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DESIGN, DEVELOPMENT AND EVALUATION OF CHEWEABLE TABLETS OF METOPROLOL SUCCINATE BY WET GRANULATION METHOD

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ABSTRACT

Problems of swallowing and provides a quicker onset of action overcomes by Cheweable tablets constitute an innovative excipients. The bioavailability of some drugs may be increased due to absorption of drugs in oral cavity. Cheweable tablets of Metoprolol succinate prepared by wet granulation method using crospovidone as a super disintegrants by wet granulation method. FTIR Spectroscopy was carried out to determine the suitability of superdisintegrants with the drug. The prepared fast dissolving tablets of Metoprolol succinate were evaluated for post compression parameters. Metoprolol succinate is β1 selective (cardio selective) adrino rceptaor blocking agent. It is used as anti-hypertensive, anti-anginal and in acute myocardial infarction. The bioavailability of the Metoprolol succinate is about 40-50%, with 3-4 hr half life. In hypertension, it is given in 50 mg daily and according to response the dose may increases to 400 mg. Hypertension is the most common cardiovascular disease. The prevalence of hypertension increases with advancing age Arterial pressure is the product of cardiac output and peripheral vascular resistance. Drugs lower blood pressure by actions on peripheral resistance, cardiac output, or both. Drugs may reduce the cardiac output by inhibiting myocardial contractility or by decreasing ventricular filling pressure. Drugs can reduce peripheral resistance by acting on smooth muscle to cause relaxation of resistance vessels or by interfering with the activity of systems that produce constriction of resistance vessels (e.g., the sympathetic nervous system). In patients with isolated systolic hypertension, complex hemodynamic in a rigid arterial system contribute to increased blood pressure; drug effects may be mediated by changes in peripheral resistance but also via effects on large artery stiffness. Metoprolol succinate, β1-

selective adrenergic receptor blocking agent used in the management of hypertension, angina pectoris, cardiac arrhythmias, myocardial infarction, heart failure, hyperthyroidism and in the prophylactic treatment of migraine.

KEYWORDS: Cheweable, disintegrants, crospovidone, adrino rceptaor.

INTRODUCTION

Dosage forms are the devices into which a drug substance can be incorporated for the convenient and efficacious treatment of a disease. The processing techniques, which includes various pharmaceutical operations like size reduction, mixing, granulation, compression etc; may also play an important role in increasing or decreasing the efficacy and stability of dosage forms.

The creation and manufacture of dosage forms has been at the center of pharmacy practice for the past thousand years. For most of its history, the field of pharmacy was much more concerned with drug preparations than with the resulting dosage forms. Up to the sixteenth century, almost all drugs were derived from plants and were made into preparations that served as the ingredients for medicines; these preparations were called galenicals.

Salient Feature of Fast Dissolving Drug Delivery System

- Ease of Administration to the patient who cannot swallow, such as the elderly, stroke victims, bedridden patients, patient affected by renal failure and patient who refuse to swallow such as pediatric, geriatric & psychiatric patients.
- No need of water to swallow the dosage form, which is highly convenient feature for patients who are traveling and do not have immediate access to water.
- Rapid dissolution and absorption of the drug, which will produce quick onset of action.
- Some drugs are absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach. In such cases bioavailability of drug is increased.
- Pregastric absorption can result in improved bioavailability and as a result of reduced dosage; improve clinical performance through a reduction of unwanted effects.

MATERIALS AND METHOD

Experimental Methodology

1. Characterization of Metoprolol Succinate pure drug

The physiochemical characterization of drug molecules is important with regards to its formulation and to design UV spectroscopy method, In-frared spectroscopy is important for the characterization of drug molecules.

1. Melting point

Melting point of was Metoprolol Succinate determined by taking small amount of sample in capillary tube at one end and placed in Thiele's tube melting point apparatus (capillary method). The melting point was noted and readings were taken in triplicate.

2. Solubility study

The solubility of the drug was determined in different solvent i.e. buffer pH6.8 and distilled water. analyzed by using UV spectrophotometer at 223 nm.

3. UV spectroscopy

The ultra violet absorption spectrum of solution of Metoprolol Succinate in phosphate buffer obtained using shimadzu 1800 UV spectrophotometer and 1cm quartz cell scan over a wavelength range of 200-400 nm after scanning ,it showed that the wavelength of maximum absorption at (223nm).

4. Fourier transforms infrared spectroscopy (FTIR)

The dry sample of Metoprolol succinate was prepared by triturating with dry potassium bromide (A.R. Grade) and placed in sample cell. The IR spectrum of the drug sample was recorded and the spectral analysis was done and the spectrum was showed in Fig. No.2 and interpretation in.

Method

1. FT-IR Spectroscopic Study

The dry sample of Metoprolol succinate was prepared by triturating with dry potassium bromide (A.R. Grade) and placed in sample cell. The IR spectrum of the drug sample was recorded and the spectral analysis was done.

2. UV spectroscopy method

Preparation of standard curve (calibration curve) of Metoprolol Succinate

1. Preparation of standard graph of Metoprolol Succinate using phosphate buffer PH 6.8.The phosphate buffer PH 6.8 solution as per IP 2011.

3. Standard stock solution

Metoprolol Succinate 100mg was accurately weighted and transferred to 100ml volumetric flask. It was dissolved in phosphate buffer PH 6.8 and volume was made up to 100ml to get stock solution of 1000ug/ml.

4. Second stock solution

1ml of the standard stock solution was diluted to 100 ml with phosphate buffer ph 6.8 to get concentration 10ug/ml.

Composition of Metoprolol Succinate Tablets (mg)

Table no 1: Composition of Metoprolol Succinate Tablets (mg).

Ingredients(mg)	**F_1**	**F_2**	**F_3**	**F_4**	**F_5**	**F_6**
Drug	250	250	250	250	250	250
	2000	2000	2000	2000	2000	2000
Acacia gum	500	400	300	500	400	300
Silica gel	25	25	25	25	25	25
PVP	200	300	400	200	300	400
Talc	-	-	-	5	5	5
Sodium Sacchrine	2	2	2	2	2	2
Eosin yellow	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Pineapple flavour	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Total (gm)	3	3	3	3	3	3

OBSERVATION AND RESULT

Characterization of Metoprolol succinate pure drug

1. Melting point

Melting point was noted in triplicate and was found to be 120 °C (248 °F) similar to the pharmacopoeia.

2. Solubility study

Metoprolol succinate is soluble in distilled water and average solubility of Metoprolol succinate found in phosphate buffer PH6.8.

3. UV spectroscopy

The UV spectrum obtained is shown in absorbance (λ max) was found to be.

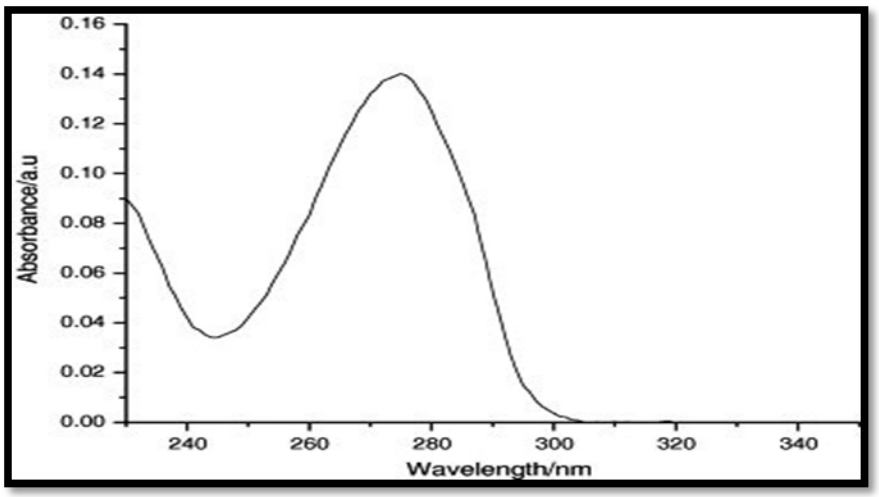

Fig. No. 1: Calibration curve of Metoprolol succinate.

Fourier transforms infrared spectroscopy (FTIR)

FT-IR Spectroscopic Study

The dry sample of Metoprolol succinate was prepared by triturating with dry potassium bromide (A.R. Grade) and placed in sample cell. The IR spectrum of the drug sample was recorded and the spectral analysis was done.

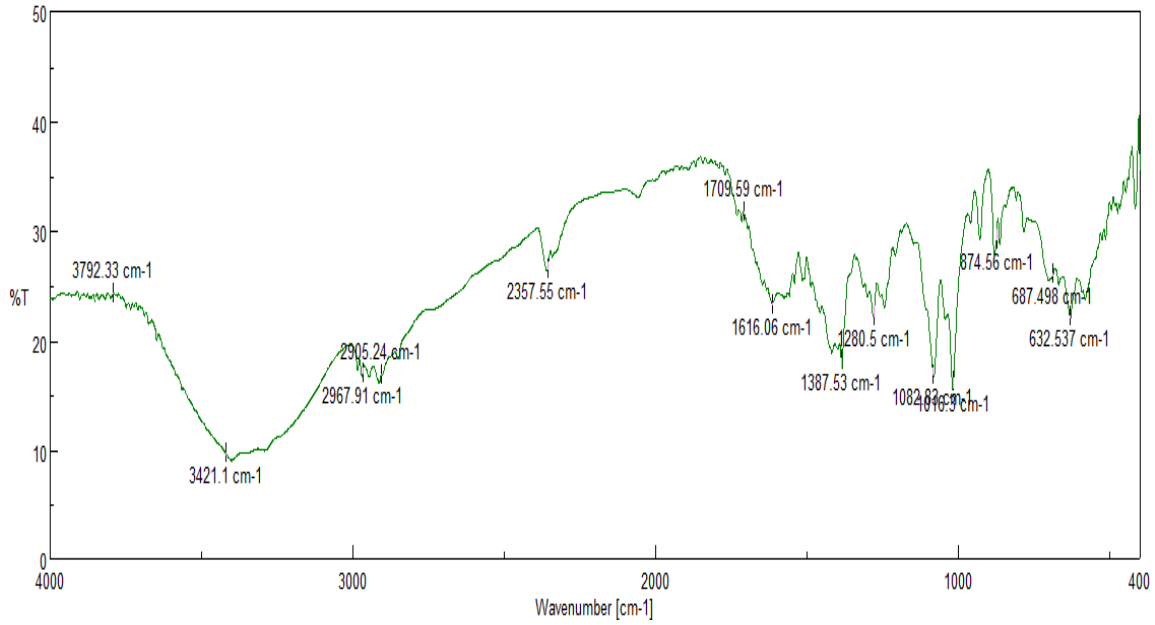

Fig. No. 2: FTIR Spectrum of Metoprolol Succinate.

Table No. 2: Interpretation of FT-IR for Metoprolol Succinate Peak (cm1).

Interpretationof FT-IR for Metoprolol succinate Peak (cm^{-1})	Functional Group
1387.53	C-O Streching
2967.91	C-H Streching
3421.10	N-H Streching
1280.50	C-N Streching
1616.06	C-C Streching(Aromatic)
1709.59	C=CStreching
3790.33	O-H

UV spectroscopy method

1. Preparation of standard curve (calibration curve) of Metoprolol Succinate.

Table No. 3: Preparation of standard curve (calibration curve) of Metoprolol Succinate.

Conc of sample (ug/ml)	Wavelength (nm)	Absorbance
0	223	0
2	223	0.021
4	223	0.122
6	223	0.247
8	223	0.436
10	223	0.534
12	223	0.640
14	223	0.685
16	223	0.785
18	223	0.845
20	223	0.90
22	223	0.957

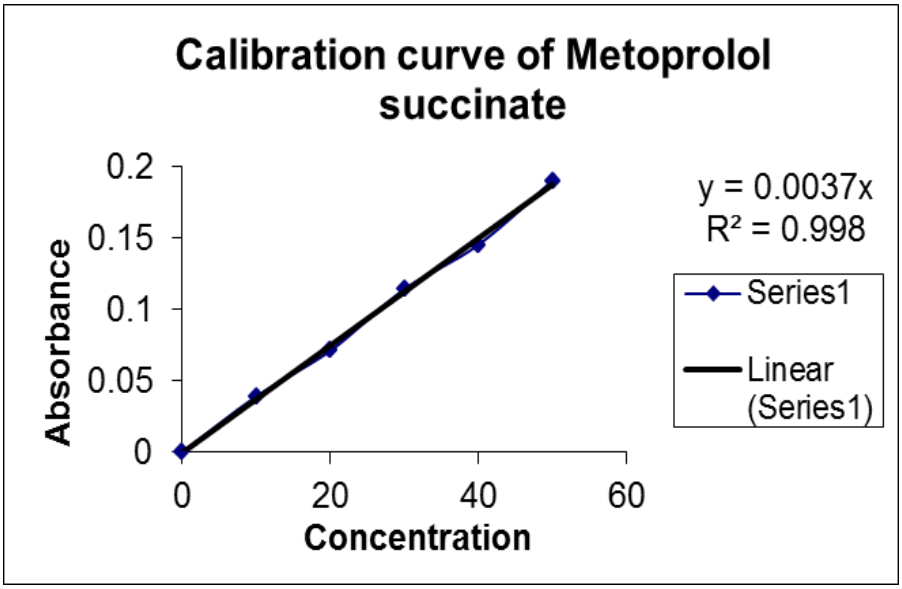

Fig. No. 3: Calibration curve of Metoprolol succinate.

Design & Optimizations of Metoprolol Succinate tablets

The procedures for formulation of are given in Design & Optimisation of Metoprolol Succinate tablets methodology and tablets are prepared by direct compression method and its composition is given in Table No 5 and each tablet weight 200mg.

Evaluation of pre-compression parameter

Pre-compression evaluation

Carr's Compressibility index was found to be in range 1.2-13.20 for all the nine formulations indicating that the powder is compressible. Bulk density and True densities were found to be < 1 for all the formulation powders. The results of repose angle studies indicated that, the powders of all the formulations are freely flow able.

Table No. 4: Evaluation of pre-compression parameters of Metoprolol succinate tablets.

SrNo	Formulation Code	Angle of repose	Bulk Density	Tapped Density	Compressibility index(%)	Hausner Ratio
1	F_1	18.6º	0.625	0.714	12.46	1.14
2	F_2	19.48º	0.645	0.81	20.37	1.12
3	F_3	20.49º	0.68	0.86	24.32	1.16
4	F_4	18.48º	0.66	0.740	10.81	1.12
5	F_5	19.12º	0.625	0.769	08.72	1.11
6	F_6	18.48º	0.714	0.714	7.15	1.00

CONCLUSION

The study conclusively demonstrated significant results of Metoprolol succinate and rapid disintegration and dissolution of cheweable tablets. The cheweable tablets of are more Metoprolol succinate palatable, also helpful to the patients with cardiac failure, hypertension which can lead to patient discomfort with or unwillingness to swallow the available oral tablet and associated water. Thus, the patient – friendly dosage form of drug, Hence, at the end of this investigation it can be cocluded that cheweable tablet of Metoprolol succinate was successfully prepared by wet granulation method using different superdisintegrants and the objectives of this study are achieved. In the present work, cheweable tablets of Metoprolol succinate were prepared by wet granulation method using different superdisintegrants. From the findings obtained, it can be concluded that :-

- The flow properties of Excipient and drug good.
- FT-IR studies revealed that there is no chemical interaction between Metoprolol succinate and excipients used in the study.
- The tablets prepared were found to be good without any chipping, capping and sticking.
- Formulated tablets gives satisfactorily result for various physic-chemical evaluation of litablets like tablet dimension, hardness, friability, weight variation, wetting time, and drug content.
- The low values of standard deviation for average weight and drug content of the prepared tablets indicate weight and drug content uniformity within the batches prepared.

REFERENCES

1. Aulton M.E., Pharmaceutics- The science of dosage form design, 2nd Edn. 2002, Churchill livingstone. P.289-305.
2. Bennett PN, Brown MJ. Clinical pharmacology, 9th edition. Philadelphia, Churchill Livingstone, 2003; P.104-9.
3. Dr. A.K. Seth., A text book of pharmaceutics-1, PV Books, 7th Edn. 2014, Introductions to dosage forms, page no.1 – 2.
4. Robinson J R, Lee V H Controlled drug delivery systems, 2nd Edn., New York; Marcell Dekkar, 2005.
5. Rathbone J.M., Jonathan H, Modified release drug delivery technology., 11th Edn., New York; Marcell Dekkar., Inc., 2002.
6. Dr. A.K. Seth., A text book of pharmaceutics-1, PV Books, 7th Edn. 2014, Introductions to dosage forms, page no.7 – 24.

7. Mrsny R J, The colon as a site for drug delivery, J Con Rel., 1992; 22: 15 – 34.
8. Gingell C H, Davis MW, Shields R, Effects of synthetic gastrin – like pent peptide upon the intestine transport of sodium, potassium and water. Gut, 1968; 9: 111 – 115.
9. S. Jose, et.al. Colon targeted drug delivery: Different approaches. Journal of Young Pharmacists, 2009; 1: 13-19.
10. Akala E O, Elekwachi O, Chase V, Johnson H, Marjorie L, Scott K. Organic redox initiated polymerization process for the fabrication of hydrogel for colon specific drug delivery, Drug Dev Ind Pharm, 2003; 29: 375.
11. Jain NK: Advances in Controlled and novel Drug Delivery. 1st edition. New Delhi Cbs publisher and distributors, 2008; 86-90.