Hardness
  - Thickness
  - Friability test
  - Tablet density

RESULTS AND DISCUSSION

In the present study, 10 formulations with variable concentrations of polymer were prepared and evaluated for physio-chemical parameters. The formulated batches are shown in Table 1. The melting point of roxatidine was found to be in the range 86-88^{o}C, which complied with standards, indicating purity of the drug sample. Roxatidine was found to have high solubility. The angle of repose for the formulated blend was carried out and the results are shown in Table 2. It concludes that all the formulations blends were found to be in the range 280.88’ to 31.30'. Compressibility index was found between 12.34% to 16.30% indicating that the powder blends have the required flow property for compression.

Table 1 : Composition of roxatidine floating tablets

Ingredients	FT1	FT2	FT3	FT4	FT5	FT6	FT7	FT8	FT9	FT10
Roxatidine	40	40	40	40	40	40	40	40	40	40
HPMC K4M	40	-	-	-	80	-	40	-	40	20
HPMC K100M	-	40	-	80	-	-	40	40	-	40
Xanthan gum	-	-	40	-	-	80	-	40	40	20
Sodium bicarbonate	20	20	20	20	20	20	20	20	20	20
Citric acid (anhydrous)	10	10	10	10	10	10	10	10	10	10
PVP-K-30	20	20	20	20	20	20	20	20	20	20
Avicel PH-102	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.	q. s.
Magnesium stearate	1	1	1	1	1	1	1	1	1	1
Talc	2	2	2	2	2	2	2	2	2	2

Quantities in milligrams.

Table 2 : Micromeritic properties of powder blends

Powder blend	Angle of repose (^{0})	Loose bulk density (g/mL)	Tapped bulk density (g/mL)	Compressibility index (%)	Total porosity (%)
FT1	28°. 30'	0.130	0.155	16.13	15.78
FT2	30°. 77'	0.110	0.130	15.67	20.00
FT3	29°. 28'	0.090	0.102	14.48	37.50
FT4	31°. 22'	0.105	0.126	16.30	26.31
FT5	31°. 30'	0.129	0.146	15.41	27.77
FT6	29°. 30'	0.114	0.135	14.30	12.50
FT7	30°. 47'	0.132	0.148	12.76	35.00

Cont…

Powder blend	Angle of repose (^{0})	Loose bulk density (g/mL)	Tapped bulk density (g/mL)	Compressibility index (%)	Total porosity (%)
FT8	24°. 28'	0.135	0.154	13.47	13.04
FT9	29°. 56'	0.144	0.162	12.34	20.83
FT10	31°. 30'	0.106	0.120	15.91	10.00

Table 3 : Evaluation of physical parameters of floating tablets

Tablets Batch	Weight variation test (%)	Friability (%)	Hardness (kg/cm^2)	Thickness (mm)	Drug content (%)
FT1	± 1.75	0.92	5.6 ± 0.47	3.08 ± 0.2	98.02
FT2	± 3.52	0.72	4.5 ± 0.63	3.16 ± 0.010	97.01
FT3	± 2.15	0.91	6.4 ± 1.27	3.14 ± 0.012	99.53
FT4	± 1.56	0.86	5.1 ± 0.03	3.12 ± 0.06	98.01
FT5	± 3.54	0.79	4.3 ± 0.83	3.16 ± 0.011	97.04
FT6	± 1.42	0.86	5.1 ± 0.03	3.18 ± 0.012	98.40
FT7	± 2.11.	0.78	4.3 ± 0.83	3.15 ± 0.010	97.11
FT8	± 1.89	0.81	6.4 ± 1.27	3.10 ± 0.012	99.55
FT9	± 2.56	0.96	5.1 ± 0.03	3.11 ± 0.06	99.01
FT10	± 2.04	0.75	4.3 ± 0.83	3.20 ± 0.011	99.69

Values are expressed as mean ± SE.

The tablets of 10 formulations were formulated and are examined for different parameters mentioned. Microscopic examinations of tablets from FT1 to FT10 were found to be circular shape with no cracks. The percentage weight variations for all formulations were tabulated in Table 3. All the formulated (FT1 to FT10) tablets passed weight variation test as the % weight variation was within the Pharmacopoeial limits of ±7.0% of the weight. The weights of all the tablets were found to be uniform with low standard deviation values. The measured hardness of tablets of each batch ranged between 4.3 to 6.4

kg/cm^2 (Table 3). This ensures good handling characteristics of all batches. The values of friability test were tabulated in Table 3. The % friability was less than 1% in all the formulations ensuring that the tablets were mechanically stable. When tablet contacts the test medium, tablet expanded (because of swellable polymers) and there was liberation of CO_2 gas (because of effervescent agent, $NaHCO_3$). The density decreased due to this expansion and upward force of CO_2 gas generation. This plays an important role in ensuring the floating capability of the dosage form. To provide good floating behavior in the stomach, the density of the tablets should be less than that of the gastric contents the density below (1.004 g/cm^3) than of gastric fluid. For formulation FT1-FT10, densities were found to be less than that of the gastric content. The percentage of drug content for FT1 to FT10 was found to be in between 97.11% to 99.69% of roxatidine, which complies with official specifications (Table 3).

ACKNOWLEDGEMENTS

The authors are thankful to the Principal for providing the facilities in the institute for carrying the present work.

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Accepted : 07.04.2009