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Formulation and evaluation of sustained release tablet of cefixime using biopolymer of *Phaseolus vulgaris*

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ABSTRACT

A need for prolonged and better control of drug administration has increase demand of natural polymer. Recently biopolymer was used to control the drug release rate from the formulation polymer are being used as main incipient. Biopolymer have advantage that they chemically inert, nontoxic, cost effective , ecofriendly, biodegerdable ,biocompatible and easily accepted by regulatory authority as compared to synthetic conterpart. The aim of present study was to develop sustained release matrix tablets of cefixime by using novel isolated biopolymer as a release modifier, obtained from dried seed of been (*Phaselous vulgaris*).The biopolymer was extracted by non solvent addition method and characterized their physiochemical ,phytochemical and micromeritic property. The advantage of sustain release matrix tablet that they maintain the steady state level of drug in the systemic circulation. The sustained release tablet of cefexime were prepared through wet granulation methods by using different ratios (1:1,1:2,1:3,1:4. and 1:5) of drug and biopolymer. Further the tablet were evaluated for its weight variation, friability, hardness, drug content and in vitro dissolution study. The result obtained that the matrix tablet prepared by using natural polymer can be obtained more than 12 hour and the drug release vary with concentration of polymer in matrix tablet, the above study was found to under limit as pharmacopoeial standard. So the research from the study shows that the biomaterial obtained from the black seed (*phaselous vulgaris*) serves as a better release modifier in the development of sustained release tablet. So been biopolymer can be used as a better alternative excipients for the development novel drug delivery system.

Keywords: *biopolymer*, matrix, *phaselous vulgaris*, sustained release tablet

Introduction

Cefixime is an orally active third generation cephalosporin, it is a highly active against number of bacterial infection. the bactericidal action of cephalosporin is due to the inhibition of cell wall synthesis[1].The polymer isolated from natural source have advantage over the synthetic one that they are chemically inert, nontoxic, cost effective ,eco-friendly, biodegradable ,biocompatible and easily accepted by regulatory authority .The aim of present investigation was to isolate the biomaterial from the dried seed of (*Phaselous vulgaris*) and used as a release retardant for the development of matrix tablets of Cefixime by using wet granulation method. The biopolymer was extracted by non solvent addition method and characterized their physiochemical, phytochemical and micromeritic property. From the study it was found that the isolated biomaterial can be used as a alternative potent release modifier as the synthetic polymer. At present era the biomaterials fulfill multi-functional roles like improvement of stability and bioavailability of active ingredient, enhancement of patient's acceptability and ensure ease of manufacture. Biomaterials have been explored successfully in the formulation of novel drug delivery systems, *Phaseolus vulgaris* belongs to the family of legumes i. e. Fabaceae. The seeds of *Phaseolus vulgaris* are termed as an excellent remedy against cancer, heart, diabetes, bladder dysfunctions. the chemical constituents present in this seeds are alkaloids, fibers, tannins, anthocyanins, carbohydrates. It is an excellent source of iron, folic acid, vitamins $B_{6,}$ potassium but is the richest source of starch, protins and dietary fibers[2].

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Formulation of cefixime sustained release tablet using biopolymer obtained from *Phaseolus vulgaris*

Materials and Method

Materials

Cefixime was obtained as gift samples from Acacia Biotech Laboratories Bal Pharma Ltd. All other reagents (magnesium stearate, talc, PVP) used were of analytical grade

Method

Isolation of bio polymer

The powdered seeds of been were soaked in double distilled water. Then the kept overnight in refrigerator further The supernatant fluid was decanted and then filtered. The filtrate was centrifuged at 6000 rpm for 10 minutes and suparnatent solution was collected and treated with Acetone to extract the biomaterial.The solution kept in refrigerator overnight so that most of the undissolved portion was settled down in precipitate form. The precipitate was washed repeatedly with acetone and dried in decicator. Powdered polymer passed through sieve number 60 and dried biomaterial was stored in air tight container [3,4].

Characterization of Biopolymer

The biopolymer obtained from the fruit of Phaseolus vulgaris was characterized for their physicochemical and phytochemical properties.

Physicochemical characterization

The isolated biopolymer was evaluated for physicochemical properties such as organoleptic evaluation (colour, odour, taste and shape), and micromeritic properties.

Result

Table 1: Organoleptic property of Biopolymer

Parameter	Biopolymer (*Phaseolus vulgaris*)
Colour	**White**
Odour	**Odorless**
Taste	**Tasteless**
Shape	**Amorphous**

A. Phytochemical characterization

Biopolymer obtained from the fruit of *Phaseolus vulgaris* was evaluated for phytochemical properties like test for alkaloids, test for carbohydrates, test for proteins, test for saponins and test for mucilage[5].

Table 2: Phytochemical properties of drug

S.NO.	Test	Observation
1	**Test for alkloids**	
	Mayer's test	**(-)**
	Dragandorff 's test	**(-)**
2	**Test for carbohydrates**	
	Fehling test	**(+)**
	Benedict 's test	**(-)**
3	**Test for saponins**	
6	**Foam test**	**(+)**
7	**Test for proteins**	
8	**Millon 's test**	**(-)**
9	**Ninhydrin test**	**(-)**
10	**Test for mucilage**	
11	**Ruthenium red test**	**(++)**
12	**Test for reducing sugar(fehling test)**	**(++)**

13	Test for chloride (silver nitrate test)	(-)
14	Test for sulphates (silver chloride test)	(-)

B. X-ray diffraction analysis

The X-ray diffraction pattern of biomaterial obtained from *phasiolus vulgaris* did not show any characteristic peak, which indicate amorphous nature.

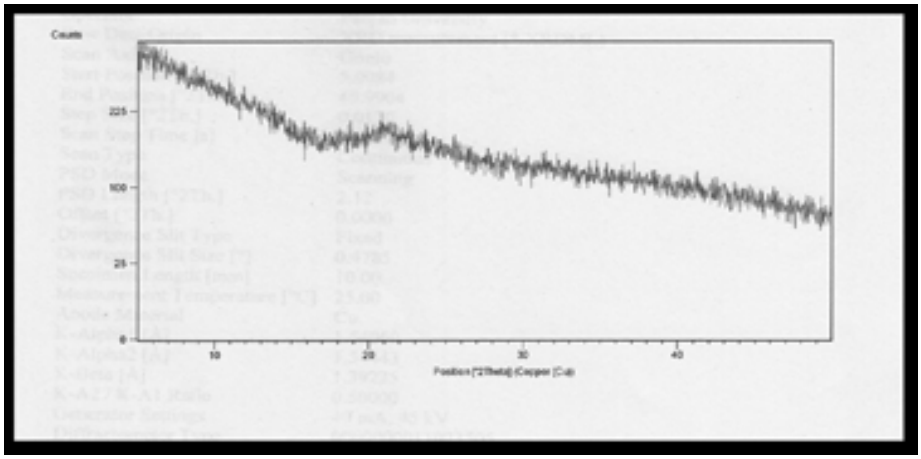

Figure 1: X-ray diffraction analysis

Spectrophotometric determination of cefixime

Calibration curve of cefixime was prepared in water. Stock solution of cefixime (100µg/ml) was prepared. Aliquot from stock solution obtained was then serially diluted with water to get final concentrations in the range of 2-10µg/ml. The absorbance value of the resultant solutions were measured using water as blank at 288nm. The absorbance values were plotted against concentration (µg/ml) to obtain the standard calibration curve[6].

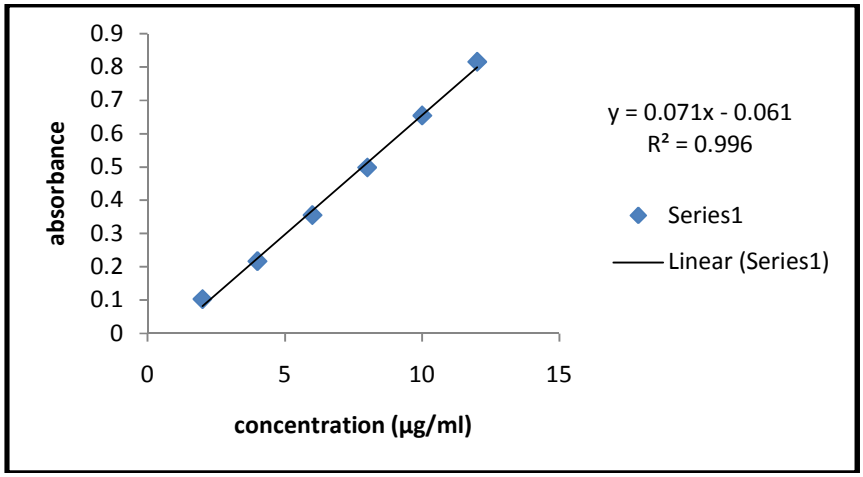

Figure 2: Calibration Curve of Cefixime in water

Table 3: Spectrophotometric determination of cefixime

S. No.	Concentration (µg/ml)	Absorbance
1	2	0.133
2	4	0.254
3	6	0.378
4	8	0.457
5	10	0.654

Preparations of sustained release tablet by using biopolymer

The sustained release tablet of cefixime were prepared through wet granulation methods by using different ratios (1:1, 1:2, 1:3, 1:4. and 1:5) of drug and biopolymer. five different formulation of tablet was prepared by wet granulation method, in this different polymer ratio was added and granulated finally the granules were compressed.

Table 4: Composition of sustained release tablet

Formulation code	Drug (mg)	Polymer (*Phaseolus Vulgaris*)	Magnesium stearate	Talc	Pvp%
F1	200	100	25	50	5
F2	200	100	25	50	5
F3	200	100	25	50	5
F4	200	100	25	50	5
F5	200	100	25	50	5

Evaluation

Precompression parameter

A. Characterization of polymer

Table 5: Properties of polymer

Property	Result
Bulk density	0.3218g/cm^3
Tapped density	0.3784
True density	0.89
Hausner ratio	1.108
Angle of repose	26.82
Loss of draying	1.8%
viscosity	1.30cp

Post compression parameter

A. Thickness and diameter: The thickness and diameter of tablet was measured by verniars calipers .it is measured in mm.

B. Hardness: The Monsanto hardness tester was used to determine hardness of tablets. Hardness was expressed in kg/cm^2

C. Weight variation: For the evaluation of sustained release tablet of cefixime taken twenty tablets of each batch were used to evaluate weight variation among tablets and standard daviation was calculated. It is measured in kg/cm^2.

Table 6: Evaluation of sustained release tablet

Formulation code	Friability	Hardness	% drug con-tent	%drug re-lease
FI	0.58	4.25	96.11	91.547
F2	0.60	5.12	92.86	89.436
F3	0.59	5.10	93.25	85.243
F4	0.65	4.12	92.56	87.954
F5	0.62	4.20	93.59	93.567

D. *In-vitro* release studies

Preparation of 0.1N HCL: 0.36 ml of concentrate HCL was diluted upto 1000ml with distilled water to produse 0.1N HCL.

Preparation of phosphate buffer 6.8: Dissolved 28.08 gm of disodium hydrogen phosphate and 11.45gm of potassium dihydrogen phosphate in sufficient water to produce 1000 ml.

Procedure for *In-vitro* dissolution study: The dissolution studies were performed using USP apparatus type II rotating at 50 rpm 900 ml of 0.1N HCL for 2 hour and phosphate buffer PH(6.8) for the remaining hours dissolution medium was used at 37oc ± 0.5oc.5 ml of sample was withdraw at specific time interval and the volume of dissolution medium was maintained by adding the same volume of fresh dissolution medium the absorbance of the withdraw sample was measured by U.V 1800SHIMADZU at 288nm[7].

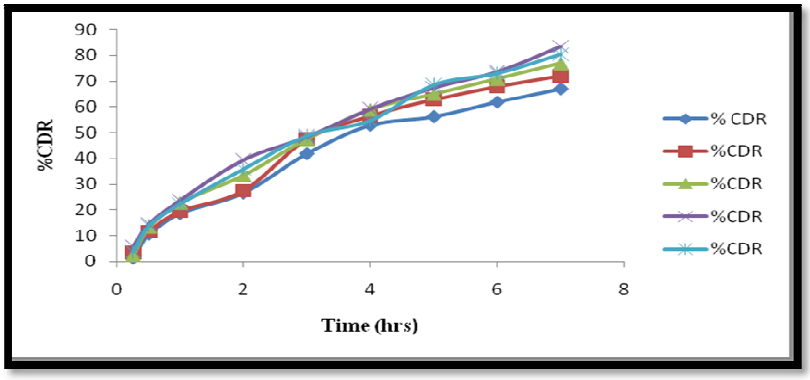

Figure 3: Cumulative Drug Release of sustained release tablet

Discussion

This study investigated that sustained release tablet of cefixime were prepared successfully by wet granulation method using the biopolymer in different ratios. It was observed that the concentration of the biopolymer can be control the hardness and drug release properties of the tablets. Thus, sustained release tablets of cefixime could be developed for controlled drug delivery.

Conclusion

This study investigated that sustained release tablet of cefixime were prepared successfully by wet granulation method using the biopolymer in different ratios. It was observed that the concentration of the biopolymer can be control the hardness and drug release properties of the tablets. Thus, sustained release tablets of cefixime could be developed for controlled drug delivery.

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Reference

1. Tripathi k.d. Essential of medical pharmacology, prescribed by jaypee brothers publishers.6th editon ,704,706.
2. Singh AK, singh A, madhv NV. extraction and characterization of noval of noval bioadhesant biomaterial obtained from the *Phaseolus vulgaris*. *Int J Pharm Pharm Sci* 2014, 6(11), 146-151.
3. Narkhede Sachin B, Vidyasagar G, Jadhav Anil G, Bendale Atul R, Patel Kalpen N. Isolation and evaluation of mucilage of Artocarpus heterophyllus as a tablet binder. *J. Chem. Pharm. Res*., 2010, 2(6),161-166.
4. X Fatima Grace, S Latha., S Shanthi., N Lakshmi., D Chamundeeswari. Isolation and preliminary evaluation of *Portulaca quadrifida* mucilage. *Journal of Pharmacy Research* 2012;5(1):505-507.
5. H Pawar, P M D Mello. Isolation of seed gum from *Cassia tora* & preliminary studies of its application as a binder for tablets. Indian drugs 2004;41(8): 465-468.
6. Sharma Y R. Elementary Organic Spectroscopy, Principles and chemical applications, S Chand & Co. Ltd, New Delhi; 2010 ,89-150 .
7. Rishbha Malviya, vipin bansal, Prmod kumar Sharma. Formulation, Evaluation and Comparison of Sustained Release Matrix Tablets of Diclofenac Sodium Using Natural Polymers as Release Modifier. *International Journal of Pharma and Bio Sciences* 2010;1(2):