International Journal of Pharmaceuticals and Health care Research (IJPHR)

IJPHR |Vol.12 | Issue 3 | Jul - Sept -2024

www.ijphr.com

ISSN: 2306-6091 DOI : https://doi.org/10.61096/ijphr.v12.iss3.2024.233-241

Review

Formulation And Evaluation Of Oral Disintegrating Tablets Of Sertraline HCL

Moola.Likitha [1*], Dr. D. Venkata Ramana, J. Pravalika

[1]Department of Pharmaceutics, Holy Mary Institute of Technology & Science (College of Pharmacy), Bogaram Village, Keesara Mandal, Hyderabad, Telangana, India

*Author for Correspondence: Moola.Likitha
Email: likithaminni0127@gmail.com

Published on: 28 Sept 2024

Published by:
DrSriram Publications

Abstract

A fast dissolving tablets was prepared by various ingredients like Croscarmellose, Sodium starch glycolate and Crospovidone with different ratios Chemical incompatibility studies confirmed that there is no interaction between drug and excipients used in the formulations. All the batches are prepared by direct compression method. Effect of disintegrants concentration on the disintegration behavior was evaluated, and all the tablets were evaluated for hardness, friability, weight variation, water absorption ratio, dissolution, and assay. Among the all preparations SH6 emerged as the best formulation and showed maximum dissolution rate.

Keywords: Sertraline Hcl, Croscarmellose, Sodium starch glycolate and Crospovidone

INTRODUCTION

The oral route of administration is considered as the most widely accepted route because of its convenience of self administration, compactness and easy manufacturing. But the most evident drawback of the commonly used oral dosage forms like tablets and capsules is difficulty in swallowing, leading to patients incompliance particularly in case of pediatric and geriatric patients.[1] but it also applies to people who are ill in bed and to those active working patients who are busy or traveling, especially those who have no access to water.[2] Over a decade, the demand for development of orally disintegrating tablets (ODTs) has enormously increased as it has significant impact on the patient compliance. Orally disintegrating tablets are appreciated by a significant segment of populations particularly who have difficulty in swallowing. It has been reported that Dysphagia.[3] (difficulty in swallowing) is common among all age groups and more specific with pediatric, geriatric population along with institutionalized patients, psychiatric patients and patients with nausea, vomiting, and motion sickness complications. ODTs with good taste and flavor increase the acceptability of bitter drugs by various groups of population.

This dosage form combines the advantages of dry and liquid formulation. Some novel ODT technology allow high drug loading, have an acceptable taste, offer a pleasant mouth felling, leaving minimal residue in the mouth after oral administration. ODT have been investigated for their potential in improving bioavaibility of poorly soluble drug through enhancing the dissolution profile of the drug and hepatic metabolism drugs. Orally disintegrating tablets are also called as orodispersible tablets, quick disintegrating tablets, mouth dissolving tablets, fast disintegrating tablets, fast dissolving tablets, rapid dissolving tablets, porous tablets, and rapimelts. However, of all the above terms, United States pharmacopoeia (USP) approved these dosageforms as ODTs. Recently, European Pharmacopoeia has used the term orodispersible tablet for tablets that disperses readily and within 3 min in mouth before swallowing.[4]

United States Food and Drug Administration (FDA) defined ODT as "A solid dosage form containing medicinal substance or active ingredient which disintegrates rapidly usually within a matter of seconds when placed upon the tongue." The disintegration time for ODTs generally ranges from several seconds to about a minute.[5]

Drug selection criteria

The ideal characteristics of a drug for oral dispersible tablet include

- Ability to permeate the oral mucosa.
- At least partially non-ionized at the oral cavity pH.
- Have the ability to diffuse and partition into the epithelium of the upper GIT.
- Small to moderate molecular weight.
- Low dose drugs preferably less than 50 mg.
- Short half life and frequent dosing drugs are unsuitable for ODT.
- Drug should have good stability in saliva and water.
- Very bitter or unacceptable taste and odor drugs are unsuitable for ODT[6]

Desired criteria for ODTs

- ODT should leave minimal or no residue in mouth after oral administration, compatible with pleasing mouth feel.
- Effective taste masking technologies should be adopted for bitter taste drugs.
- Exhibit low sensitivity to environment condition such as humidity and temperature.
- ODTs should dissolve / disintegrate in the mouth in matter of seconds without water.
- Have sufficient mechanical strength and good package design.
- The drug and excipients property should not affect the orally disintegrating tablets.
- Be portable and without fragility concern.[7,8]

Advantages of ODTs

The advantages of ODTs include

No need of water to swallow the tablet.

- Compatible with taste masking and have a pleasing mouth feel.
- Can be easily administered to paediatric, elderly and mentally disabled patients.
- No residue in the oral cavity after administration.
- Manufacturing of the tablets can be done using conventional processing and packaging equipments at minimum cost. Allow high drug loading.
- Accurate dose can be given as compared to liquids.
- Dissolution and absorption of the drug is fast, offering a rapid onset of action.
- Advantageous over liquid medication in terms of administration as well as transportation. Some amount of drugs is absorbed from the mouth, pharynx and esophagus as the saliva passes down into the stomach, thus reducing first pass metabolism, which offers improved bioavailability and thus reduced dose and side effects.
- No risk of suffocation due to physical obstruction when swallowed, thus offering improved safety.
- ODTs are suitable for sustained and controlled release actives.
- Unit packaging.[9,10]

Limitations of ODTs

It includes

- The tablets commonly have insufficient mechanical strength. Hence, conscientious handling is necessary.
- The tablets may leave an unpalatable taste and grittiness in the oral cavity if not formulated properly.
- Drugs which have large doses, can cause problems to formulate them into ODTs.
- Patients who simultaneously take anticholinergic drugs are not suitable candidates for ODTs.[11,12]

Challenges in the formulation of ODTs

- Mechanical strength and disintegration time: Disintegration time will extend if the mechanical strength is more, so a good cooperation between these two parameters is always necessary.
- Taste masking: Efficient taste masking of the bitter drugs must be done so that the taste of the drug is not felt in the oral cavity.
- Mouth feel: The particles produced after disintegration of the ODT should be very small. ODT should not leave any residue in the mouth after oral administration. Addition of flavors and cooling agents like menthol enhance the mouth feel.
- Sensitivity to environmental conditions: ODTs should have low sensitivity to environmental conditions such as humidity and temperature.
- Cost: The technology adopted for an ODT should be acceptable in terms of cost of the final product.[13,14]

Approaches for preparation of ODTS

Various preparation techniques have been developed on the basis of different principles, thus present different properties of ODTs by means of mechanical strength, stability, mouth feel, taste, swallow ability, dissolution profile and bioavailability. Some of those technologies are patented. Basic pharmaceutical processes to manufacture ODTs are explained as follows:

Spray drying

Spray drying methods are used to a great extent in pharmaceutical and biochemical procedures. Spray drying provides a rapid and economically efficient way to eliminate solvents and produces highly porous and fine powders. The formulations are compounded by hydrolyzed and non hydrolyzed gelatins as supporting agents, mannitol as bulking agent, croscarmellose sodium or sodium starch glycolate as disintegrating agent. An acidic material (e.g., citric acid) or alkali material (e.g., sodium bicarbonate) is used to improve disintegration and dissolution behaviour. Tablets prepared by the compression of spray dried powder, when immersed in an aqueous medium, showed a disintegration time of 20 s.[15,16]

Sublimation

Compressed tablet which contains highly water-soluble components can show slo dissolution behaviour, due to the low porosity of the tablets that reduces water penetration into the matrix. By conventional methods, volatile materials are compressed into tablets, these volatile materials can be removed by sublimation, which results in extremely porous structures. The volatile materials which can be used are ammonium carbonate, urea, ammonium bicarbonate, camphor and hexa methylene tetramine. In a few cases, thymol, menthol, camphor, an organic acid such as adipic acid and fatty acid such as arachidic acid, myristic acid, capric acid, and palmitic acid were used as the volatile materials and the sublimation temperature ranged from 40 ºC to 60 ºC. The disintegration time in the oral cavity was found to be about 25 s [17,18].

Freeze drying

Lyophilization process involves removal of solvents from a frozen drug solution or a suspension containing structure-forming excipients. The tablets formed by this process are usually very light and have highly porous structures that allow, rapid dissolution or disintegration. Lyophilization is done at very low temperature to eliminate the adverse thermal effects that may alter drug stability during processing. The freeze dried dosage form have relatively few stability concerns during its shelf life. The drying process may give rise to the glassy amorphous structure of excipients and drug substance.[19,20]

Molding

Molded tablets are made up of watersoluble ingredients. The powder mixture is sprinkled with a solvent (usually water or ethanol). The mixture is molded into tablets under pressure. Applied pressure should be lower than those used in conventional tablet compression. This process is also known as compression molding. Air drying can be used to remove the solvent. Due to lower pressure; a highly porous structure is created, that enhances the dissolution. The powder blend should be passed through a very fine screen, to improve the dissolution rate. Molded tablets disintegrate more rapidly and provide improved taste because of their highly water-soluble, sugar components. However, molded tablets generally do not have high mechanical strength. The chances of breakage of the molded tablets during tablet handling and opening of blister pockets, is very high. If the hardness enhancing agents are used in the formulation, decrease in disintegration rate is observed. Mechanical strength and good disintegration of the tablets can be improved by using non-conventional equipment and by using multistep processes [21,22].

Mass extrusion

The mass extrusion technology involves softening the active blend using the solvent mixture of water soluble polyethylene glycol and methanol. Expulsion of softened mass through the extruder or syringe is carried out, to get a cylinder of the product which is then cut into even segments using a heated blade to form tablets .[23,24]

Direct compression

Direct compression is the easiest and cost effective tablet manufacturing process. This method can be applied to manufacture ODT by selecting appropriate combinations of excipients, which can provide fast disintegration and optimum physical resistance. Sugar-based excipients are widely used as bulking agents because of their aqueous solubility, sweetness pleasing mouth feel, and good taste masking. Tablets obtained by conventional compression method are less friable, but disintegrate more slowly. The compression method, with or without wet granulation, is a convenient and cost effective way to prepare tablets with sufficient structural integrity .[25,26]

Ideal characteristics of ODTs

ODTs should depict some ideal characteristics to distinguish them from traditional conventional dosage forms. Important desirable characteristics of these dosage forms include

1. No water requirement for swallowing purpose but it should dissolve or disintegrate in the mouth usually within fraction of seconds.
2. Provide pleasant feeling in the mouth.
3. Be compatible with taste masking.
4. Be portable without fragility concern.
5. Leave negligible or no residue in the mouth after oral administration.
6. Exhibit low sensitivity to altered environmental conditions such as humidity and temperature.
7. Allow high drug loading.
8. Adaptable and amenable to conventional processing and packaging equipment at nominal expense.

Mechanisms of ODTs

ODTs involve the following mechanisms to achieve the desired fast dissolving characteristics :

1. Water must quickly enter into the tablet matrix to cause rapid disintegration and instantaneous dissolution of the tablet.
2. Incorporation of an appropriate disintegrating agent or highly water soluble excipients in the tablet formulation.
3. There are some under mentioned mechanisms by which the tablet is broken down into the smaller particles and then subsequently result a solution or suspension of the drug. The mechanisms are-
   - High swellability of disintegration
   - Chemical reaction
   - Capillary action

MATERIALS AND METHODS

Croscarmellose-Procured From Dr. Reddy's laboratories. Provided by SURA LABS, Dilsukhnagar, Hyderabad, Sodium starch glycolate-S.D. Fine Chem. Ltd., Mumbai, India, Crospovidone-S.D. Fine Chem. Ltd., Mumbai, India, Aerosil -S.D. Fine Chem. Ltd., Mumbai, India, Talc-S.D. Fine Chem. Ltd., Mumbai, India, Magnesium stearate-S.D. Fine Chem. Ltd., Mumbai, India, MCC-S.D. Fine Chem. Ltd., Mumbai, India.

Methodology

Buffer preparation

Preparation of 0.2 M Potassium dihydrogen orthophosphate solution: Accurately weighed 27.128 gm of monobasic potassium dihydrogen orthophosphate was dissolved in 1000 ml of distilled water and mixed.

Preparation of 0.2 M sodium hydroxide solution: Accurately weighed 8 gm of sodium hydroxide pellets were dissolved in 1000 mL of distilled water and mixed.

Preparation of pH 6.8 phosphate buffer: Accurately measured 250 mL of v0.2 M potassium dihydrogen orthophosphate and 112.5 mL of 0.2 M NaOH was taken into the 1000 mL volumetric flask. Volume was made up to 1000 mL with distilled water.

Analytical method development for Sertraline Hcl:

Determination of absorption maxima

A spectrum of the working standards was obtained by scanning from 200-400 nm against the reagent blank to fix absorption maxima. The λmax was found to be 273nm. Hence all further investigations were carried out at the same wavelength.

Construction of standard graph

100 mg of Sertraline Hcl was dissolved in 100 mL of pH 6.8 phosphate buffer to give a concentration in 1mg/mL (1000µg/mL) 1 ml was taken and diluted to 100 ml with pH 6.8 phosphate buffer to give a concentration of 0.01 mg/ml (10µg/ml). From this stock solution aliquots of 0.2 ml, 0.4 ml, 0.6ml, 0.8ml, 1ml, were pipette out in 10 ml volumetric flask and volume was made up to the mark with pH 6.8 phosphate buffer to produce concentration of 2,4,6,8and10µg/ml respectively. The absorbance of each concentration was measured at respective (λmax) i.e., 273nm.

Formulation development

Drug and different concentrations of super disintegrate (Croscarmellose, Sodium starch glycolate and Crospovidone) and required ingredients were accurately weighed and passed through a 40-mesh screen to get uniform size particles and mixed in a glass motor for 15 min.

- The obtained blend was lubricated with magnesium stearate and glidant (Aerosil) was added and mixing was continued for further 5 min.
- The resultant mixture was directly compressed into tablets by using punch of rotary tablet compression machine. Compression force was kept constant for all formulations.

Table 1: Formulation table showing various compositions

Ingredients	SH1	SH2	SH3	SH4	SH5	SH6	SH7	SH8	SH9
Sertraline Hcl	50	50	50	50	50	50	50	50	50
Croscarmellose	25	50	75	-	-	-	-	-	-
Sodium starch glycolate	-	-	-	25	50	75	-	-	-
Crospovidone	-	-	-	-	-	-	25	50	75
Aerosil	10	10	10	10	10	10	10	10	10
Talc	6	6	6	6	6	6	6	6	6
Magnesium stearate	3	3	3	3	3	3	3	3	3
MCC	106	81	56	106	81	56	106	81	56
Total weight	200	200	200	200	200	200	200	200	200

The tablets were prepared by using tablet compression machine. The hardness of the tablet was maintained as (3.39 - 3.64) kg/cm^2

RESULT AND DISCUSSION

Preparation of calibration curve of Sertraline Hcl

The regression coefficient was found to be 0.997 which indicates a linearity with an equation of y = 0.0556x + 0.005. Hence Beer-Lmbert's law was obeyed.

Table 2: Calibration curve data of Sertraline Hcl in pH 6.8 phosphate buffer

Concentration	Absorbance
0	0
2	0.118
4	0.231
6	0.342
8	0.451
10	0.557

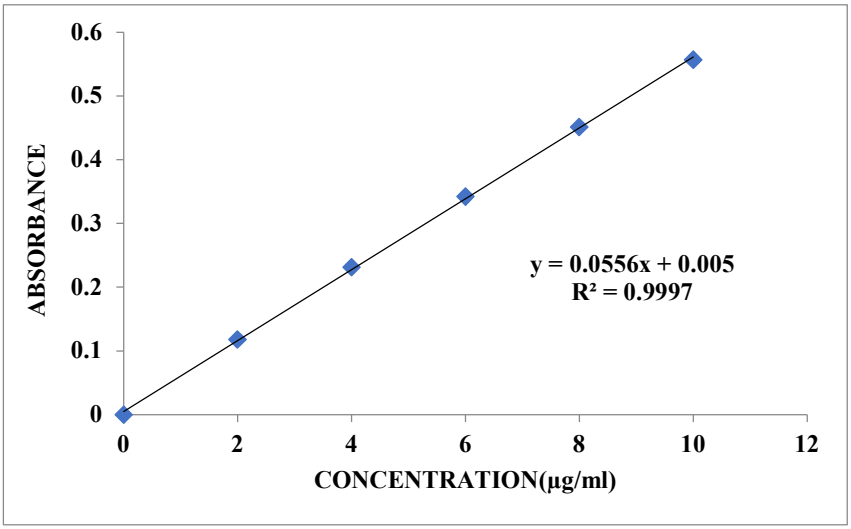

Fig 1: Calibration curve data of Sertraline Hcl in pH 6.8 phosphate buffer

Evaluation of pre-compresion parameters of powder blend

Table 3: Evaluation of pre-compression parameters of powder blend

Formulation code	Angle Of Repose	Bulk Density(gm/mL)	Tapped Density (gm/mL)	Carr's Index(%)	Hausner's Ratio
SH1	41.8 ± 0.08	0.40 ± 0.08	0.36 ± 0.15	16.6 ± 0.69	1.20 ± 0.22
SH2	42.6±0.02	0.30 ± 0.57	0.25 ± 0.31	20.0 ± 0.12	1.25 ± 0.58
SH3	40.1 ± 0.12	0.35 ± 0.05	0.31 ± 0.09	19.3 ± 0.78	1.24 ± 0.57
SH4	41.3±0.04	0.21 ± 0.66	0.25 ± 0.51	16.0 ± 0.18	1.19 ± 0.63
SH5	40.2 ± 0.08	0.21 ± 0.46	0.25 ± 0.2	16.0 ± 0.01	1.19 ± 0.63
SH6	41.2±0.04	0.37 ± 0.18	0.45 ± 0.3	17.7 ± 0.74	1.21 ± 0.64
SH7	41.6±0.09	0.25 ± 0.18	0.30 ± 0.44	16.6 ± 0.71	1.20 ± 0.26
SH8	40.9±0.08	0.25 ± 0.75	0.30 ± 0.34	16.6 ± 0.51	1.21 ± 0.19
SH9	42.5±0.04	0.33 ± 0.12	0.37 ± 0.11	10.8 ± 0.9	1.12 ± 0.81

- For each formulation blend of drug and excipients were prepared and evaluated for various pre compression parameters described earlier in methodology chapter.
- The bulk density of all formulations was found in the range of 0.21 ± 0.46 - 0.35 ± 0.05 and tapped density was in the range of 0.25 ± 0.2 - 0.37 ± 0.11
- The Carr's index and Hausner's ratio was calculated from tapped density and bulk density.

Evaluations of post compression parameters of sertraline HCL ODTS

Table 4: Evaluation of post compression parameters of Sertraline HCL Fast dissolving tablets

Formulation codes	Average weight(mg)	Hardness (kg/cm^2	Friability (%loss)	Thickness (mm)	Drug content (%)
SH1	198.85	3.47	0.27	2.68	98.45
SH2	199.36	3.41	0.35	2.55	97.24
SH3	201.73	3.56	0.41	2.62	99.62
SH4	202.34	3.49	0.56	2.58	98.47
SH5	197.28	3.62	0.49	2.51	99.33
SH6	200.66	3.39	0.21	2.48	99.18
SH7	199.22	3.53	0.37	2.66	101.83

SH8	198.53	3.64	0.58	2.53	97.12
SH9	201.13	3.44	0.29	2.69	98.56

Weight variation and Thickness

All the formulations were evaluated for uniformity of weight using electronic weighing balance and the results are shown above. The average tablet weights of all the formulations were noted down.

Hardness and friability

All the ODT formulations were evaluated for their hardness using Monsanto hardness tester and the results are shown above. The average hardness for all formulations was found to be between (3.39 - 3.64) kg/cm^2 which was found to be acceptable. Friability was determined to evaluate the ability of the tablets to with stand the abrasion during packing, handling and transpoting. All the ODT formulations were evaluated for their percentage friability using Roche friabilator and the results are shown above. The average percentage friability for all the formulations was between 0.21 - 0.58 which was found to be within the limit.

Drug content

All formulations were evaluated for drug content according to the procedure described in methodology section and the results were shown above. The assay values for all formulations were found to be in the range of (97.12 - 101.83). According to IP standards the tablets must contain not less than 95% and not more than 105% of the stated amount of the drug. Thus, all the ODT formulation comply with the standards given in IP.

***In vitro* Dissolution Time**

In vitro disintegration studies showed from 5-30 minutes. The SH6 formulation showed in vitro Dissolution time i.e. 30 minutes.

***In vitro* drug release syudies of sertraline HCL**

Table 5: Dissolution data of Sertraline Hcl

TIME (MIN)	SH1	SH2	SH3	SH4	SH5	SH6	SH7	SH8	SH9
0	0	0	0	0	0	0	0	0	0
5	17.85	18.09	22.64	24.29	24.24	27.98	21.31	24.51	29.76
10	34.57	39.54	44.02	37.35	43.28	46.52	42.12	53.89	43.65
15	48.39	47.41	56.13	45.97	52.53	63.28	51.69	64.14	64.49
20	56.01	61.45	71.91	59.21	61.23	75.15	64.95	75.28	72.28
25	62.68	66.61	77.69	66.47	79.54	88.53	76.89	88.51	77.53
30	77.44	79.05	82.97	82.01	88.62	99.11	97.94	98.67	87.34

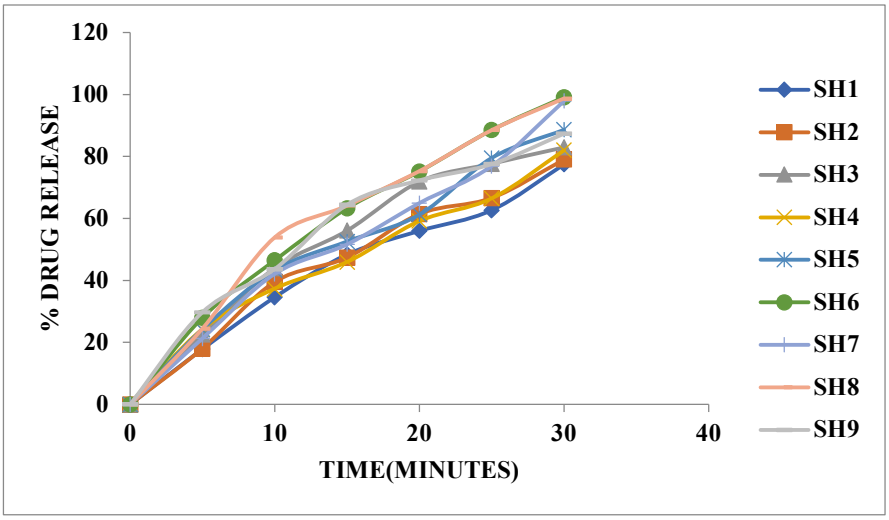

Fig 2: Dissolution profile of all formulations SH1- SH9

The *In Vitro* dissolution profile in Fig. showed the dissolution behavior all formulation batch tablet (SH1 to SH9) in pH 6.8. The formulation SH6 showed improvement in dissolution rate up to 99.11 % in 30 Minutes. Batch SH1, SH2 and SH3 displays markedly increase in dissolution rate to an extent up to 77.44%,79.05%,82.97% in 30 min respectively. It was observed that as the concentration of Croscarmellose increased there was decrease in the disintegration time and increase in dissolution rate of Sertraline Hcl, i.e. directly proportional to the concentration of Sodium starch glycolate. Therefore, formulation SH3 having disintegrants Sodium starch glycolate in the concentration of 25 mg. Batches SH4-SH6 showed a significant increase in dissolution rate to a level up to 82.01%, 88.62%, 99.11% in 30 min respectively. It was observed that increase in concentration of Sodium starch glycolate showed Increase in dissolution rate of Sertraline Hcl. Batch SH7, SH8 and SH9 displays markedly increase in dissolution rate to an extent up to 97.94%, 98.67%, 87.34% in 30 min respectively. The faster dissolution rate of SH6 batch compared to All Formulations was observed and could be attributed to the improvement of wettability of Sertraline Hcl particles due to the presence of superdisintegrants (Sodium starch glycolate). Many factors contributed to faster release rate such as decrease in particle size, decrease in agglomeration of particles, increase wettability and decrease in crystallinity of the drug. Finally concluded that SH6 Formulation was considered as Optimised Formulation.

FTIR results

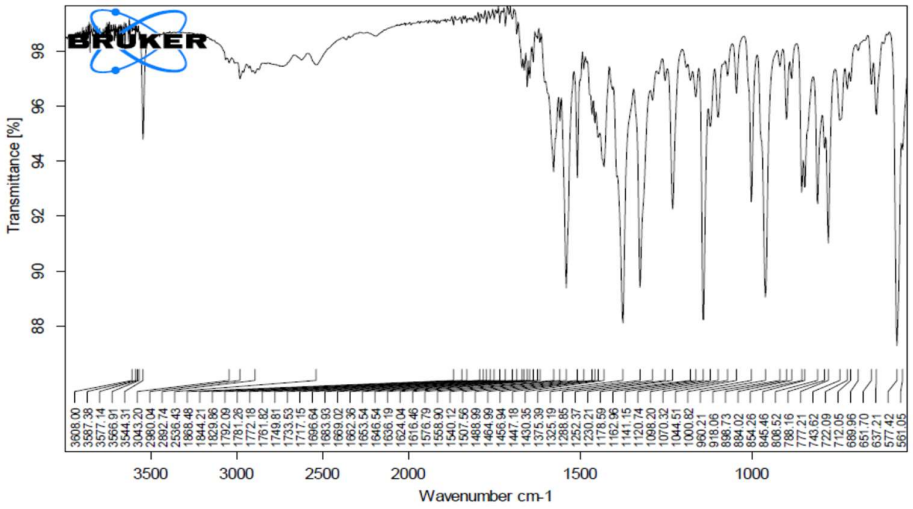

Fig 3: FTIR of Sertraline Hcl Pure Drug

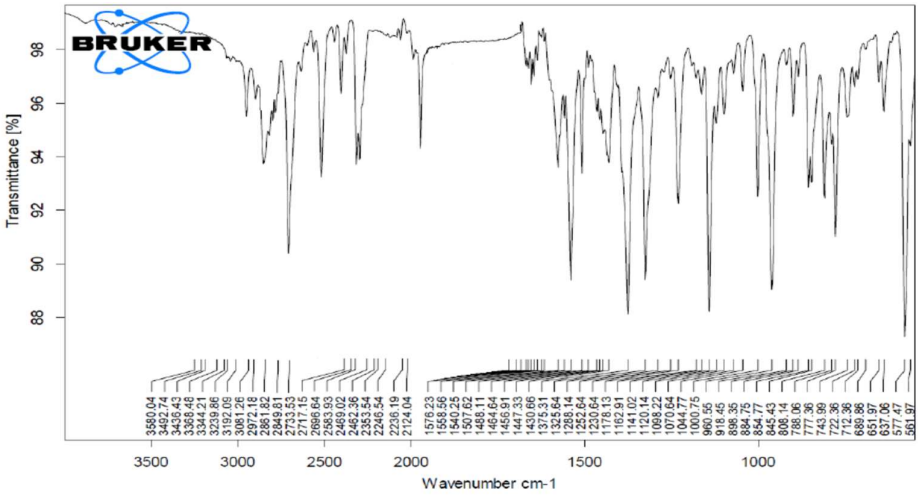

Fig 4: FTIR of Sertraline Hcl optimized formulation

Sertraline Hcl was mixed with proportions of excipients showed no colour change providing no drug-excipient interactions.

CONCLUSION

In the present study total nine formulations were prepared by direct compression method each tablet containing 200mg of Sertraline Hcl. All the formulation were prepared by using different polymers like Croscarmellose, Sodium Starch Glycolate and Crospovidone with different ratios. Physical mixtures of Sertraline Hcl and excipients were examined for drugs polymer interaction by FTIR. The IR spectrum did not show presence of any additional peaks for new functional groups interaction between Sertraline Hcl & used of tablets from each batch showed uniformity content as the concentration of the drug in tablet was found in between 97.12 - 101.835 %. From the data it was found that SH6 formulation showed optimum drug release of 99.11%. It was revealed that the increase in disintegrants concentration increases percentage friability and less hardness and drug release was found. The powder mixtures for all Nine formulations were evaluated for bulk density which ranged from 0.21 ± 0.46 - 0.35 ± 0.05 (g/ml), tapped density ranged from 0.25 ± 0.2 - 0.37 ± 0.11 (g/ml), angle of repose ranged from 40.1 ± 0.12to 42.6±0.02° was found. All these results indicated that, the powder mixture had satisfactory flow of powder blend into the die cavity and compressibility properties.

REFERENCES

1. Velmurugan S and Sundar Vinushitha. Oral Disintegrating Tablets: An Overview. International Journal of Chemical and Pharmaceutical Sciences 2010, Dec., Vol.1 (2).
2. Seager H. Drug-delivery products and the Zydis fast-dissolving dosage form. Journal of Pharmacy and Pharmacology. 1998; 50(4):375-82.
3. Lindgren S, Janzon L. Dysphagia; Prevalence of swallowing complaints and clinical findings. Medical clinics of North America., 1993; 77: 3-5.
4. Fu Y, Yang S, Jeong SH, Kimura S, Park K. Orally fast disintegrating tablets: Developments, technologies, taste-masking and clinical studies. Critical Review in Therapeutic Drug Carrier System. 2004;21:433-76.
5. Brown D. Orally Disintegrating TabletsTaste over Speed. Drug Delivery Technology. 2003; 3:58-61.
6. Kumaresan C, Orally Disintegrating Tablet - Rapid Disintegration, Sweet Taste, And Target Release Profile, pharmainfo.net sep9 2008.
7. Reddy L. H, Ghosh B, and Rajneesh. Fast dissolving drug delivery systems: a review of the literature. Indian Journal of Pharmaceutical Science. 2002; 64(4): 331-336.
8. Seager H. Drug-deliver products and the zydis fast-dissolving dosage form. Journal of Pharmacy and Pharmacology. 1998;50: 375-382.
9. Parijat Pandey, Mandeep Dahiya. Oral Disintegrating Tablets: A Review. International Journal of Pharma Research & Review, Jan 2016;5(1):50-62.
10. .Seager H. Drug delivery products and the zydis fast dissolving dosage form. Journal of Pharmacy and Pharmacology 1998;50(4): 375-382
11. Habib W, Khankari R, Hontz J. Fast dissolving drug delivery system. Critical Reviews in Therapeutic Drug Carrier Systems 2000; 17(1):61-72.
12. Gafiţanu E, Dumistracel I, Antochi S. Formulations and bioavailability of propyphenazone in lyophilized tablets. Revista Medico-chirurgicala a Societatii De Medici Si Naturalisti Din Iasi 1991;95(1- 2):127-128.
13. Bharadwaj S, Jain V, Sharma S, Jat RC, Jain S. Orally Disintegrating Tablets: A Review. Drug Invent Today 2010;2(1):81-88.
14. Vani R, Rasheed A. Formulation and evaluation of hydrochlorothiazide and ramipril mouth dissolving tablet using different superdisintegrants. International Journal of Pharma Sciences and Research 2014;5(1):207-212.
15. Parkash V, Maan S, Deepika, Yadav SK, Hemlata, Jogpal V. Fast disintegrating tablets: Opportunity in drug delivery system. Journal of Advanced Pharmaceutical Technology and Research 2011;2(4):223-235.