FORMULATION AND INVITRO EVALUATION OF GASTRORETENTIVE DOSAGE FORMS OF BALOFLOXACIN

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ABSTRACT
The purpose of present investigation was to develop and evaluate gastroretentive drug delivery system of fluoroquinolone antibiotics (Balofloxacin). These floating tablets were prepared with the objective to obtain site-specific drug delivery and to extend its duration of action. More over the floating system of balofloxacin will provide increased local and systemic action in stomach. Floating effervescent tablets were formulated by various materials like Hydroxypropyl methylcellulose HPMC (K 4M, K100M), Xanthum gum, Microcrystalline cellulose as swelling agent and gas generating agent like sodium bicarbonate. All the formulations were evaluated for floating properties, swelling characteristics and drug release studies.

In vitro drug release studies were performed and drug release kinetics evaluated using the linear regression method was found to follow zero order release and non-fickian diffusion mechanism. The floating lag time were found to be significantly increased with the increasing concentration of the polymers. After the dissolution study of prepared balofloxacin floating effervescent tablet it was concluded that the formulation FT4 with HPMCK100 and xanthum gum shows better controlled release effect (98.65%).

KEYWORDS: Balofloxacin, gastroretentive, effervescent floating drug delivery, HPMC (K 4M, K100M), Xanthum gum, Microcrystalline cellulose, sodium bicarbonate.

INTRODUCTION
Balofloxacin (BFX) is an orally active of third generation fluoroquinolone antibiotic. Balofloxacin is a fluoroquinolone antibiotic. Balofloxacin, a quinolone derivative, is prescribed for the treatment of various bacterial infections including uncomplicated urinary tract infections, infective ophthalmitis, community-acquired pneumonia, acute exacerbation,
sinusitis, skin infections and chronic bronchitis. Balofloxacin is effective and Gram-negative and Gram-positive microbes including MRSA and Streptococcus pneumonia. The half-life following a single oral dose is 7-8 hours. The success of a therapy depends on selection of the appropriate delivery system. Thus, Balofloxacin is chosen as a suitable candidate for Gastric floating release drug delivery system.

The purpose of this work is to develop a novel sustained release tablet with to prolong the gastric residence time of Balofloxacin.

Various approaches for preparation of gastroretentive drug delivery system include floating systems, swellable and expandable systems, high density systems, bioadhesive systems, altered shape systems, gel forming solution or suspension system and sachet systems.

Floating drug delivery systems is one of the important approaches to achieve gastric retention to obtain sufficient drug bioavailability. This delivery system is desirable for drugs with an absorption window in the stomach or in the upper small intestine. These systems have a bulk density lower than that of gastric fluids and thus remain buoyant in the stomach without affecting the gastric emptying rate for a prolonged period of time. While the system is floating in the gastric contents, the drug is released slowly at a desired rate from the system. After the release of the drug, the residual system is emptied from the stomach. This results in an increase in the gastric retention time and a better control of fluctuations in plasma drug concentration.

Balofloxacin absorbs only in the upper part of GIT. So, In the present study, balofloxacin is formulated as an effervescent floating system helps to float the drug in gastrointestinal fluid prolonging gastric residence time.

**MATERIALS AND METHODS**

**Materials**

Balofloxacin purchased from Hetero drugs, India. Hydroxy propyl methyl cellulose K4M, HPMC K100, HPMC K15, Sodium bicarbonate, Lactose, Xanthan gum, Magnesium stearate, Talc were used. All other ingredients, reagents and solvents were of analytical grade.
Methods

Direct Compression

Balofloxacin floating was prepared by direct compression technique using drug and variable concentration of polymers (HPMC K4M, HPMCK100, Xanthan gum, Sodium Bicarbonate, MCC, Lactose, Mg-stearate and Talc).

The respective powders & optional additives were blended thoroughly with a mortar and pestle. The powder blended was then lubricated with Mg-stearate and purified talc and then compressed on a tablet punching machine.

EVALUATION PARAMETERS

The prepared floating tablets were evaluated for uniformity of weight using 20 tablets, Hardness, Friability, In vitro buoyancy, swelling behavior (water uptake studies) and In vitro dissolution studies.

Thickness and diameter

The thickness and diameter of tablet was carried out using Digital caliper. Five tablets were used for the above test from each batch and results were expressed in millimeter.

Hardness

Hardness is defined as the force required breaking a tablet in a diametric compression test. The devices operating in this manner are the Monsanto tester, the Strong- cobb tester, the Pfizer tester, the Erweka tester and the Schleuniger tester. It is expressed in kg/cm². The hardness of the tablet from each formulation was determined using Pfizer hardness tester.

Friability

Friability of the tablets was determined using Roche Friabilator. This device subjects the tablets to the combined effect of abrasion and shock in a plastic chamber revolving at 25 rpm and dropping the tablets at a height of 6 inches in each revolution. Pre weighed sample of tablets was placed in the friabilator and were subjected to 100 revolutions. Tablets were dedusted using a soft muslin cloth and reweighed. The friability (f) is given by the formula.

\[
\text{Friability (f)} = (1 - \frac{W_0}{W}) \times 100
\]
Where, $W_0$ is weight of the tablets before the test and $W$ is the weight of the tablet after the test.

**Weight Variation**
Twenty tablets from each formulation were selected at random and average weight was determined. Then the individual tablets were weighed and were compared with average weight.

**Floating or Buoyancy Test**
The time taken for tablet to emerge on the surface of the medium is called the floating lag time (FLT) or buoyancy lag time (BLT) and duration of time the dosage form constantly remains on the surface of the medium is called the total floating time (TFT). The buoyancy of the tablets was studied in USP type II dissolution apparatus at 37 ± 0.50°C in 900ml of simulated gastric fluid at 0.1N HCl. The time of duration of floatation was observed visually.

**Drug Content Uniformity**
Powder of one tablet extraction was carried out using 0.1 N HCL. The concentration was determined spectrophotometrically against appropriate blank. Calculate the content of Balofloxacin specific absorbance at 293 nm. As given in IP.

**In vitro Buoyancy Studies**
The *in vitro* floating behavior of the tablets was studied by placing them in 100 ml beaker 100 ml of 0.1 N HCl (pH 1.2, 37°C). The time, tablet required for the emerge on the surface is floating lag time (FLT) or buoyancy lag time (BLT). And the time tablet constantly float on the surface of the medium is called total floating time (TFT).

**Swelling Study**
The extent of swelling was measured in terms of % weight gain by the tablet. The swelling behavior of all the formulation was studied. One tablet from each formulation was kept in a Petridish containing 0.1N HCL. At the end of 1 hr, the tablet was withdrawn, soaked with tissue paper, and weighed. Then for every 2 hrs, weights of the tablet were noted, and the process was continued till the end of 12 hrs. % weight gain by the tablet was calculated by formula:

\[
S.I = \frac{(M_t - M_o)}{M_o} \times 100,
\]
Where, S.I = Swelling index, Mt = Weight of tablet at time “t” and Mo = weight of tablet at time t = 0.

**In Vitro Dissolution Studies**

The release rate of Balofloxacin from floating tablet was determined using the United States Pharmacopoeia (USP) dissolution testing apparatus II. The dissolution test was performed using 900ml of 0.1 N HCL, at 37 ± 0.50C and 50 rpm. The samples were taken at pre-selected time intervals with replacement of equal volume of dissolution medium. The samples withdrawn were filtered through 0.45µ membrane filter, and concentration of drug in each sample was analyzed by UV spectrophotometer at 293 nm and cumulative percent drug release was calculated. The study was performed in triplicate.

**Thickness and diameter**

The thickness and diameter of tablet was carried out using Digital caliper. Five tablets were used for the above test from each batch and results were expressed in millimeter.

**DRUG RELEASE KINETICS**

**Zero order release rate kinetics**

To study the zero order release kinetics the release rate data are fitted to the following equation

\[ F = K_0 t \]

Here, \( F \) is the fraction of drug release

\( K_0 \) is the rate constant

\( T \) is the release time

**First order model**

This model has also been used to describe absorption and/elimination of drug, the release of the drug which followed first order kinetic can be expressed by the equation

\[ \log C = \log C_0 - \frac{Kt}{2.303} \]

Where, \( C_0 \) is the initial concentration of drug

\( K \) is the first order rate constant

\( t = \) is the time

**Higuchi release model**

To study the higuchi release kinetics, the release rate data was fitted to the following equation
\[ F = K_h t^{1/2} \]

Where, \( F \) is the amount of the drug release
\( K_h \) is the release time
\( t \) is the release time

**Korsmeyer and Peppas model**
The release rate data were fitted to the following equation,

\[ \frac{M_t}{M_\infty} = K_M t^n \]

Where, \( \frac{M_t}{M_\infty} \) is the fraction of drug release
\( K_M \) is the release constant
\( t \) is the release time

**RESULTS AND DISCUSSION**

**Pre-compression parameters**
Ciprofloxacin HCL along with other excipients were evaluated for bulk density, tap density, angle of repose, compressibility and Hausner ratio, before proceeding to direct-compression.
The physical parameters are recorded in Table 1.2.
Angle of repose: \( 21^0.22 \pm 0.346 \) to \( 24^0.50 \pm 0.520 \) indicating good.
Compressibility index: \( 11.85 \pm 0.478 \) to \( 21.98 \pm 0.312 \) indicating good
Hausner ratio: 1.13 to 1.28 indicating good.

**Post compression parameters**
The important parameters in the production of tablets were evaluated and reported in Table 1.3,1.4. The thickness varied from 4.12 mm to 4.91 mm. The hardness varied from 4.4 kg\( \text{cm}^2 \) to 4.9 kg\( \text{cm}^2 \) found satisfactory. The friability test was passed. The buoyancy lag time was found to be 51 sec to 180 sec (table 1.3). The total lag float time were found to be more than 12 hrs. Swelling index was found to be 40.22 to 61.78. The drug content uniformity was 95.63% to 99.74% and therefore was satisfactory.

**Dissolution Studies**
Based on the objectives of the present investigation, the tablets were evaluated for release of Balofloxacin. Dissolution studies were attempted. Since the delivery system was floating, stimulated gastric acid fluid pH 1.2 solutions was used as dissolution medium. The results are shown in Table.
In-vitro effervescent dissolution studies were performed for all the batches of tablets containing Balofloxacin using USP XXIII dissolution test apparatus-II at 50rpm, 900ml of 0.1N HCl used as dissolution media. Formulations FT1, FT2 and FT3 containing drug and polymers like HPMC K4M and Xanthan gum exhibited 83.96, 79.12 and 76.57% of drug release in 12 hours respectively and the data is given in table.

Formulations FT4, FT5, and FT6 containing drug polymers HPMCK100, exhibited 98.65, 92.40 and 88.65% of drug release in 12 hours respectively and the data is given in table 1.5.

Formulations FT7, FT8 and FT9 containing drug and polymers like HPMC K4M and Xanthan gum exhibited 96.79, 92.82 and 88.63% of drug release in 12 hours respectively and the data is given in table 1.6.

Drug release kinetics
The in-vitro drug release data was subjected to analysis according to zero order, first order kinetic equations, Higuchi and Peppas models to ascertain the mechanism of drug release. The results of linear regression analysis of data including regression coefficient are summarized in table 1.7.

When the regression coefficient ‘r’ value of zero order and first order plots were compared, it was observed that the ‘r’ values of zero order were in the range of 0.989(FT4) whereas the ‘r’ values of first order plots were found to be in the range of 0.819(FT4) indicating drug release from all the formulations were found to follow zero order kinetics.

The Higuchi’s plot has shown with the regression values in the range of 0.954(FT4) shown in table no 1.7.

The in-vitro dissolution data as log cum percent drug release versus log time were fitted to Peppas, values of the exponent ‘n’ was found to be in the range of 0.786(FT4), indicating that the drug release is by Non-Fickian diffusion mechanism.

CONCLUSION
From the compatibility studies, it is concluded that, HPMC K4M, Xanthan gum, HPMCK100M,Carbopol 976P, HPMC K15M, HPMC E 50, Guar gum, & Sodium alginate were compatible with drug Balofloxacin and thus suitable for the formulation of Balofloxacin floating tablets.
Balofloxacin tablets were fabricated by direct compression method. *In-vitro* buoyancy studies were performed for all the formulations, FT1-FT9 (effervescent technique) by using 0.1 N HCL solution at 37°C. Tablet containing HPMC K100 (FT4) showed good buoyancy with very short lag time and long floatation time of more than 12 hrs in 0.1 N HCL. *In-Vitro* release study is performed for 12 hrs. Optimized formula containing HPMCK100 (FT4) showed better release compare to other formulations and it followed zero order kinetics. The non-Fickian diffusion for FT4 is confirmed as the drug release mechanism from this formulation.

From this study, it was concluded that HPMCK100 can be used in formulation of Balofloxacin gastro retentive floating drug delivery system by using effervescent method. Overall, this study concludes that viscosity of the polymer is a major factor affecting the drug release and floating properties of FDDS.

### TABLES AND GRAPHS

**Table 1.1: Composition of the Formulations (per each tablet in mg).**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>FT1</th>
<th>FT2</th>
<th>FT3</th>
<th>FT4</th>
<th>FT5</th>
<th>FT6</th>
<th>FT7</th>
<th>FT8</th>
<th>FT9</th>
</tr>
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<tbody>
<tr>
<td>Drug</td>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>HPMC K100</td>
<td></td>
<td></td>
<td>15</td>
<td>30</td>
<td>35</td>
<td>20</td>
<td>10</td>
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<td>10</td>
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<tr>
<td>HPMC K4M</td>
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<td></td>
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<td>MCC</td>
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<td>MG -stearate</td>
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<td>Talc</td>
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<td>Lactose</td>
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<td>45</td>
<td>35</td>
<td>60</td>
<td>45</td>
<td>35</td>
<td>45</td>
<td>50</td>
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<tr>
<td>Total wt (mg)</td>
<td>350</td>
<td>350</td>
<td>350</td>
<td>350</td>
<td>350</td>
<td>350</td>
<td>350</td>
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<td>350</td>
</tr>
</tbody>
</table>

**Table 1.2: Pre Compression Parameters Indicating Flow Properties of Blend.**

<table>
<thead>
<tr>
<th>formulation code</th>
<th>Angle of repose (θ) ±SD</th>
<th>Bulk density 3 (gm/cm³) ±SD</th>
<th>Tapped density 3 (gm/cm³) ±SD</th>
<th>Hausner ratio (HR) ±SD</th>
<th>Carr index (Ic) ±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT1</td>
<td>23.11±0.825</td>
<td>0.228±0.010</td>
<td>0.262±0.011</td>
<td>1.149±0.006</td>
<td>12.97±0.357</td>
</tr>
<tr>
<td>FT2</td>
<td>22.84±0.645</td>
<td>0.214±0.010</td>
<td>0.260±0.010</td>
<td>1.214±0.030</td>
<td>17.61±0.341</td>
</tr>
<tr>
<td>FT3</td>
<td>23.61±0.471</td>
<td>0.223±0.010</td>
<td>0.266±0.005</td>
<td>1.192±0.050</td>
<td>16.16±0.471</td>
</tr>
<tr>
<td>FT4</td>
<td>24.50±0.520</td>
<td>0.232±0.010</td>
<td>0.270±0.010</td>
<td>1.163±0.004</td>
<td>14.07±0.214</td>
</tr>
<tr>
<td>FT5</td>
<td>23.46±0.471</td>
<td>0.225±0.020</td>
<td>0.260±0.010</td>
<td>1.155±0.033</td>
<td>13.46±0.442</td>
</tr>
<tr>
<td>FT6</td>
<td>22.14±0.746</td>
<td>0.238±0.015</td>
<td>0.270±0.026</td>
<td>1.134±0.020</td>
<td>11.85±0.478</td>
</tr>
<tr>
<td>FT7</td>
<td>23.36±0.312</td>
<td>0.220±0.005</td>
<td>0.282±0.011</td>
<td>1.281±0.011</td>
<td>21.98±0.312</td>
</tr>
<tr>
<td>FT8</td>
<td>21.85±0.665</td>
<td>0.228±0.011</td>
<td>0.260±0.010</td>
<td>1.140±0.014</td>
<td>12.30±0.412</td>
</tr>
<tr>
<td>FT9</td>
<td>21.22±0.346</td>
<td>0.229±0.010</td>
<td>0.266±0.015</td>
<td>1.161±0.07</td>
<td>16.37±0.231</td>
</tr>
</tbody>
</table>
# All the values are expressed as mean ± SD. (n=3)

<table>
<thead>
<tr>
<th>Formulation code</th>
<th>Weight variation Average wt in (mg)±SD</th>
<th>Hardness (Kg/cm²)±SD</th>
<th>Thickness in (mm)±SD</th>
<th>Friability (% )±SD</th>
<th>Drug content uniformity (% )±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT1</td>
<td>350.2±0.952</td>
<td>4.95±0.115</td>
<td>4.139±0.010</td>
<td>0.78±0.090</td>
<td>96.362±0.305</td>
</tr>
<tr>
<td>FT2</td>
<td>349.97±0.877</td>
<td>4.83±0.115</td>
<td>4.239±0.049</td>
<td>0.75±0.060</td>
<td>95.633±0.130</td>
</tr>
<tr>
<td>FT3</td>
<td>350.1±0.857</td>
<td>4.46±0.115</td>
<td>4.253±0.000</td>
<td>0.77±0.017</td>
<td>98.432±0.355</td>
</tr>
<tr>
<td>FT4</td>
<td>349.14±0.815</td>
<td>4.44±0.115</td>
<td>4.204±0.100</td>
<td>0.63±0.010</td>
<td>98.738±0.228</td>
</tr>
<tr>
<td>FT5</td>
<td>350.5±0.885</td>
<td>4.93±0.115</td>
<td>4.144±0.066</td>
<td>0.52±0.055</td>
<td>97.564±0.407</td>
</tr>
<tr>
<td>FT6</td>
<td>348.6±0.824</td>
<td>4.85±0.115</td>
<td>4.126±0.055</td>
<td>0.79±0.015</td>
<td>99.044±0.817</td>
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<tr>
<td>FT7</td>
<td>349.15±0.815</td>
<td>4.73±0.115</td>
<td>4.912±0.057</td>
<td>0.66±0.010</td>
<td>98.424±0.116</td>
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<tr>
<td>FT8</td>
<td>350.04±0.889</td>
<td>4.80±0.200</td>
<td>4.355±0.100</td>
<td>0.79±0.010</td>
<td>96.172±0.677</td>
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<tr>
<td>FT9</td>
<td>349.12±0.748</td>
<td>4.55±0.208</td>
<td>4.245±0.057</td>
<td>0.75±0.057</td>
<td>99.741±0.612</td>
</tr>
</tbody>
</table>

# All the values are expressed as mean ± SD. (n=3).

<table>
<thead>
<tr>
<th>Formulations</th>
<th>Floating log time(sec)</th>
<th>Total floating time</th>
<th>Swelling index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT1</td>
<td>97±0.2</td>
<td>&gt;12hrs</td>
<td>40.22±0.01</td>
</tr>
<tr>
<td>FT2</td>
<td>104±0.1</td>
<td>&gt;12hrs</td>
<td>46.39±0.02</td>
</tr>
<tr>
<td>FT3</td>
<td>124±0.3</td>
<td>&gt;12hrs</td>
<td>45.11±0.01</td>
</tr>
<tr>
<td>FT4</td>
<td>51±0.2</td>
<td>&gt;12hrs</td>
<td>54.45±0.04</td>
</tr>
<tr>
<td>FT5</td>
<td>63±0.2</td>
<td>&gt;12hrs</td>
<td>61.78±0.01</td>
</tr>
<tr>
<td>FT6</td>
<td>82±0.1</td>
<td>&gt;12hrs</td>
<td>59.75±0.02</td>
</tr>
<tr>
<td>FT7</td>
<td>139±0.3</td>
<td>&gt;12hrs</td>
<td>51.42±0.01</td>
</tr>
<tr>
<td>FT8</td>
<td>155±0.1</td>
<td>&gt;12hrs</td>
<td>46.86±0.03</td>
</tr>
<tr>
<td>FT9</td>
<td>180±0.1</td>
<td>&gt;12hrs</td>
<td>57.10±0.02</td>
</tr>
</tbody>
</table>

# All the values are expressed as mean ± SD. (n=3).

<table>
<thead>
<tr>
<th>Time</th>
<th>% CDR</th>
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<tbody>
<tr>
<td></td>
<td>FT1±SD</td>
</tr>
<tr>
<td>1</td>
<td>11.42±0.438</td>
</tr>
<tr>
<td>2</td>
<td>17.34±0.305</td>
</tr>
<tr>
<td>3</td>
<td>21.39±0.133</td>
</tr>
<tr>
<td>4</td>
<td>29.21±0.219</td>
</tr>
<tr>
<td>5</td>
<td>35.65±0.217</td>
</tr>
<tr>
<td>6</td>
<td>39.02±0.278</td>
</tr>
<tr>
<td>7</td>
<td>48.52±0.218</td>
</tr>
<tr>
<td>8</td>
<td>55.19±0.267</td>
</tr>
<tr>
<td>9</td>
<td>61.67±0.183</td>
</tr>
<tr>
<td>10</td>
<td>69.23±0.218</td>
</tr>
<tr>
<td>11</td>
<td>77.17±0.182</td>
</tr>
<tr>
<td>12</td>
<td>83.96±0.182</td>
</tr>
</tbody>
</table>

# All the values are expressed as mean ± SD. (n=3).
Table 1.6: *In-vitro* drug release data of Balofloxacin floating tablets of Batch F7 to F9

<table>
<thead>
<tr>
<th>Time</th>
<th>FT7±SD</th>
<th>FT8±SD</th>
<th>FT9±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.31±0.352</td>
<td>9.44±0.172</td>
<td>8.11±0.455</td>
</tr>
<tr>
<td>2</td>
<td>17.98±0.266</td>
<td>12.34±0.328</td>
<td>13.41±0.412</td>
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<tr>
<td>3</td>
<td>25.64±0.352</td>
<td>19.62±0.220</td>
<td>18.55±0.353</td>
</tr>
<tr>
<td>4</td>
<td>31.10±0.393</td>
<td>24.42±0.306</td>
<td>22.83±0.307</td>
</tr>
<tr>
<td>5</td>
<td>37.18±0.315</td>
<td>28.38±0.399</td>
<td>26.31±0.532</td>
</tr>
<tr>
<td>6</td>
<td>43.81±0.353</td>
<td>32.08±0.347</td>
<td>34.93±0.534</td>
</tr>
<tr>
<td>7</td>
<td>55.54±0.348</td>
<td>38.32±0.394</td>
<td>40.27±0.332</td>
</tr>
<tr>
<td>8</td>
<td>60.69±0.308</td>
<td>45.91±0.353</td>
<td>49.32±0.367</td>
</tr>
<tr>
<td>9</td>
<td>69.24±0.352</td>
<td>56.44±0.308</td>
<td>57.45±0.355</td>
</tr>
<tr>
<td>10</td>
<td>78.81±0.306</td>
<td>70.15±0.351</td>
<td>65.66±0.397</td>
</tr>
<tr>
<td>11</td>
<td>83.67±0.353</td>
<td>85.23±0.308</td>
<td>76.21±0.315</td>
</tr>
<tr>
<td>12</td>
<td>96.79±0.414</td>
<td>92.82±0.306</td>
<td>88.63±0.423</td>
</tr>
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</table>

# All the values are expressed as mean ± SD. (n=3).

FIG. 1: *In Vitro* Dissolution Profile For Batches F1 – F3.

FIG. 2: *In Vitro* Dissolution Profile For Batches F4-F6.
FIG. 3: *In Vitro* Dissolution Profile For Batches F7-F9.

DRUG RELEASE KINETICS OF BALOFLOXACIN

FIG. 4: Zero order release kinetics

![Zero order release profile of Balofloxacin floating tablets of FT4.](image)

Fig: 4 Zero order release profile of Balofloxacin floating tablets of FT4.

FIG. 5: **FIRST ORDER RELEASE KINETICS DATA OF BALOFLOXACIN FLOATING TABLETS**

![First order release profile of Balofloxacin floating tablets of FT4.](image)

Fig: 5 First order release profile of Balofloxacin floating tablets of FT4.
FIG. 6: HIGUCHI RELEASE KINETICS DATA OF BALOFLOXACIN FLOATING TABLETS

![Higuchi Release Kinetics Profile of Balofloxacin Floating Tablets of FT4](image)

Fig: 6 Higuchi release kinetics profile of Balofloxacin floating tablets of FT4.

FIG. 7: PEPPAS RELEASE KINETICS DATA OF BALOFLOXACIN FLOATING TABLETS

![Peppas Release Kinetics Profile of Balofloxacin Floating Tablets of FT4](image)

Fig: 7 Peppas release kinetics profile of Balofloxacin floating tablets of FT4.

Table 1.7: Regression coefficients fit to different drug release kinetics models for Balofloxacin floating tablets.

<table>
<thead>
<tr>
<th>Formulation code</th>
<th>Zero order ( r^2 )</th>
<th>First order ( r^2 )</th>
<th>Higuchi ( r^2 )</th>
<th>Peppas ( r^2 )</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT4</td>
<td>0.989</td>
<td>0.819</td>
<td>0.954</td>
<td>0.717</td>
<td>0.786</td>
</tr>
</tbody>
</table>

Fig.8: *In-vitro* buoyancy studies of the Balofloxacin floating tablet.

At (97 sec)
Fig 8.1 *In-vitro buoyancy* studies of the Balofloxacin floating tablet using HPMC K4M (F1).

At (51 sec)

Fig. 8.2: *In-vitro buoyancy* studies of the Balofloxacin floating tablet using HPMC K100 (F4).

At (139 sec)

Fig 8.3 *In-vitro buoyancy* studies of the Balofloxacin floating tablet using HPMC K100 & Xanthan gum (F7).

REFERENCES


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