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Formulation and Process Verification of Orodispersible Tablet of Cefixime Trihydrate

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ABSTRACT

Oro dispersible tablets have started gaining popularity and acceptance as a new drug delivery system because they are easy to administer. Recent development in mouth dissolving technology mainly works to improve disintegration quality of these delicate dosage forms without affecting their integrity. The purpose of the present investigation was to increase dissolution rate of cefixime trihydrate. For the preparation of cefixime trihydrate Oro dispersible tablets super disintegrants, microcrystalline cellulose, cross povidone, and Kyron T-314, mannitol, magnesium stearate, aspartame, talc used in varying concentrations. Tablets were evaluated for friability, hardness, weight variation, disintegration, drug content and in-vitro dissolution.

INTRODUCTION

Among all routes of administration, the oral route is most preferable route of administration of solid dosage forms. Tablets are the most common solid dosage form, administered orally, but it is found many patients especially children, mentally ill patients and geriatrics are having problem in swallow the tablets and do not take medication as per prescription.

Oro-dispersible tablets are having the advantage of ease of medication and rapid onset of action. ODTs are having rapid disintegration without use of water in oral cavity. When ODTs is kept in mouth/oral cavity then saliva quickly penetrates into tablet pores and causes rapid disintegration[1]. US FDA defined ODT tablets as "A solid dosage form containing medicinal substances which disintegrates rapidly usually within a matter of seconds, when placed upon the tongue".[1]

Cefixime is an orally active semi-synthetic third-generation cephalosporin antibiotic. Chemically, it is (6R, 7R)-7- {[2-(2-amino-1,3-thiazol-4-yl (carboxy methoxyimino) acetyl] amino}-3-ethenyl-8-oxo-thia-1-azabicyclo- [4.2.0] oct-2-ene-2-carboxylicacid trihydrate. Clinically it is used in the treatment of susceptible infections including gonorrhea, otitis media, pharyngitis, tonsillitis, lower respiratory tract infections such as bronchitis, and urinary tract infections.[2]

PROCESS VERIFICATION[3]

Process validation is establishing documented evidence that provides a high degree of assurance that a specific process will consistently produce a product meeting its pre-determined specifications and quality characteristics. It is beneficial to the manufacturer in many ways.

Objectives of process verification

- To reduce variation between various batches.
- To provide a high degree of assurance the quality of the product.
- To decrease the risk of defect costs and regulatory noncompliance.
- To ensure the consistency of the manufacturing operation and reproducibility of the process.
- To demonstrate the robustness of the process.

MATERIALS AND METHODS

We have used different excipients along with the cefixime trihydrate drug to prepare 6 formulations such as Cefixime, Cross povidone, Agar, Microcrystalline cellulose, Mannitol, Magnesium Stearate, Aspartame and Talc.

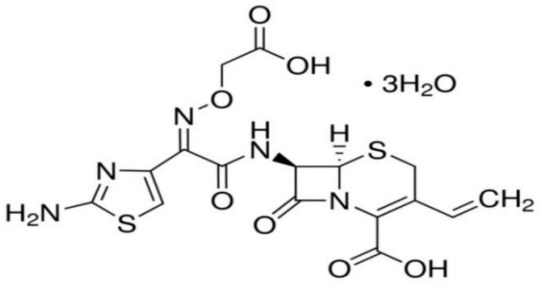
DRUG PROFILE

API structure and characteristics:

Molecular Formula : $C_{16}H_{15}N_5O_7S_2.3H_2O$

Molecular weight :507.50

Melting Point :240^0-250^o



Structure and IUPAC name of Cefixime: (6R, 7R)-7- {[2-(2-amino-1,3-thiazol-4-yl (carboxy methoxyimino) acetyl] amino}-3-ethenyl-8-oxo-thia-1-azabicyclo- [4.2.0] oct-2-ene-2-carboxylicacid trihydrate[3].

Pre-formulation studies:

Solubility:

The Solubility of cefixime trihydrate drug was tested in various solvents like:

Solvents	**Solubility**
Water	Slightly soluble
Methanol	Freely soluble
Ethanol	Sparingly soluble
Ethyl Acetate	Insoluble
Acetone	Insoluble

MATERIALS: Materials and their use:

Sl. No.	Chemicals	Category
01	Cefixime	Active medicament
02	Cros povidone	Super disintegrant
03	Microcrystalline cellulose	Disintegrant
04	Mannitol	Sweeting agent
05	Magnesium stearate	Lubricant
06	Aspartame	Sweetener
07	Talc	Glidant

Preparation of cefixime trihydrate tablet by direct compression method:

Formulation Table:

INGREDIENTS	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**
CEFIXIME	100mg	100mg	100mg	100mg	100mg	100mg
CROSS POVIDONE	10mg	12 mg	0	-	-	-
CROSS CARMELLOSE CELLULOSE	-	-	10 mg	12 mg	0	0
SODIUM STRACH GLYCOLATE	-	-	-	-	10 mg	12 mg
MICRO CRYSTALLINE CELLULOSE	30 mg	28 mg	30mg	28mg	30 mg	28 mg
MANNITOL	2 mg	2 mg	2 mg	2 mg	2 mg	2 mg
MG. STEARATE	3 mg	3mg	2mg	3mg	2mg	3mg
TALC	2mg	3mg	2mg	3mg	2mg	3mg
ASPARTAME	3 mg	3 mg	3 mg	3 mg	3 mg	3 mg
TOTAL	150mg	150mg	150mg	150mg	150mg	150mg

All the ingredients viz active ingredients, additives were passed through 60# sieve separately, magnesium stearate and talc through 40#. Then the ingredients were weighed and mixed in geometric mixing and tablets were compressed with 7mm sizes by convex round punch to get tablets using Rimek double rotary compression machine.

Post-compression parameter:

1] Friability

The friability of the prepared tablets was measured using a Roche friabilator (TAR 200 Eureka, Germany), and the percentage loss in weights were calculated and taken as a measure of friability.

F = W initial- W final/W initial x 100

2] Hardness:

The hardness of the tablets was determined using Monsanto hardness tester. It is expressed in kg/cm^2.

3] Weight variation:

10 tablets were randomly selected and individual weight was measured using the electronic weighing balance and the average weight and % weight variation were calculated.

% Deviation = (Individual weight – Average weight / Average weight) x 100

4] In- Vitro Disintegration Time:

Tablets were placed in the disintegration apparatus, which is filled by 900ml of distilled water (disintegration medium) maintained at 37 ± 1^0 C. The time taken to disintegrate the tablet and pass through the mesh was recorded and the mean of time taken was calculated.

5] In- Vitro Dissolution Test:

The dissolution test was conducted according to USP pharmacopeia. A buffer was prepared from HCL (pH 1.2) with a temperature maintained at 37 ± 1^0C minutes and the equivalent amount of fresh buffer solution was immediately introduced as a replacement. The samples were filtered and assayed for drug content by measuring the absorbance at 287nm using a UV spectrophotometer. 1.2 HCL buffer was used as a blank.

RESULTS AND DISCUSSION

Table: Pre-compression parameters of all the formulations

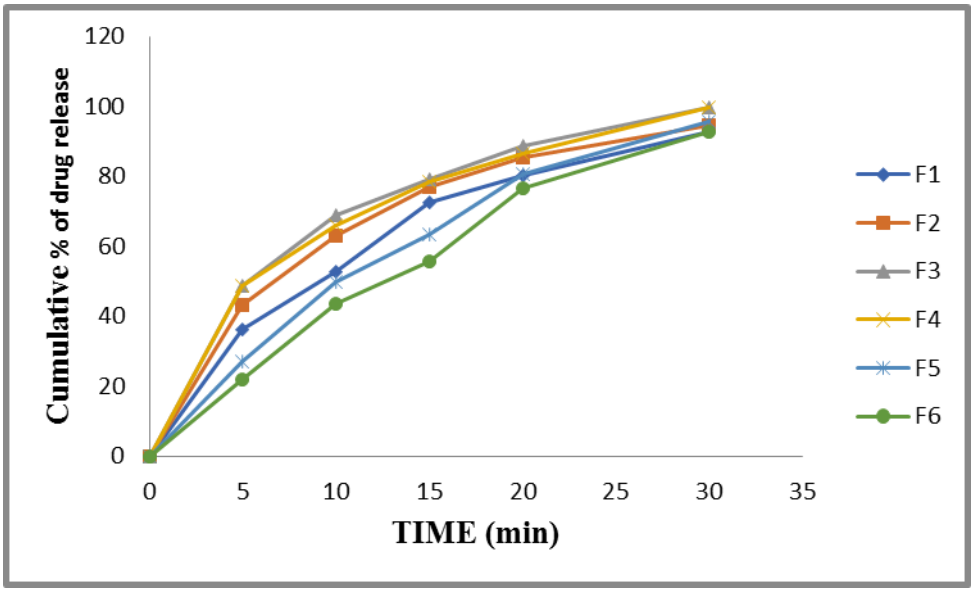
Formulation code	Bulk density (gm/ml)	Tapped Density (gm/ml)	Carr's Index (%)	Angle of Repose(θ)
F1	0.536±0.0029	0.684±0.0065	18.10	24.31±.0346
F2	0.547±0.0064	0.665±0.0027	20.42	23.53±1.501
F3	0.527±0.0053	0.690±0.0019	16.42	23.46±0.338
F4	0.555±0.0041	0.682±0.0060	16.08	23.88±0.358
F5	0.512±0.0049	0.682±0.0054	17.23	24.24±0.598
F6	0.541±0.0073	0.645±0.0124	17.24	24.16±0.675

Table: Post-compressional parameters of all the formulations

Formulation Code	Hardness (kg/cm2)	Friability (%)	Weight Variation (mg)	Thickness (mm)	*In vitro* Disintegration Time(min)	Drug Content (%)
F1	3.00±0.012	0.50	150.50±0.152	4.003±0.0112	68.42±0.90	98.54±0.012
F2	3.50±0.288	0.53	149.20±0.070	4.002±0.0025	58.21±1.54	97.62±0.017
F3	3.83±0.288	0.46	150.12±0.493	4.010±0.0100	40.37±1.50	99.32±0.009
F4	3.83±0.288	0.47	150.05±0.378	4.017±0.0057	40.10±1.36	99.69±0.003
F5	3.83±0.120	0.52	148.40±0.183	4.004±0.0061	56.29±3.55	98.46±0.034
F6	3.50±0.280	0.56	150.30±0.043	4.001±0.0043	57.03±1.51	99.74±0.009

Table: Cumulative % drug release of Cefixime ODT

TIME	F1	F2	F3	F4	F5	F6
0	0	0	0	0	0	0
5	36.34±1.86	47.24±1.37	48.79±2.83	48.79±2.10	27.2±3.11	21.87±2.61
10	52.63±0.67	67.98±3.37	68.83±1.22	65.83±1.07	49.98±2.91	43.63±1.77
15	72.56±1.7	77.01±2.28	79.27±0.07	72.27±3.48	63.21±1.58	55.56±2.37
20	80.42±2.23	85.45±1.68	88.53±1.89	86.53±2.67	80.45±2.45	76.42±3.11
30	96.55±1.5	94.48±2.46	99.86±1.46	99.86±1.19	95.48±1.65	92.55±2.38



CONCLUSION

In this project work formulation and evaluation of cefixime Oro dispersible tablets were done. The formulated tablets passed the acceptable criteria of evaluation parameters i.e., content uniformity, weight variation, friability, hardness, dissolution and disintegration and further, the raw materials used for the formulation comply with the approved raw material specifications. Hence it was concluded that the formulation process adopted is robust and consistent to produce the product meeting the predetermined standards. The qualities of the tablets were desired quality attributes based on the results obtained, it was concluded that formulated tablets comply with the approved In-process and Finished product specification defined for the product.

REFERENCES:

1. Tanmay GHOSH, Amitava GHOSH and Devi prasad. A Review on new generation Oro dispersible tablets and its future prospective. Dept. of pharmaceutics, Himalaya pharmacy Institute Majhitar Rangpo Sikkim 737136 India.
2. Sujit Biswas, sharif Md, Anisuzzaman, Md. Sohel Rana Development of formulation and In-vitro Evaluation of physiochemical properties of cefixime Trihydrate tablet. Dept. of Pharmacy, Jahangimagar University, Savar Dhaka-1342.
3. Prachi Patil, Shraddha Pethkar, Manisha Phoujdar, Hargovind Seth. Process Validation. World J Pharma Pharmaceutical Sci. 2015; 5(3):487-492.
4. Subramania. L, P. Ramasubramaiyan, Remya, A. Thangathirupathi, A. Karthikeyan. Formulation development and evaluation of cefixime dispersible Tablets. Sankaralingam Bhuvaneswari college of pharmacy Sivakasi-626130-Tamilnadu.
5. Umme Rumana U.G1, Ansari Yaasir Ahmed2, Dr.G.J Khan3, Shoeb Quazi4, Syed Abdul Azeem5, Formulation And Evaluation Of Mouth Dissolving Tablet Of Cefixime Trihydrate.1,2,4,5Lecturer at Jamia

college of Pharmacy, Akkalkuwa, Nandurbar-425415, Maharashtra, Principal Ali Allana college of pharmacy, Akkalkuwa, Nandurbar-425415, Maharashtra

6. Muder al hayder1, Jamal Ali Ashoor2, qasim allawi bader3, zaid al-obaidi Preparation and Evaluation of Cefixime Dispersible Tablets Using Co-Processed Excipients Human Journal Research Article September 2015 Vol.:4, Issue:2

7. Remya KS, Beena P, Bijesh PV, Sheeba A Formulation Development, Evaluation and Comparative Study of Effects of Super Disintegrants in Cefixime Oral Disintegrating Tablet Nazareth College of Pharmacy, Othera P.O, Thiruvalla, Pathanamthitta (Dist.), Kerala - 689 546, India.

8. Kadria A. Elkhodairy a,b, Maha A. Hassan a,c, Samar A. Afifi a,d Formulation and optimization of Oro dispersible tablets of flutamide a Department of Pharmaceutics, College of Pharmacy, King Saud University, Riyadh, Saudi Arabia b Department of Industrial Pharmacy, Faculty of Pharmacy, Alexandria University, Alexandria, Egypt c Department of Pharmaceutics, Faculty of Pharmacy, Assiut University, Assiut, Egypt d Department of Pharmaceutics, National Organization for Drug Control and Research, Giza, Egypt.

9. Ashiqul Islam, Syed Shabbir Haider, and Md. Selim Reza Formulation and Evaluation of Oro dispersible Tablet of Domperidone Department of Pharmaceutical Technology, Faculty of Pharmacy, University of Dhaka, Dhaka-1000, Bangladesh