FORMULATION AND EVALUATION OF ORAL CONTROLLED RELEASE TABLETS OF OXYBUTYNIN

Mr. Permula Praveen Kumar 1, Mrs. M. Shiroja [2], Mr.Chandrasekhara Rao Baru, [3] Miss .Guddanti Hema[4] , Mrs. BeebireddyVidhya

1.Assistant Professor, Chilkur Balaji college of Pharmacy, Aziz nagar, Moinabad, 500075
2.Assistant Professor, Chilkur Balaji college of Pharmacy, Aziz nagar, Moinabad, 50007
3. Professor and Principal, Chilkur Balaji college of Pharmacy, Aziz nagar, Moinabad, 500075
4. Assistant Professor, Chilkur Balaji college of Pharmacy, Aziz nagar, Moinabad, 500075
5.Assistant Professor, Chilkur Balaji college of Pharmacy, Aziz nagar, Moinabad, 500075

ABSTRACT

The objective of the study was to develop matrix tablets of oral controlled release tablets of oxybutynin. In the present study oxybutynin tablets were successfully developed using direct compression method. To achieve better patient compliance and for prolonged release of drug from the dosage form. Formulation development of diffusion based tablets of oxybutynin using different types of polymers such as Ethyl cellulose, Chitosan, and Locust bean gum and selection of the best formulation among them. Flow properties Angle of repose, Loose bulk density ,tapped density and also Carr's index was determined for all the formulations which showed good flow property. The thickness found uniform, ,hardness and friability values of all the formulations tablets prepared by direct compression method were within the limits and found to be mechanically stable .In vitro dissolution results showed that% of drug release was prolonged in formulation F5 that is up to 12hrs when compared to other formulations .This indicates the drug released from the formulation F5 was effective up to 12 hours . Oxybutynin is used to treat certain bladder and urinary conditions Oxybutynin belongs to a class of drugs known as antispasmodics. Oxybutynin is indicated for the symptomatic treatment of overactive bladder, which causes urge urinary incontinence and frequency, and urgency. Oxybutynin may also be used for children aged 6 and above for the symptomatic management of detrusor muscle overactivity which has been found to be related to a neurological condition.

KEY WORDS - Prolonged release of drug, patient compliance, symptomatic treatment of overactive bladder

INTRODUCTION

Over past 30 years, expense and complications involved in marketing and new entities have been increased.CRD provides better control, less dosage frequency and less side effects. The goal in designing controlled release drug delivery system is to reduce the frequency of the dosing, reducing the dose and providing uniform drug delivery So, controlled release dosage form is a dosage form that releases one or more drugs continuously in predetermined pattern for a fixed period of time, either systemically or locally to specified target organ . Controlled release dosage forms provide better control of plasma drug levels, less dosage frequency, less side effect, increased efficacy and constant delivery.

AIMS AND OBJECTIVES: -

- Aim of study is to formulate and evaluate oxybutynin-controlled release tablets using different polymers such as ethyl cellulose, chitosan, and locust bean gum.
- To formulate controlled released tablets of oxybutynin for the treatment of overactive bladder.
- To formulate tablets using different polymers.
- To evaluate pre and post compression evaluation parameters.
- To perform drug and excipients compatibility studies.
- To perform various various quality control parameters for prepared tablets.

DRAWBACK OF CONVENTIONAL DOSAGE FORM

- 1) Poor patient compliance: Chances of missing of the dose of a drug.
- 2) The unavoidable fluctuations of drug concentration may lead to under medication or over medication.
- 3) A typical peak-valley plasma concentration-time profile is obtained which makes attainment of drawback of conventional dosage form.
- 4) The fluctuations in drug levels which causes precipitation of adverse effects mainly the drug which having the small Therapeutic Index whenever over medication occur.

CONTROLLED RELEASE FORMULATION

- Constant supply of active drug.
- An ideal delivery system which delivers the drug at predetermined rate .
  Locally or systematically for a specific period of time

ADVANTAGE:

It provides the convenience of supplying additional Dose or doses without the need of re-administration.
DISADVANTAGE:
It is that the blood levels still exhibit the Peak and valley characteristic conventional intermittent drug therapy.
Encapsulation
The drug particles coated with encapsulated by microencapsulation technique. Materials used are cellulose, polyethylene, glycols, wax etc
The drug particles are coated or encapsulated by microencapsulation techniques with slowly dissolving materials like cellulose, poly ethylene glycols, polymethacrylates, waxes etc. the dissolution rate of coat depends upon the solubility and thickness of the coating. Those with the thinnest layers will provide the initial dose. The maintenance of drug levels at late times will be achieved from those with thicker coating.

Methodology
DETERMINATION OF ABSORPTION MAXIMA
100mg of Oxybutynin pure drug was dissolved in 100ml of Methanol (stock solution)10ml of above solution was taken and make up with100ml by using 0.1 N HCL (100µg/ml). From this 10ml was taken and make up with 100 ml of 0.1 N HCL (10µg/ml) and pH 6.8 Phosphate buffer UV spectrums was taken using Double beam UV/VIS spectrophotometer. The solution was scanned in the range of 200 – 400nm.
PREPARATION CALIBRATION CURVE: 100mg of Oxybutynin pure drug was dissolved in 100ml of Methanol (stock solution)10ml of above solution was taken and make up with100ml by using0.1 N HCL (100µg/ml). 10ml was taken and make up with 100 ml of 0.1 NHCL (10µg/ml). The above solution was subsequently diluted with 0.1N HCL to obtain series of dilutions Containing 2, 4, 6, 8 and 10 µg/ml of Oxybutynin per ml of solution. The absorbance of the above dilutions was measured at 223 nm by using UV-Spectrophotometer taking 0.1N HCL as blank. Then a graph was plotted by taking Concentration on X-Axis and Absorbance on Y-Axis which gives a straight line Linearity of standard curve was assessed from the square of correlation coefficient (R^2) which determined by least-square linear regression analysis. The above procedure was repeated by using pH 6.8 phosphate buffer solutions.

LITERATURE REVIEW

Othman A Al Hanbali et at (2018)
Formulation and evaluation of diclofenac CR matrix tablets made of Hpmc and poloxamer 188 polymer. Four formulation of hydrophillic matrix tablets containing 16.7%w/w hpmc and o, 6.7 ,16.7 and 25.0%. Tablets were prepared by direct compression and characterized for hardness, thickness, weight and uniformity of content.
DR.Khaja Pasha et al.,(2017)
Formulation and evaluation of controlled release osmotic tablet of glipizide. Controlled porosity osmotic pump tablets of glipizide were prepared and final formula is optimized after formulating four formulations by using different polymers, two factors, osmogent ratio and coating percentage are varied and evaluated based on their effects on drug release rate.
Kamlesh J. Wadher et al.,(2017) Formulation and Evaluation of Controlled Release Matrix Tablets Using Eudragit RSPO and Gum Copal. In the present investigation an attempt was made to formulate the oral controlled release metoclopramide hydrochloride matrix tablets by using Eudragit RSPO and natural gums like guar copal as rate controlling polymer and to evaluate drug release parameters as per various release kinetic models. The sustained release matrix tablets of Metoclopramide HCl were prepared by wet granulation process. All tablets were evaluated for their physical parameters for both, precompression and post-compression. FTIR and DSC studies proved that no chemical interaction in drug and polymers. The combination of both the polymers found to retard the release of drug for 12 hrs. All the batches showed Mixed Matrix and Peppas best fitted model for release kinetics, which showed that, the release of the drug from the prepared tablets is sustained by swelling, followed by drug diffusion and slow erosion of the polymer. Falguni Sharma et al.,(2014) Formulation and evaluation of controlled release osmotic tablet of metoprolol succinate. : Metoprolol Succinate has a short elimination half- life (3-7 hours) and rapidly absorbed in GIT If it is formulated by conventional tablets requires multiple daily administration with resulting inconvenience to the hypertensive patient and the possibility of reduced compliance with prescribed therapy. Core tablets were prepared by direct compression technique using fructose and KCl as osmogens and Avicel PH101 as filler. The core tablets were coated by spray gun in coating pan and used a coating agent cellulose acetate (2%w/v) with PEG 400 and PEG 6000 as water soluble pore former and dibutyl-pthalate as plasticizer. The optimized formulation was evaluated for Compatibility Study by FTIR, InVitro drug release study by USP-II dissolution apparatus and, accelerated stability study.

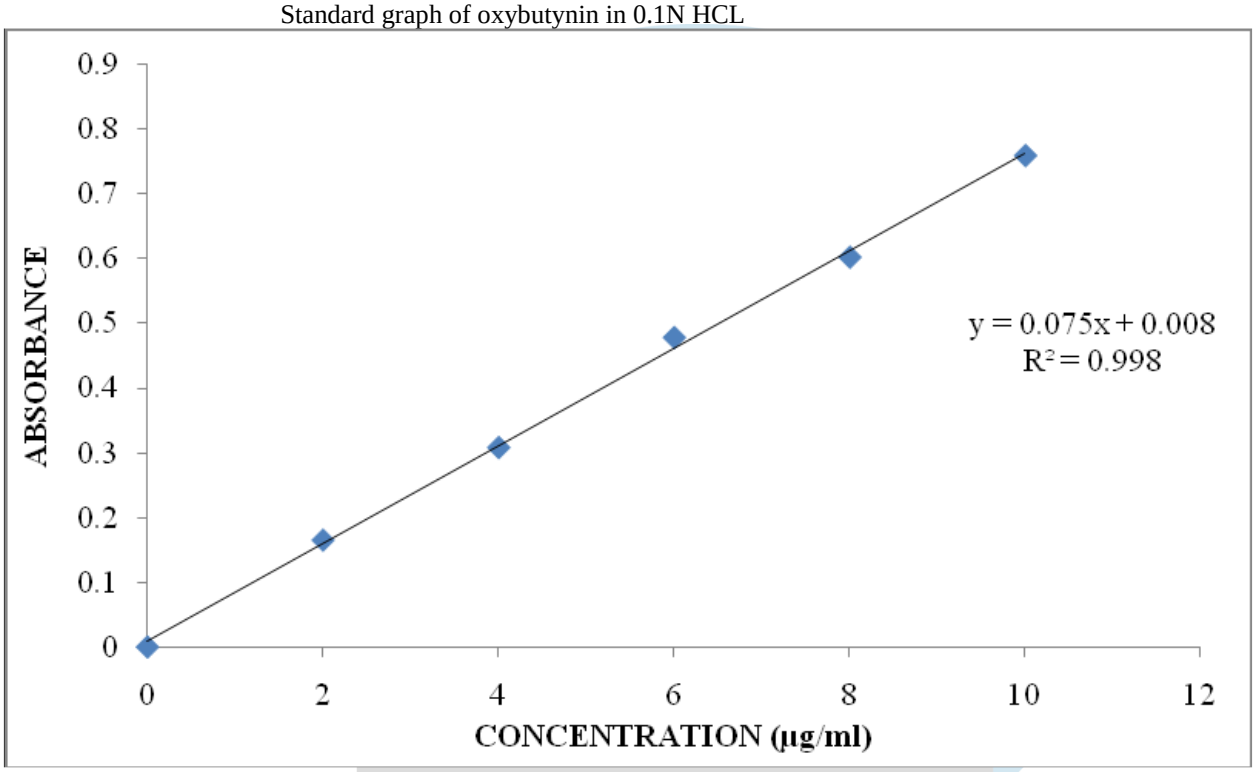
RESULTS AND DISCUSSIONS

Formulation composition for tablets

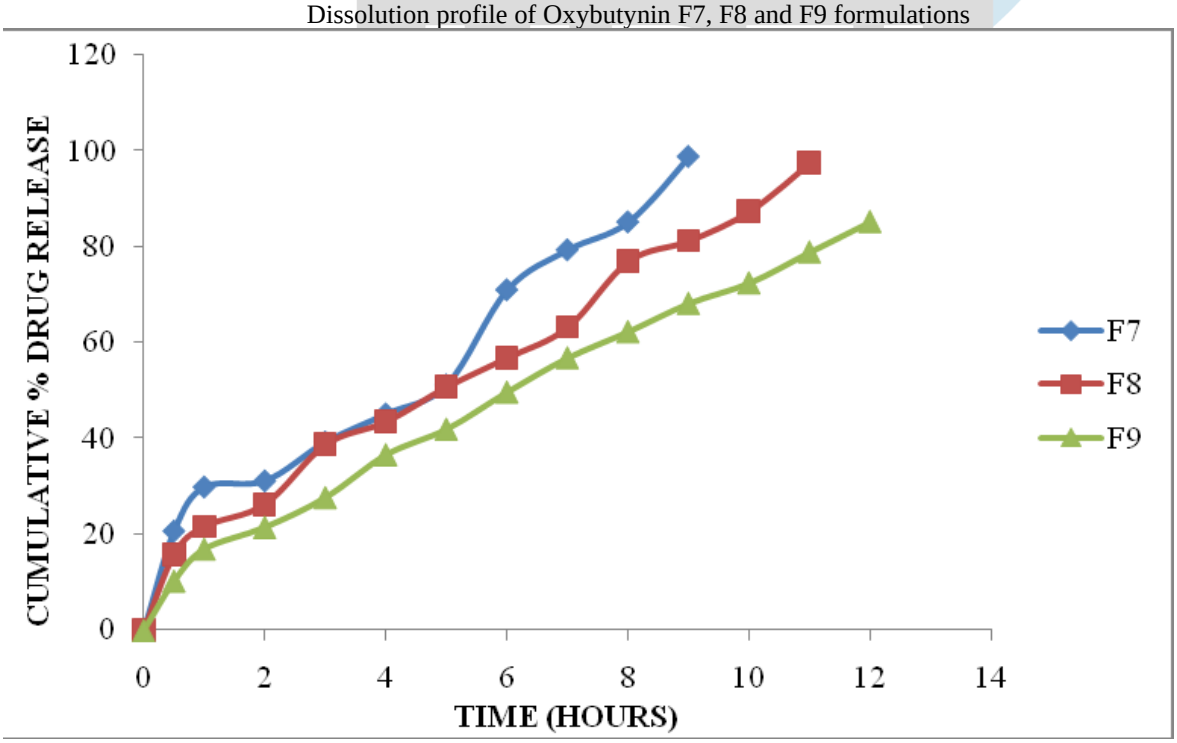
INGREDIENTS	F1	F2	F3	F4	F5	F6	F7	F8	F9
Oxbutynin	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg
Ethyl cellulose	15mg	30mg	45mg	-	-	-	-	-	-
Chiosan	-	-	-	15mg	30mg	45mg	-	-	-
Locustt Bean gum	-	-	-	-	-	-	15mg	30mg	45mg

MCC	771mg	56mg	41mg	771mg	56mg	41mg	771mg	56mg	41mg
Aerosil	4 mg	4 mg	4 mg	4 mg	4 mg	4 mg	4 mg	4 mg	4 mg
Magnesium Stearate	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg	5 mg
Total weigt	100mg	100mg	100mg	100mg	100mg	100mg	100mg	100mg	100mg

Standard graph of oxybutynin in 0.1N HCL



Dissolution profile of Oxybutynin F7, F8 and F9 formulations



From the dissolution data it was evident that the formulations prepared with Ethyl cellulose as polymer were able to retard the drug release up to desired time period i.e., 122 hours.

Conclusion: -

In the present study an attempt was made to formulate and develop a controlled release tablet containing Oxybutynin using different types of polymers. Initially chemical interactions were found out using Fourier transform infrared spectrophotometer, from the study it was concluded that there was no chemical interaction between the drug and the excipients used for the formulation of controlled release tablets. The obtained pre compression and post compression study data revealed that the prepared tablets comply with the requirements necessary to pass official quality control test. Formulations F1-F9 showed a controlled drug release till 12 hours of dissolution study of which Formulation F5 has showed maximum amount of drug released 99.34% at the end of 12th hour, so it is choosen as an optimized formulation.

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