CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187

Online at: http://www.iajps.com *Research Article*

FORMULATION AND EVALUATION OF LEVOFLOXACIN AN ANTIBIOTIC DRUG INTO ORAL DISPERSIBLE TABLETS

Gundla Swetha[1*], M. Sai lakshmi[2], G. Deepthi[3], C A Sri Ranjani[4]

[1]Arya college of Pharmacy, Kandi, Sanga Reddy, Kandi
[2]Omega College of Pharmacy, Edulabad, Ghatkesar
[3]Sree Dattha College of Pharmacy, Ibrahimpatnam
[4]Omega College of Pharmacy, Edulabad, Ghatkesar

Article Received: April 2021 **Accepted:** April 2021 **Published:** May 2021

Abstract:

Levofloxacin is used to treat a variety of bacterial infections. This medication belongs to a class of drugs known as quinolone antibiotics. It works by stopping the growth of bacteria.This antibiotic treats only bacterial infections. It will not work for viral infections (such as common cold, flu). Using any antibiotic when it is not needed can cause it to not work for future infections.

Oral disintegrating tablets are solid single unit dosage forms that are placed on tongue, allowed to disperse or dissolve in saliva without the need of water, frequently releasing of the drug for quick onset of action. Oral disintegrating tablets are well accepted by wide range of population especially as pediatric and geriatric patients who have difficulty in swallowing of conventional dosage forms. Some drugs areabsorbed from mouth, pharynx and esophagus as saliva passes down to stomach.

KEY WORDS: quinolone, levofloxacin, antibiotic, esophagus, pharynx,

Corresponding author:

Gundla Swetha,*
Arya college of Pharmacy,
Kandi, Sanga Reddy, Kandi

QR code

Please cite this article in press Gundla Swetha et al., ***Formulation and Evaluation of Levofloxacin An Antibiotic Drug into Oral Dispersible Tablets****.., Indo Am. J. P. Sci, 2021; 08(05).*

INTRODUCTION:

Oral disintegrating tablets are solid single unit dosage forms that are placed on tongue, allowed to disperse or dissolve in saliva without the need of water, frequently releasing of the drug for quick onset of action. Oral disintegrating tablets are well accepted by wide range of population especially as pediatric and geriatric patients who have difficulty in swallowing of conventional dosage forms. Some drugs are absorbed from mouth, pharynx and esophagus as saliva passes down to stomach.

The bioavailability of such drug will be increase due to first pass metabolism.

Consumer satisfaction is the buzzword of the current millennium, and movement to achieve it has already begun in the pharmaceutical industry. An inability or un willingness to swallow solid oral dosage forms such as tablets and poor taste of medicine are some of the important reasons for consumer dissatisfaction.

Recent developments in technology have presented viable alternatives for the patients who may have difficulty in swallowing tablets or liquids. Traditional tablets and capsules administered with an 8-oz. glass of water may be inconvenient or impractical for some patients. For example, a very elderly patient may not be able to swallow a daily dose of tablets. An eight-year-old child with allergies could use a more convenient dosage form of antihistamine syrup. A schizophrenic patient in the institution setting can hide a conventional tablet under his or her tongue to avoid his/her daily dose of atypical antipsychotic. A middle-aged woman undergoing radiation therapy for breast cancer may be too nauseous to swallow her H2-blocker.

To overcome these drawbacks, orally disintegrating tablets (ODT) or Fast Dissolving Tablets (FDT) has emerged as alternative oral dosage forms. These are novel types of tablets that disintegrate/dissolve/ disperse in saliva within few seconds. According to European Pharmacopoeia, the orally dispersible tablet should disperse/disintegrate in less than three minutes. The basic approach used in development of FDT is the use of super disintegrants like Crospovidone (Polyplasdone XL-10), Sodium starch glycolate (Primo gel, Explotab) and Pregelatinized starch (Starch-1500) etc., which provide instantaneous disintegration of tablet after putting on tongue, thereby releasing the drug in saliva.The bioavailability of some drugs may be increased due to absorption of drugs in oral cavity and also due to pre gastric absorption of saliva containing dispersed drugs that pass down into the stomach. Moreover, the amount of drug that is subjected to first pass metabolism is reduced as compared to standard tablets.

Over the past three decades, ODT have gained much attention as a preferred alternative to conventional oral dosage forms such as tablets and capsules. ODTis a solid dosage form that disintegrates and dissolves in the mouth (either on or beneath the tongue or in the buccal cavity) without water within 60 seconds or less8. The US Food and Drug Administration Center for Drug Evaluation and Research (CDER) defines in the Orange Book an ODT as “A solid dosage form containing medicinal substances, which disintegrates rapidly, usually within a matter of seconds, when placed upon the tongue. The European Pharmacopoeia however defines a similar term, that is fast dissolving tablet is a tablet that can be placed in the mouth where it disperses rapidly before swallowing.

These tablets are distinguished from conventional sublingual tablets, lozenges, and buccal tablets which require more than a minute to dissolve in the mouth. In the literature, FDT are also called orally disintegrating, orodisperse, mouth-dissolving, quick-dissolve, fast-melt, and rapid-disintegrating tablets and freeze-dried wafers. FDTs release drug in the mouth for absorption through local oro mucosal tissues and through pregastric (e.g., oral cavity, pharynx, and esophagus), gastric (i.e., stomach), and postgastric (e.g., small and large intestines) segments of the gastrointestinal tract (GIT). Conventional oral dosage forms refer to tablets and capsules that must be swallowed with water for dissolution, release, and absorption of the drug in the stomach and GIT distal sites.

Recent market studies indicate that more than half of the patient population prefers FDTs to other dosage forms and most consumers would ask their doctors for ODT (70%), purchase FDTs (70%), or prefer FDTs to regular tablets or liquids (>80%). These responses may, in part, be attributed to know ODT advantages such as ease of administration, ease of swallowing, pleasant taste, and the availability of several flavors. ODT also offer clinical advantages such as improved safety and in dissolve quickly, they cannot provide controlled or sustained release, except those that contain slow-dissolving, microparticulate-coated drugs, which quickly disperse and are swallowed5. Fast dissolve tablets are in demand now-days because of their ability to release the medicament in fraction of minutes. There are particularly useful for treatment of conditions like hypertension and arthritic pain for obvious reasons.

MATERIALS AND METHODS:

PRE-FORMULATION STUDIES

Preformulation testing is an investigation of physical and chemical properties of drug substances alone and when combined with pharmaceutical excipients. It is the first step in the rational development of dosage form.

STANDARD CURVE OFLEVOFLOXACIN

Potassium dihydrogen phosphate solution, 0.2M87

27.218gm of potassium dihydrogen phosphate was dissolved in 1000ml distilled water in a volumetric flask.

Sodium hydroxide solution, 0.2M

8gm of sodium hydroxide was dissolved in 1000ml distilled water and it gives 0.2M solution.

Preparation of pH 6.8 buffer

Place 50.0ml of 0.2M potassium dihydrogen phosphate in a 200ml volumetric flask add 22.4ml of 0.2M sodium hydroxide and then make up with water up to volume.

Preparation of levofloxacin stock solution

100 mg of pure drug of Levofloxacin was dissolved in 100ml volumetric flask. The drug was shaked with 5ml methanol. For the above solution, add remaining amount was make up with 6.8pH Phosphate buffer. This solution contains 1000µg/ml of levofloxacin stock solution. Take 10ml from above solution in 100ml volumetric flask and make up with 6.8pH Phosphate buffer. This solution contains 100µg/ml of drug. From above solution take 1 ml in 10ml volumetric flask and make up with 6.8 pH Phosphate buffer. From this solution pipette out 0.2 ml in 10ml volumetric flask add buffer. This gives 0.2µg/ml Solution. Similarly, preparing the 0.4ml, 0.6ml, 0.8ml and 1ml of solutions in 10ml volumetric flasks Resulting gives, 2µg/ml, 4µg/ml, 6µg/ml, 8µg/ml and 10µg/ml solutions. The concentrated solution scanned in UV-Visible Spectrophotometer with absorption maximum is 298nm.

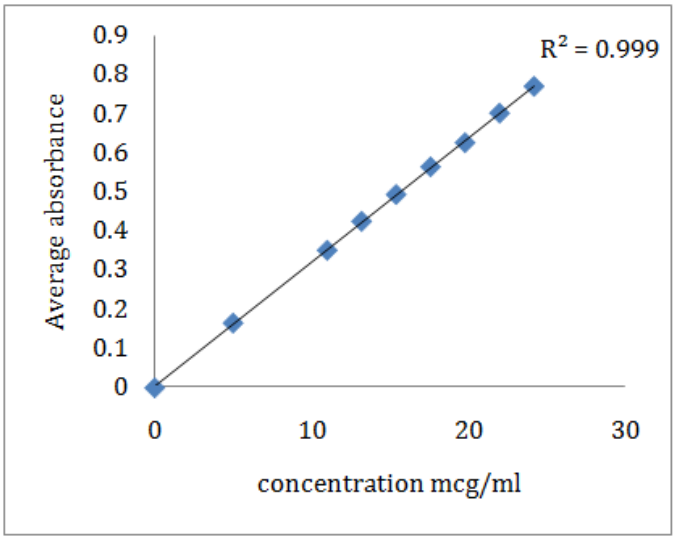
STANDARD CURVE OF LEVOFLOXACIN

Table No.1: Standard curve of Levofloxacin in Phosphate buffer (pH 6.8)

S.No	Concentration(µg/ml)	Absorbance (298nm)
1	**0**	0.00
2	**2**	0.232
3	**4**	0.465
4	**6**	0.684
5	**8**	0.926
6	**10**	1.126

Figure No.1:

Calibration curve for levofloxacin in 0.1 N HCl at 37±0.5 °C



METHOD OF PREPARATION

PREPARATION OF LEVOFLOXACIN TABLETS:

Direct Compression Technique:

This method is used when the ingredients can be blended and placed in a tablet press to make a tablet without any of the ingredients having to be pre-processed. This requires the active ingredient to have appropriate physical and chemical properties, such as good compatibility and low stickiness. Direct compression is often preferred because of its simplicity and relatively low cost, but may not always be technically feasible. In this method, all the powder excipients are mixed thoroughly in a polyethylene bag. After proper mixing, the powder was punched into tablets. The weight of the tablet was 500mg and dose of the drug is 250mg.

Table 2: Preparation of Levofloxacin Tablets

Ingredients	F1	F2	F3	F4	F5	F6
Levofloxacin	250	250	250	250	250	250
CCS	25	-	-	35	35	-
SSG	-	25	-	-	-	-
CP	-	-	25	-	-	-
Aspartame	5	5	5	5	5	-
Talc	8	8	8	8	8	-
Mannitol	209	209	209	199	149	-
Avicel	-	-	-	-	50	-
Prosolv® ODT	-	-	-	-	-	247
Mg stearate	3	3	3	3	3	3
TOTAL	500	500	500	500	500	500

EVALUATION PARAMETERS

PRECOMPRESSION STUDIES OF POWDER BLENDS

Bulk density

Bulk density is the ratio between a given mass of powder or granules and its bulk volume. Accurately weighed quantity of granules was carefully transferred into 100ml measuring cylinder, initial volume was measured and calculated according to the formula

Bulk density = Mass / Volume

Tapped density

Tapped density is the ratio between a given mass of powder or granules and the constant or fixed volume of the powder or granules after tapping. Tapped density is determined by placing a graduated cylinder containing a known mass of granules and mechanical tapper apparatus, which is operated for a fixed number of taps until the powder bed volume has reached a minimum volume. Using the weight of the granules in the cylinder and this minimum volume, the tapped density may be computed.

Tapped density = Weight of granules/ Tapped volume of granules

Angle of Repose90

Angle of repose is defined as the maximum angle possible between the surface of the pile of powder and horizontal plane. The angle of repose of the power or granules was determined by fixed funnel method to assess the flow property of the powder or granules. The manner in which stresses are transmitted through a bead and the beads response to applied stress are reflected in the various angles of friction and response. The most commonly used of this in angle of repose, which may be determined experimentally by number of methods. The method used to find the angle of repose is to pour the powder a conical on a level, flat surface and measure the included angle with the horizontal. The angle of repose (**θ**) was calculated by using the following formula:

θ = Tan-1 (h/r)

Where,

θ = **Angle of repose,**

h = Height of the powder cone,

r = Radius of the powder cone.

Table No.8: Angle of Repose I.P limits

S.No Angle of Repose Powder flow

1 < 25 Excellent

2 25 – 30 Good

3 30 – 40 Passable

4 > 40 Very poor

Compressibility Index or Carr's Index
Carr's Index is measured using the values of bulk density and tapped density.
The following equation is used to find the Carr's Index,

$$CI = \frac{(TD-BD)}{TD} \times 100$$

Where, TD = Tapped density
BD = Bulk density

Carr's Index I.P Limits value
1 Excellent <10
2 Good 11 – 15
3 Fair 16 – 20
4 Possible 21 – 25
5 Poor 26 – 31
6 Very poor 32 – 37
7 Very very poor >38

Hausner's Ratio
It indicates the flow properties of the powder and ratio of Tapped density to the Bulk density of the powder or granules (Table No.10). The hausner's ratio was calculated by using the following formula.
Hausner's Ratio = Tapped density/Bulk density

Hausner's Ratio I.P Limits value
1 Excellent 1.00 – 1.11
2 Good 1.1 – 1.18
3 Fair 1.19 – 1.25
4 Possible 1.26 -1.34
5 Very poor 1.35 -1.45
6 Very very poor >1.60

Table No.3: Micrometric properties of the different powder blend.

Formula code	F1	F2	F3	F4	F5	F6
Bulk density (gm/ml)	0.48	0.47	0.49	0.48	0.58	0.51
Tapped Density (gm/ml)	0.55	0.54	0.55	0.56	0.66	0.5
Angle of Repose Θ	28^{o}	27^{o}	30^{o}	27^{o}	25^{o}	23^{o}
Percentage compressibility	12.72	12.69	10.90	14.2	12.12	8.93
Hausner Ratio	1.14	1.15	1.12	1.16	1.13	1.09

Table No.4: Evaluation of the tablets

Formula code	**Weight variation**	**Hardness* (Kg/cm2)**	**Friability* (%)**	**Wetting time* (sec)**	***In vitro* disintegration time* (sec)**	**Drug content* (%)**
F1	PASS	3.5±0.51	0.61±0.05	38±1.1	40±1.3	98±1.5
F2	PASS	3.6±0.62	0.60±0.06	48±1.5	45±2.1	99±2.0
F3	PASS	3.4±0.38	0.63±0.09	45±2.0	48±2.0	100±1.1
F4	PASS	3.5±0.44	0.55±0.09	29±1.8	32±1.2	101±0.98
F5	PASS	3.7±0.51	0.52±0.08	35±2.1	36±3.1	98±0.99
F6	PASS	3.2±0.08	0.40±0.01	30±1.5	31±1.3	99±0.5

POSTCOMPRESSION STUDIES OF LEVOFLOXACIN TABLETS

To design tablets and later to monitor tablets production, and quality, quantitative evaluation, assessments of tablets physical, chemical, and bioavailability properties must be made. There are various standards that have been set in the various pharmacopoeias regarding the quality of pharmaceutical tablets. These include the diameter, thickness, weight variation, hardness, disintegration and dissolution characters. The diameters and shape depend on the die and punches selected for the compression of tablets. The remaining specifications assure that tablets do not vary from one production lot to another. The following standards or quality control tests should be carried out on
compressed tablets:

Hardness or Crushing strength Test

Hardness is a force required to break a tablet across a diameter. Hardness of the tablet was determined using the Monsanto hardness tester (The lower plunger was placed in contact with the tablet and a zero reading was taken. The plunger was then forced against a spring by tuning a threaded bolt until the tablet fractured. As the spring was compressed a pointer rides along a gauge in the barrel to indicate the force. The force required to break the tablet is measured in kilograms and a crushing strength of 4Kg is usually considered to be the minimum for satisfactory tablets. Oral tablets normally have a hardness of 4 to 10kg ; however, hypodermic and chewable tablets are usually much softer (3 kg) and some sustained release tablets are much
harder (10 -20 kg).

Thickness Test

The thickness of the tablet is mostly related to the tablet hardness can be uses as initial control parameter. Ten tablets were randomly selected from each tablet thickness was determined using a Vernier calliper and the reading was recorded in millimetres.

Friability Test

Friability is the loss of weight of tablet in the container/package, due to removal of fine particles from the surface. It is usually measured by the use of the Roche Friabilator. The pre-weighed tablets were placed in the Friabilator which was then operated for 100rpm, then dusted and reweighed. The Conventional compressed tablets that lose less than 0.5-1.0% of their weight are generally considered acceptable. The percent friability was determined using the following formula.

Where,
W 1 = Weight of ten tablets before test
W2 = Weight of ten tablets after test

Weight variation test

This is an important in-process quality control test to be checked frequently (every half an hour). Corrections were made during the compression of tablets. Any variation in the weight of tablet (for any reason) leads to either under medication or overdose. Therefore, every tablet in each batch should have a uniform weight. Twenty tablets of each formulation were selected at random and weighed individually. The weight of individual tablets was noted. Average weight was calculated from the total weight of all tablets. The individual weights were compared with the average weight. Not more than two of the tablets must differ from the average weight by not more than the percentages stated in table below. The percentage deviation was calculated by using the following formula.

$$\text{Percentage Deviation} = \frac{\text{Individual weight - Average weight}}{\text{Average weight}} \times 100$$

Table No.5: Weight variation Tolerances for uncoated Tablets

s.no	Average weight of Tablets (mg	Maximum % difference allowed
1	130 or less	± 10
2	130-324	±7.5
3	More than 324	±5

Estimation of Drug Content93

The term "Uniformity of dosage unit" is defined as the degree of uniformity for substance among dosage units. The test for content uniformity is based on the assay of the active medicament of content uniformity is necessary the quantity of the active medicament is within the limit in the formulation.

Ten tablets from each formulation were powdered. The powder equivalent to 150mg of Levofloxacin was weighed and dissolved in Distilled water in 100ml standard flasks. From this suitable dilution was prepared and the solution was analyzed at 298 nm using UV double beam spectrophotometer.

Disintegration time study
The test was carried out on six tablets using distilled water at 370C + 20C was used as disintegration media and the time in second taken for complete disintegration of the tablet with no palatable mass remaining in the apparatus was measured in seconds.

Wetting time study
A piece of tissue paper folded twice was placed in a small Petri dish (internal diameter = 6.5cm) containing 5 ml of distilled water. A tablet was placed on the paper, and the time for complete wetting of the tablet was measured in seconds. All the post compression parameters results are shown in table.

***In vitro* drug release study**
In vitro release studies were carried out by using USP paddle dissolution test apparatus. 900ml of Phosphate buffer (pH 6.8) was taken in the dissolution vessel and the temperature of the medium was maintained at 37±0.5oC. 100rpm was maintained, 1 ml of sample was withdrawn at predetermined time intervals for 0, 1, 3, 6, 9, 12 and 15mints. The same volume of the fresh medium was replaced. The samples were analysed at 298nm by using a UV spectrophotometer. The dissolution data obtained were plotted as percentage drug release versus time.

FT-IR studies
It was used to study the interactions between the drug and superdisintegrants. The drug and superdisintegrants must be compatible with one another to produce a product stable, efficacious and easy to administer and safe.

IR spectral analysis for drug, superdisintegrants was carried out. If there is no change in peaks of mixture when compared to pure drug, it indicates the absence of interactions.

Stability Studies
The concentration of an active ingredient of any formulation may decrease with increase in temperature and time. This will lead to decrease the potency of the product. Stability study in different temperatures should be carried out to predict the stability of the formulations.

Stability studies were aimed at determining the result of aging and storage under various conditions on the formulated Fast dissolving tablets. Stability studies are used to find out whether any chemical degradation of Levofloxacin formulations take place or not. The formulated tablets were stored at 4o± 2oC (in refrigerator), 27°± 2°C (in room temperature) and 45oC ± 2oC (in accelerated stability chamber) for 45 days. Three tablets were taken from all the stored samples at the intervals of 15th, 30th and 45th days and analysed for drug content and in vitro release studies were carried out to determine the percentage of Levofloxacin released.

RESULTS AND DISCUSSIONS:

Pre-Formulation Studies
The present study was undertaken to formulate Levofloxacin oral dispersible tablets with three polymers namely Crospovidone, CCS and SSG and in combination of three Superdisintegrants and by dry granulation technique. Before compression of the granules physical characters such as, bulk density, tapped density, angle of repose, compressibility index and Hausner ratio were determined and tabulated in the Table12. Then the granules were compressed into tablets and then evaluated. The results are presented in Table 13.

PRECOMPRESSION STUDIES OF GRANULES
Bulk density
The packing properties of the drugs and their formulations widely depend upon bulk density. It has been stated that bulk density values less than 1.2gm/cm3 indicate good flow and values greater than 1.5 gm/cm3 indicate poor flow.

From the results it can be seen that the bulk density values are less than 1.2gm/cm3. This indicates good flow characteristics of the granules.

Tapped density
From the above results it can be seen that the Tapped density values indicate good flow characteristics of the granules.

Angle of Repose
Angle of repose less than or equal to 40oC indicates free flowing properties of the granules. However, angle of repose greater than 40oCindicates poor flow of material. It can be observed from above table that the angle of repose for various batches of the granules is found to be less than 40oC, it indicates good flow properties of the granules.

Compressibility Index or Carr's Index
Carr's Index less than or equal to <10 indicates free flowing properties of the granules. However, Carr's Index greater than <10 indicates poor flow of material.

It can be observed from above table that the Carr's Index for various batches of the granules is found to

be less than >10; it indicates good flow properties of the granules.

Hausner's Ratio
Hausner's Ratio less than or equal to 1.069 indicates free flowing properties of the granules. However, Hausner's Ratio greater than 1.35 indicates poor flow of material.

It can be observed from above table that the Hausner's Ratio for various batches of the granules is found to be less than 1.122; it indicates good flow properties of the granules.

EVALUATION OF LEVOFLOXACIN ORAL DISPERSIBLE TABLETS
The compressed tablets were evaluated for physical properties and the results are tabulated in Table no -4

Hardness Test
The hardness of the tablet various batches was determined. The various batches of the tablets of hardness values are found within limits and it indicates good strength of the oral dispersible tablets.

Thickness Test
The tablets mean thicknesses were almost uniform in the all formulations and were found to be in the range of 0.37mm.

Friability Test
The oral dispersible tablets friability values are found to be less than 1% in all cases and considered to be satisfactory.

Weight variation test
All this oral dispersible tablet passed weight variation test as the % weight variation was within the pharmacopoeia limits. The weight of the all tablets was found to be uniform with low standard deviation values.

Estimation of Drug Content
Drug content of all the batches are within the acceptable range which shows the proper mixing of the drug with the excipients.

Disintegration time study
The disintegration time (D.T) of all formulations.

Table No. 6: Precompression studies of powder blend

S. No	Formulations	Bulk Density (gm/ml	Tapped Density (gm/ml	Angle of Repose (θ)	Carr's Index (%)	Hausner's Ratio
1	**Flot-1**	0.334	0.375	32.26	10.93	1.122
2	**Flot-2**	0.346	0.372	34.15	6.98	1.075
3	**Flot-3**	0.328	0.362	33.82	9.39	1.103
4	**Flot-4**	0.312	0.333	31.38	6.30	1.067
5	**Flot-5**	0.333	0.368	35.07	9.51	1.105
6	**Flot-6**	0.352	0.384	35.07	8.33	1.090
7	**Flot-7**	0.326	0.354	39.48	7.90	1.085

Table No.7: Post compression studies of Levofloxacin oral dispersible Tablets

S. No	Formulations	Hardness Test	Thickness Test (cm)	Friability Test (%)	% of Weight variation test	Estimation of Drug Content %
1	**Flot-1**	2.45	0.37	0.164	99.7	98.12
2	**Flot-2**	2.34	0.37	0.228	99.2	96.29
3	**Flot-3**	3.42	0.37	0.236	99.8	97.54
4	**Flot-4**	2.92	0.37	0.267	99.8	97.27
5	**Flot-5**	2.65	0.37	0.224	99.6	96.48
6	**Flot-6**	3.23	0.37	0.254	99.5	98.34
7	**Flot-7**	2.86	0.37	0.253	99.9	98.84

Table No.8: Post compression studies of Levofloxacin oral dispersible Tablets

S.No	Formulations	Disintegration time (sec)	Wetting time(sec)
1	FLOT-1	**25**	**17**
2	FLOT-2	**23**	**16**
3	FLOT-3	**32**	**17**
4	FLOT-4	**22**	**15**
5	FLOT-5	**25**	**15**
6	FLOT-6	**23**	**16**
7	FLOT-7	**20**	**14**

IR Spectral analysis

The IR Spectral studies of Pure levofloxacin, Crospovidone, Sodium starch glycolate and CCS were carried out to study the interaction between the drug and super disintegrants used.It showed that IR spectrum of pure Levofloxacin and superdisintegrants were similar fundamental peaks and patterns. The results proved that there were no significant interactions between the drug and super disintegrants.

The results are shown

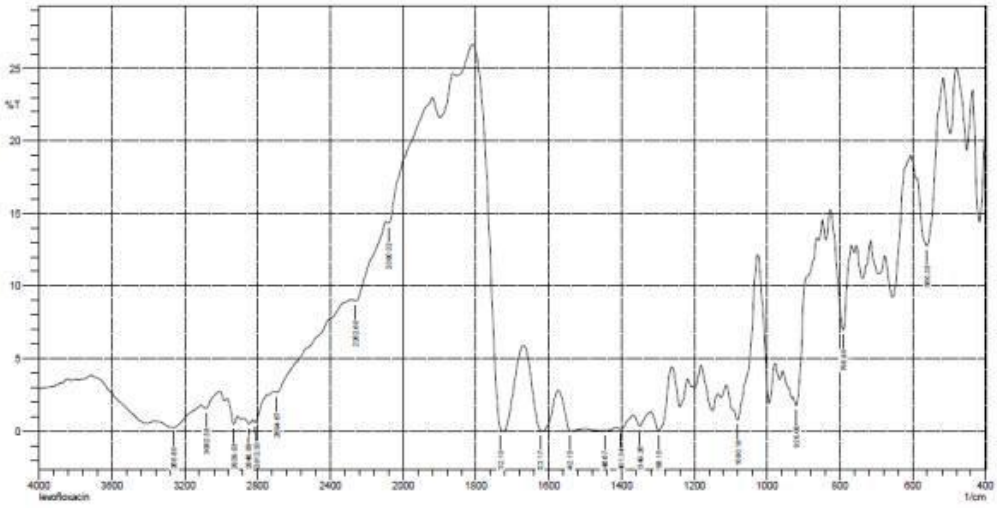


Figure No.1: FTIR spectrum of Levofloxacin

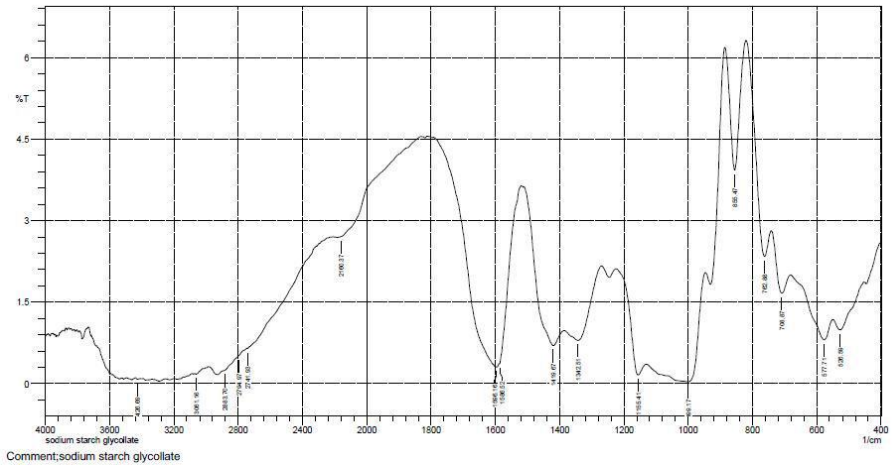


Figure No.2: FTIR spectrum of SSG

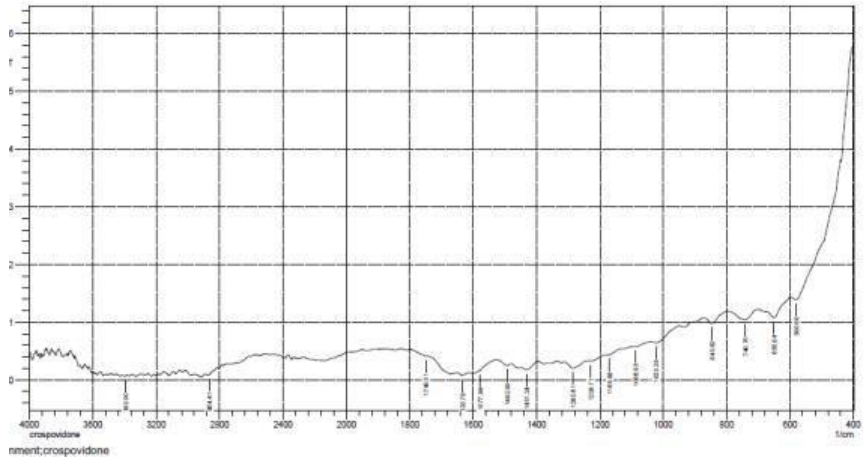


Figure No.3: FTIR spectrum of CP

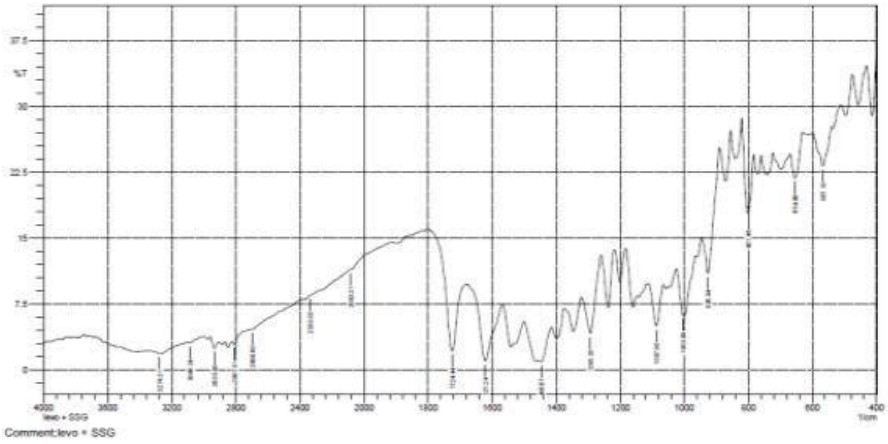


Figure No 4: FTIR spectrum of Levofloxacin and SSG

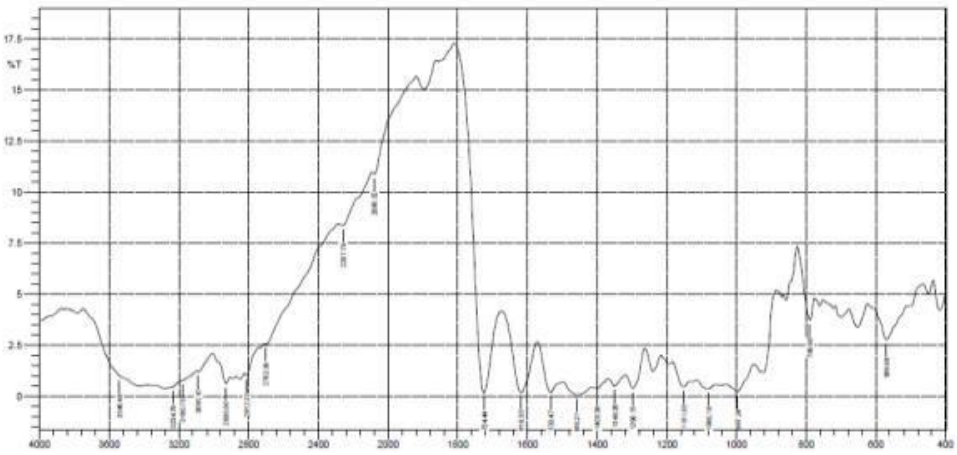


Figure No.5: FTIR spectrum of Levofloxacin and CCS

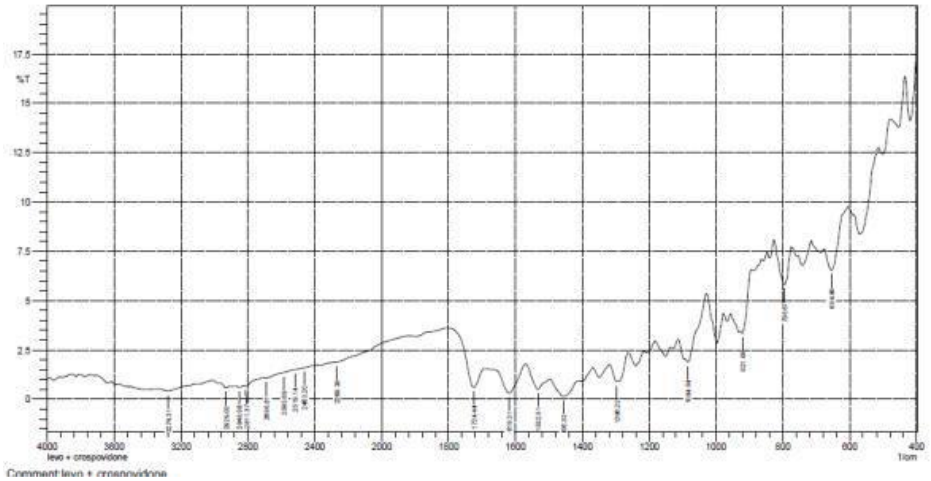


Figure No.6: FTIR spectrum of Levofloxacin and CP

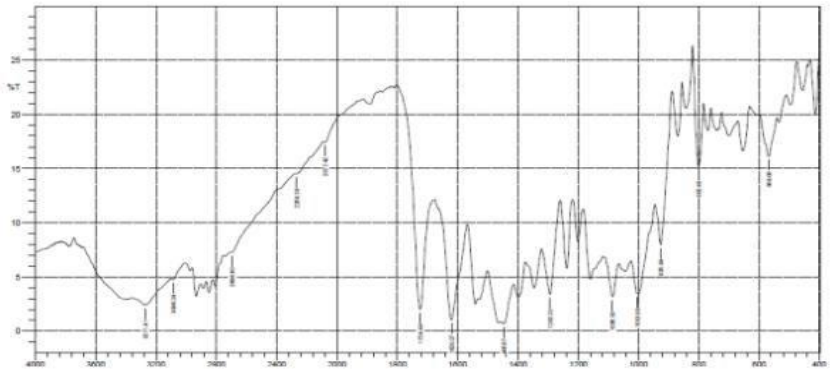
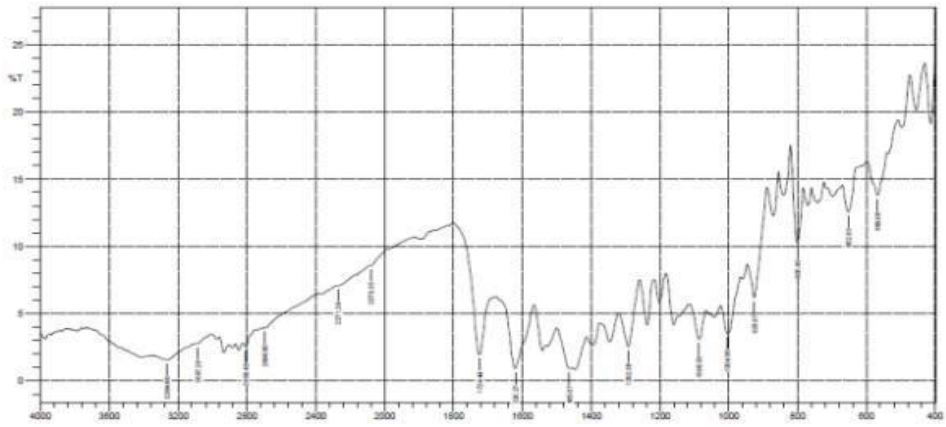


Figure No.7: FTIR spectrum of Levofloxacin +SSG+CCS



+CP

Figure No.8: FTIR spectrum of Levofloxacin +CCS

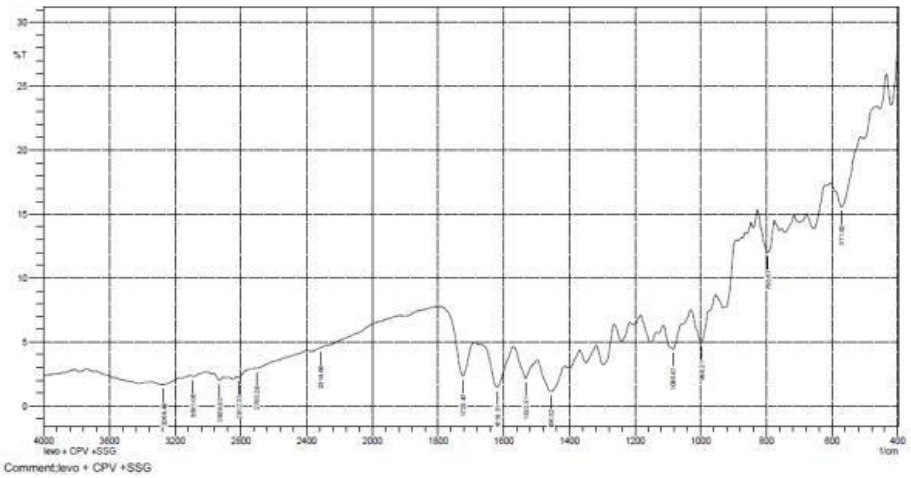


Figure No.9: FTIR spectrum of Levofloxacin +SSG+CP

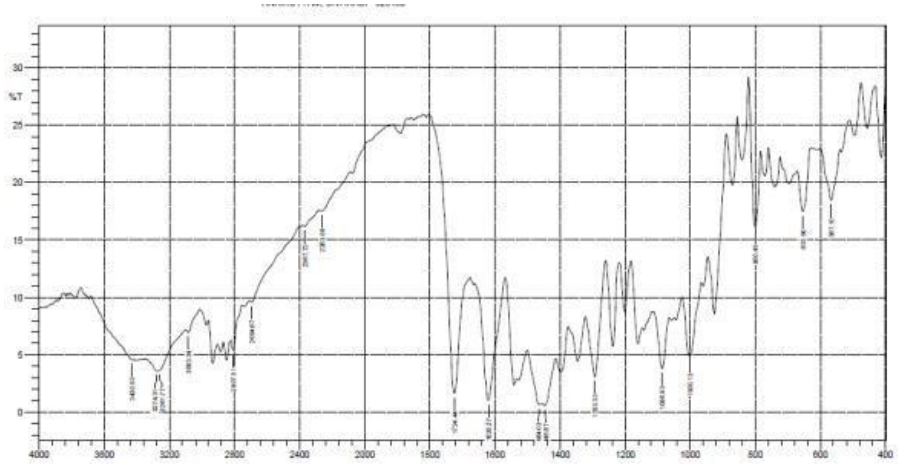


Figure No.10: FTIR spectrum of Levofloxacin +SSG+CCS+CP

***IN-VITRO* DRUG RELEASE STUDY**

Tablets of all the formulations were subjected for *invitro* release studies .the results are presented in Table no. 6

Table No.9: Formulations-1 (FLOT-1)

S.NO	Time(mins)	Abosorbance (298nm)	Concentration((µg/ml)	Amount of drug release (in 900ml)	% of drug release
1	**0**	0.000	0.000	0.000	0.000
2	**1**	0.125	1.078	9.710	6.47
3	**3**	0.496	4.350	39.15	26.61
4	**6**	0.684	6.000	54.00	36.00
5	**9**	0.923	8.096	72.86	48.57
6	**12**	1.249	10.956	98.605	65.73
7	**15**	1.723	15.114	136.02	90.68

Table No.10: Comparative dissolution study of different formulations with various ratios of Super disintegrants

S. No	Time (mints)	% of drug release (FLOT-1)	% of drug release (FLOT-2)	% of drug release (FLOT-3)	% of drug release (FLOT-4)	% of drug release (FLOT-5)	% of drug release (FLOT-6)	% of drug release (FLOT-7)
1	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	1	6.47	5.05	4.315	6.947	5.684	6.736	7.263
3	3	26.61	20.63	19.15	27.42	21.31	27.05	28.52
4	6	36.00	31.15	29.57	36.52	32.21	35.47	36.63
5	9	48.57	46.26	44.89	49.57	47.05	48.73	50.36
6	12	65.73	60.63	58.21	66.10	61.47	65.00	67.26
7	15	90.68	88.10	83.31	92.78	88.73	91.84	96.10

DISCUSSION:

Oral dispersible tablets of Levofloxacin were prepared by direct compression method. The prepared Oral dispersible tablets are round in shape. Microscopic examination of tablets from each formulation batch showed circular shape with no cracks. The fourier transform infra-red analysis was conducted for the surface structure characterization. FTIR spectrum of the formulated Oral dispersible tablets, pure drug and super disintegrants was recorded. The Fourier Transform Infrared Spectroscopy study reveals that there is no interaction between the super disintegrants and pure drug.

Bulk density (0.312 to 0.352 gm/cm3) and Tapped density (0.333 to 0.384 gm/cm3) values are within the limits, indicating that the powder blends have the required flow property for direct compression. The values obtained for angle of repose for all formulations are tabulated in table the values were found to be in the range from 31.38-39.480C. This indicates good flow property of the powder blend. Compressibility index (6.30 to 10.93) and Hausner's ratio (1.067 to 1.122) values are within the limits, indicating that the powder blends have the required flow property for direct compression.

The hardness of the Oral dispersible tablet various batches was determined.

The various batches of the Oral dispersible tablets of hardness values are found within limits and it indicates good strength of the Oral dispersible tablets. Tablet mean thicknesses were almost uniform in the all formulations and were found to be in the range of 0.37mm. Friability values are found to be less than 1% in all cases and considered to be satisfactory. All this tablet passed weight variation test as the % weight variation was within the pharmacopoeia limits. Drug content of all the batches are within the acceptable range which shows the proper mixing of the drug with the excipients.

The *in vitro* drug release profile of tablets from each batch (FLOT-1 to FLOT- 7 was carried in phosphate buffer (pH 6.8) for 15 mints by using paddle type of device. From the *in vitro* dissolution data, FLOT-7 formulation was found that the drug release is best and the cumulative % of drug release was 96.10 % respectively, when compared to other formulation.

All the formulations were subjected for stability studies for 45 days at different temperatures such as room temperature, fridge temperature and accelerated temperature (45°C±2°C). At 15 days interval upto 45 days, the drug content and dissolution studies were carried out. There was no significant change in the drug content and *invitro* drug release.

9. SUMMARY AND CONCLUSION:

Oral dispersible Tablets of Levofloxacin were prepared with two different superdisintegrants and evaluation of blend powder, tablets evaluation studies, IR spectral studies, dissolution studies and stability studies were performed. The summary are presented.

Preformulation studies such as angle of repose, bulk density, tapped density, compressibility index and hausner ratio were performed and the results showed that all the parameters are within the acceptable limits.

Tablets were prepared by direct compression method and evaluated for general appearance, hardness test, uniformity of weight, friability, wetting time, disintegration time, drug content estimation and in vitro release study. All the formulations were found to be good appearance without showing any chipping, capping and sticking defects and all other parameters were passed the test.

IR spectroscopic studies indicated that the drug is compatible with all the polymers and there was no drug-polymer interaction.

When comparing all the formulations, F7 shows a better drug release of **96.10%** at the end of 15 minutes.

All the formulations were subjected for stability studies for 45 days at different temperatures such as room temperature, fridge temperature and accelerated temperature (45°C±2°C). At 15 days interval upto 45 days, the drug content and dissolution studies were carried out. There was no significant change in the drug content and *invitro* drug release.

The main objective of the present study was to develop Oral dispersible tablet formulation containing 150mg of Levofloxacin for the treatment of a number of infections including infection of Joints and bones, respiratory tract infections, urinary tract infections, skin structural infections and typhoid fever etc. In the present work it has been observed from all formulations of precompression and post compression studies were given within the limit of values. The *in vitro* dissolution data, FLOT- 7 (combination of different superdisintegrants) formulation was found that the drug release is best and the cumulative % of drug release was 96.10 % respectively, when compared to other formulation

REFERENCES:

1. Dobetti L. Fast Melting Tablet: Development and technologies, *Pharm Tech*, 37, 2001, 44-8.
2. Bradoo R, Shahani S, Poojary S, Deewan B, Sudarsan S. Fast dissolving drug delivery system, *JAMA India*,4(10), 2001, 27-31.
3. Habib W, Khankari R, Hontz J. Fast dissolving drug delivery system: Critical Review In Therapeutics, *Drug Carrier Systems*, 17(1), 2000, 61-72.
4. Lorenzp-Lamosa ML, Cuna M, Vila-Jato JL, Torres D. Fast dissolving drug delivery system: An Update, *J Microencapsul*,14, 1997, 607.
5. Chaudhary P D, Chaudhary S P, Lanke S D and Patel Nakul T K. Formulation and *in vitro* evaluation of taste masked Orodispersible dosage forms of Levocetrizine dihydrochloride, *Indian J. Ph arm. Educ. Res*,41,2007,319-327.
6. Avani J and Amin F. Emerging Trends in the development of orally disintegrating tablet technology- A Review, *Pharma.Tech*, 4, 2006, 26-32.
7. Shailesh Sharma R and Gupta G D. Formulation and characterization of fast dissolving tablets of Promethazine theoclate, *Asian Journal of Pharmaceutics*, 16, 2008, 70-72.
8. Sandipan Kundu P K and Sahoo K. Recent trends in the developments of orally disintegrating tablet technology, *Pharma Times*, 40, 2008, 11-15.
9. Panigrahi D, Baghel S and Mishra B. Mouth dissolving tablets: A over view of preparation techniques, evaluation and patented technologies, *Journal of Pharmaceutical Research*, 49,2005, 33-38.
10. Bhaskaran S and Narmada S. Mouth Dissolving tablets a Review, *Indian Pharmacist*, 3, 2002, 9-12.
11. Rao M R P, Bachhar D and Gogad V. Formulation and evaluation of Aceclofenac immediate release tablets, *The Indian Pharmacist*, 49, 2007, 73-78. 96
12. Seger H. Drug delivery products and the zydis fast dissolving dosage forms, *J.Pharm. Pharmacol*, 50, 1998, 375-382.
13. Chang R K, Guo X, Burnside B A and Couch R A. Fast dissolving tablets- A Review, *Pharm. Tech*, 24, 2000, 52-58.
14. Dobetti L. Fast melting tablets; Developments and Technologies, *Pharm. Tech*, 44, 2001,592-597.
15. Kuchekar B S and Arumugam V. Fast dissolving tablets, An over view, *Indian J.Pharm. Edu*, 35, 2001, 150-152.
16. Shenoy V, Agarwal S and Pandey S. Optimizing fast dissolving dosage form of Diclofenac sodium by rapidly disintegrating agents, *Indian J. Pharm. Sci*, 65, 2003, 197-201.
17. Augsburger L L, Brzecko A W, Shah V and Hahm H A. Characterzation and functionality of super disintegrants, *Encyclopedia of Pharmaceutical Technology, New York, N Y: Marcel Dekker Inc*, 49, 2002, 2623-2625.
18. Sastry S V, Nyshadham J R and Joseph A F. Fast dissolving tablets of Famotidine, *Pharm Sci. Tech Today*, 3, 2000, 135-138.
19. Shangraw R, Mitrevej A and Shah M. Fast Release carbamazepine tablet for kids. *Pharma. Tech*, 4, 1980, 49-52.
20. Caramella C. Effect of superdisintegrants and subliming materials on clozaping dispersible tablets, *Drug Develop. Ind. Pharm*, 26, 1990, 2561-2565.
21. Reddy L H, Ghash B and Rajneesh S. Fast dissolving drug delivery system:review of the literature, *Ind. J. Pharm Sci*, 64, 2004, 1-3.