**COMPARISON OF DISSOLUTION OF TWO DIFFERENT MARKETED PRODUCTS/ BRANDS**

**AIM**

To determine the similarity factor for the various brands of Ofloxacin tablets by Moore and Flanner equation method by performing dissolution studies

**REQUIREMENTS**

Two different brands of tablets, Dissolution apparatus, test tubes, disposable syringes, UV visible spectrophotometer

**PRINCIPLE**

Dissolution (release of the drug from the dosage form) is of primary importance for all conventionally constructed, solid oral dosage forms in general, and for modified-release dosage forms in particular, and can be the rate limiting step for the absorption of drugs administered orally

1. Physicochemically, ‘‘Dissolution is the process by which a solid substance enters the solvent phase to yield a solution’’
2. Dissolution of the drug substance is a multi-step process involving heterogeneous reactions or interactions between the phases of the solute–solute and solvent–solvent phases and at the solute–solvent interface
3. The heterogeneous reactions that constitute the overall mass transfer process may be categorized as
   * Removal of the solute from the solid phase,
   * Accommodation of the solute in the liquid phase, and
   * Diffusive and/or convective transport of the solute away from the Solid/liquid interface into the bulk phase.

**THEORY**

The most common approach for the comparison of dissolution profiles is model-independent approach using the similarity factor f2.

The similarity factor is calculated according to the following algorithm:

**f2= 50×log {[1+ (1/n) Σ t=1n (Rt-Tt) 2] -0.5×100}**

where, f2 is the similarity factor,

n = the number of considered time intervals,

Rt= the arithmetic mean of dissolved API (% of label claim) from reference product at time interval t,

Tt= arithmetic mean of dissolved API (% of label claim) from test product at time interval t.

* f2 values of not less than 50 indicate the equivalence of the two dissolution profiles.

**PROCEDURE**

1. Ofloxacin tablets of 4 different brands were taken.
2. The branded drug which was considered to be the standard formulation was given the code ‘R’.
3. The remaining three brands of Ofloxacin tablets were considered as test samples and given the codes T1, T2, T3.
4. The dissolution studies of the all four branded Ofloxacin tablets were carried out at the prescribed conditions in the Indian pharmacopoeia 2007.
5. After the dissolution a study, the percent cumulative drug release into the dissolution medium was calculated from the calibration plot and dissolution profiles were drawn in graphs.
6. Then, based on the Moore and Flanner equation method, the similarity factors for the three test samples were calculated.
7. If the similarity factor is >50 -100, then that sample was considered to be having similar drug release pattern to that of reference sample (tablets).

**CALCULATIONS**

**Dissolution studies**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **Absorbance** | **concentration(μg/ml)** | **Amount of drug released (mg)** | **% Cumulative amount of drug released (R)** |
| 5 | 0.275 | 1.422 | 12.798 | 6.4 |
| 10 | 0.46 | 4.312 | 38.81 | 19.4 |
| 15 | 0.596 | 6.445 | 58 | 29 |
| 20 | 0.692 | 7.945 | 71.5 | 35.75 |
| 25 | 0.8 | 9.625 | 86.62 | 43.31 |
| 6 | 0.922 | 11.53 | 103.77 | 51.885 |

**Dissolution profile for the reference sample (r)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **absorbance** | **concentration(μg/ml)** | **Amount of drug released (mg)** | **% Cumulative amount of drug released (T1)** |
| 5 | 0.317 | 17 | 153 | 9.405 |
| 10 | 0.45 | 24.82 | 223.28 | 18.675 |
| 15 | 0.553 | 30.88 | 277.92 | 26.82 |
| 20 | 0.642 | 36.11 | 324.99 | 32.2 |
| 25 | 0..683 | 38.52 | 346.68 | 35.05 |
| 30 | 0.76 | 43.41 | 390.69 | 40.9 |

**Dissolution profile for the test sample (T1)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **absorbance** | **concentration(μg/ml)** | **Amount of drug released (mg)** | **% Cumulative amount of drug released (T2)** |
| 5 | 0.26 | 1.187 | 10.683 | 5.342 |
| 10 | 0.277 | 1.546 | 13.11 | 6.555 |
| 15 | 0.52 | 5.25 | 47.25 | 23.625 |
| 20 | 0.549 | 5.71 | 51.3 | 25.65 |
| 25 | 0.828 | 10.0625 | 90.562 | 45.281 |
| 30 | 0.11 (d2)\* | 1.156 | 104.04 | 52.02 |

**Dissolution profile for the test sample (T2)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **Absorbance**  **(d2)\*** | **concentration(μg/ml)** | **Amount of drug released (mg)** | **% Cumulative amount of drug released (T3)** |
| 5 | 0.194 | 0.156 | 14.04 | 7.02 |
| 10 | 0.162 | 0.343 | 30.87 | 15.435 |
| 15 | 0.246 | 0.975 | 87.75 | 43.12 |
| 20 | 0.109 | 1.172 | 105.48 | 52.74 |
| 25 | 0.106 | 1.212 | 109.08 | 54.54 |
| 30 | 0.105 | 1.234 | 111.06 | 55.53 |

**Dissolution profile for the test sample (T3)**

\*(d2) = dilution by hundred times; if no d2 mentioned it is diluted by 10 times from initial sample.

**SIMILARITY FACTOR BY MOORE AND FLANNER METHOD**

FORMULA

Similarity factor= f2= 50×log {[1+ (1/n) Σ t=1n (Rt-Tt) 2] -0.5×100}

Where, n= number of sampling intervals

Rt= %cumulative drug release of reference at that time,’t’,

Tt=%cumulative drug release of test sample at that time’t’,

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **Rt** | **T1** | **(Rt – Tt)** | **(Rt – Tt)2** |
| 5 | 6.4 | 9.405 | 3.005 | 9.03 |
| 10 | 19.4 | 18.675 | 0.725 | 0.525 |
| 15 | 29 | 26.82 | 2.18 | 4.752 |
| 20 | 35.75 | 32.2 | 3.55 | 12.602 |
| 25 | 43.31 | 35.05 | 8.26 | 68.228 |
| 30 | 51.885 | 40.9 | 10.985 | 120.67 |

**Similarity factor calculations between reference and test (T1)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **Rt** | **T2** | **(Rt – Tt)** | **(Rt – Tt)2** |
| 5 | 6.4 | 5.342 | 1.058 | 1.12 |
| 10 | 19.4 | 6.55 | 12.845 | 164.994 |
| 15 | 29 | 23.625 | 5.375 | 28.89 |
| 20 | 35.75 | 25.65 | 10.1 | 102.01 |
| 25 | 43.31 | 45.281 | 1.971 | 3,884 |
| 30 | 51.885 | 52.02 | 0.135 | 0.018 |

**Similarity factor calculations between reference and test (T2)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time (min)** | **Rt** | **T3** | **(Rt – Tt)** | **(Rt – Tt)2** |
| 5 | 6.4 | 1.702 | 0.62 | 0.384 |
| 10 | 19.4 | 15.435 | 3.965 | 15.72 |
| 15 | 29 | 43.125 | 14.125 | 199.52 |
| 20 | 35.75 | 52.74 | 16.99 | 288.66 |
| 25 | 43.31 | 54.54 | 11.23 | 126.113 |
| 30 | 51.885 | 55.53 | 3.645 | 13.286 |

**Simiarity factor calculations between reference and test (T3)**

**REPORT**

|  |  |  |
| --- | --- | --- |
| **Sample** | **Similarity factor (f2)** | **Similarity** |
| T1 |  |  |
| T2 |  |  |
| T3 |  |  |