FORMULATION AND EVALUATION OF SUSTAINED RELEASE MATRIX TABLETS OF GLIBENCLAMIDE

Kanika Nayak1*, A. K. Singhai2, Gourav K. Saraogi2, Sarvesh Sharma2, M. K. Mishra1

1Shambhunath Institute of Pharmacy, Jhalwa, Allahabad (UP), India.
2Laxmi Narayan College of Pharmacy, Bhopal (MP), India.

ABSTRACT
The present work is aimed to design, develop and evaluate sustained release matrix tablets of glibenclamide capable of delivering drug at nearly constant rate, suitable for once a day administration. Glibenclamide is an oral hypoglycaemic agent, which is a drug for the treatment of patients with Non-Insulin Dependent Diabetes Mellitus (NIDDM) and given in insulin resistance condition. The relatively small daily dose, short half life, undesirable side effects and rapid absorption from the GIT make GBD a good candidate for formulation in a sustained release dosage form. GBD was incorporated in 5 formulae containing hydroxypropylmethylcellulose (HPMC) as a matrix former in variable quantity. Microcrystalline Cellulose (MCC) was added to formulae in different amounts in order to disintegrate the tablets and magnesium stearate was added as a lubricant. Direct compression techniques was used to prepare the tablets. The physical properties were found to be satisfactory for all the formulae. Swelling behaviour of sustained release matrix tablets showed increase in % weight gain in phosphate buffer pH 7.4 due to increase in amount of hydrophilic polymer. In-vitro release study was performed by using USP type-2 dissolution apparatus. In-vitro release data showed that there is retardation of drug release with increase in amount of polymer. The drug release indicated that the release of drug predominately is a diffusion-controlled process through polymer matrix.

KEYWORDS: Diabetes mellitus, Glibenclamide, Sustained release, Extended release.

INTRODUCTION
Glibenclamide is a popular anti-diabetic drug, belonging to the class of sulfonylurea. The drug is widely used for treating type II diabetes. The most frequently reported side effects are...
Gastric disturbances like nausea, vomiting, anorexia and increased appetite after oral therapy. Since these drugs are usually intended to take for a long period, patient compliance is very important.\[1\]

The goal of any drug delivery system is to provide a therapeutic amount of drug to the proper site in the body, secondly to achieve promptly and then maintain the desired drug concentration for therapeutic benefits. The idealized objective points to the two aspects most important to the drug delivery namely, spatial placement and temporal delivery of drug. Spatial placement relates to the targeting of a drug to specific organ or tissue while temporal delivery refers to controlling the rate of drug delivery to target tissue. An appropriately designed sustained release drug delivery system can be a major advance towards solving these two problems.\[2\]

The aim of sustained delivery of drugs, in a general way is to modify the normal behaviour of drug molecule in physiological environment. It can lead to the following: -

1. Sustaining drug action at a predetermined rate by maintaining a relatively constant effective drug level in the body with concomitant minimization of undesirable side effects.
2. Localization of drug activity by spatial placement of a control release system adjacent to or within the diseased tissue or organ.
3. Targeting drug action by using specific carriers or chemical derivatives to deliver drugs to particular target cell type.

Some characteristics make a drug more suitable for extended release dosing, such as-

1. Elimination half-life between 2 to 8 hours.
2. Broader therapeutic index.
3. Moderate unit dose
4. Significant extent of absorption in GIT.
5. Optimum solubility characteristics.
6. Minimal first-pass clearance.\[3\]

The present work is aimed to design, develop and evaluate sustained release matrix tablets of glibenclamide capable of delivering drug at nearly constant rate. Suitable for once a day administration. Glibenclamide is an oral hypoglycaemic agent, which is a drug for the treatment of patients with Non-Insulin Dependent Diabetes Mellitus (NIDDM) and given in
insulin resistance condition. It is potent but slow acting, marked initial insulinameic action, may work when other drugs fail. Higher incidence of hypoglycaemia, single daily dose possible despite short half life. Using this system based on controlled and sustained release plasma half life can be maintained. The relatively small daily dose, short half life, undesirable side effects and rapid absorption from the GIT make GBD a good candidate for formulation in a sustained release dosage form.

MATERIALS AND METHODS

Materials: Glibenclamide was received as a gift sample from WILCURE REMEDIES Pvt. Ltd., Indore. All other chemicals like hydroxypropylmethyl cellulose, microcrystalline cellulose and magnesium stearate purchased were of analytical grade.

Formulation of powder blends for direct compression

The powder blends were prepared by taking required quantities of drug and polymer. They were mixed thoroughly. After that microcrystalline cellulose (MCC) was added as directly compressible filler, binder. Finally magnesium stearate was added as a lubricant. These powder blends were then passed through sieve no. 40 to break any lumps or aggregates. The formula are indicated in Table.1.

Preparation of sustained release matrix tablets of glibenclamide

The powder blends were compressed into tablets by direct compression technique on rotary tabletting machine. The compression force was optimized by proper adjustment of upper and lower punches. The tablets formed did not show any defects like capping or chipping. These tablets of each formulation type (F-1 to F-5) were evaluated for various properties such as thickness, diameter, weight variation, uniformity of drug content, hardness, and friability.

EVALUATION

Evaluation of powder blends

The various powder blends were evaluated for angle of repose, bulk density and compressibility index. The evaluation parameters for different powder blends is are given in Table.2

Evaluation of tablets

1. Appearance of Tablets

All tablets were inspected visually and found white colored, round shaped and biconvex.
2. Thickness
The thickness of the tablets was determined using Vernier calipers. Three tablets from each type of formulation were used and average values were calculated.

3. Weight variation test\(^7\)
To find out weight variation, 20 tablets of each type of formulation were weighed individually using an electronic balance, average weight was calculated and individual tablet weight was then compared with average value to find the deviation in weight.

4. Hardness
For each type of formulation the hardness values for 3 tablets were determined using Monsanto hardness tester.

5. Friability
For each type of formulation the friability was determined as follows-
Twenty tablets were weighed accurately and placed in Roche friabilator. The speed of rotation of Roche friabilator was kept 25 rpm for 4 min. The tablets were removed and then weighed. The percent friability was determined using following formula-

\[
\text{% Friability} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100
\]

Limits for friability = < 1% of their weight
Physical evaluation data for the compressed tablets is given in Table.3.

6. Uniformity of drug content
Five tablets of each type of formulation were weighed and crushed in mortar and 900 mg of this powder, which is equivalent to 30 mg of glibenclamide, was weighed accurately and dissolved in 100 ml phosphate buffer pH7.4. This was the stock solution from which 1ml sample was withdrawn and diluted to 10 ml with distilled water. The absorbance was measured at wavelength 226 nm using double beam UV-Visible spectrophotometer.

7. Swelling behaviour of controlled release matrix tablets:\(^8\)
The extent of swelling was measured in terms of % weight gain by the tablet. The swelling behavior of formulations F1, F2, F3, F4 and F5 were studied. One tablet from each formulation was kept in a Petri dish containing pH 7.4 phosphate buffer. At the end of 1 h, then for 2 h, the tablet was withdrawn, kept on tissue paper and weighed and the process was continued till the end of 12 h. The % weight gain by the tablet was calculated by formula.
S.I = \{(Mt-M0) / M0\} X 100

Where, S.I = swelling index, Mt = weight of tablet at time (t) and Mo = weight of tablet at time t = 0. Swelling Index of different formulations is given in Table.4. Swelling behavior of sustained release matrix tablets is represented in fig.1.

8. *In vitro* dissolution studies

**Standard Curve for Glibenclamide**[^9]

The standard curve for Glibenclamide was prepared in phosphate buffer pH 7.4. Stock solution of 100 μg/ml was prepared by dissolving accurately weighed quantity of 50mg Glibenclamide in 500 ml of phosphate buffer pH 7.4. Aliquots of 2,4,6,8,10,12,14,16,18 and 20ml were pipetted out separately into 100ml volumetric flask and made to volumes to get a concentration range of 2-20 μg/ml respectively. The absorbance was measured at 226 nm using Systronics U.V spectrophotometer-117. Data is shown in Table.5 and standard curve of glibenclamide is shown in fig.2.

**In vitro dissolution of sustained release matrix tablet**

The study was carried out using dissolution apparatus USP Type-II (paddle)

Dissolution Medium : Phosphate buffer pH 7.4, 900 ml.

Speed of Paddle : 50 rpm.

Temperature of Dissolution Medium : 37°C ±0.5°C.

Tablets were placed in the dissolution medium and apparatus was run. At intervals of 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 hours samples were withdrawn and replacement was made each time with 10ml of fresh dissolution medium maintained at the same temperature. Each 10 ml sample solution was filtered through Whatman filter paper No-41. One ml sample filtrate was diluted to 10ml with phosphate buffer pH 7.4. Drug concentration in the samples was determined from the standard calibration curve. Cumulative percent of drug dissolved was found out at each time point. The findings are compiled in Table.6 and compared in fig.3

9. Treatment of dissolution data with different models

The dissolution data for all the trial formulations using different polymers was fitted into various kinetic models for depicting the mechanism of release of drug from the matrix tablets. The values are shown in Table.7 and the data for formulations F1 to F5 is compared in fig.4, 6 and 6
RESULT AND DISCUSSION

Evaluation of powder blends
The blends of various formulations containing drug, polymer and other excipients were evaluated for angle of repose; LBD, TBD, and compressibility index. These IPQC parameters were evaluated for assessing the flow properties and the compressibility of blends.

Angle of repose and Compressibility Index
The values of angle of repose and compressibility index ranged from $20.00 \pm 0.06$ to $29.98 \pm 0.02$ and $12.12 \pm 0.01$ to $16.86 \pm 0.05$ respectively.

These values for angle of repose (<30) indicated good flow properties of blends and this was further supported by lower compressibility index values. Generally, compressibility index values up to 16 % result in good to excellent flow properties.

Loose bulk density (LBD) and tapped bulk density (TBD):
The values for LBD and TBD were found to range from $0.40 \pm 0.01$ to $0.74 \pm 0.01$ and $0.45 \pm 0.03$ to $0.89 \pm 0.02$ respectively. Bulk densities of blends were satisfactory. These values may further influence properties such as compressibility and tablet dissolution.

Preparation and evaluation of sustained release matrix tablets of Glibenclamide
The powder blends were compressed into tablets by direct compression technique on rotary tableting machine. The compression force was optimized by proper adjustment of upper and lower punches. The tablets formed did not show any defects like capping or chipping. These tablets of each formulation type (F-1 to F-6) were evaluated for various properties such as thickness, diameter, weight variation, uniformity of drug content, hardness, and friability.

Thickness
All tablets showed thickness values in the range of 4.15 to 4.35 mm.

Weight variation test
The pharmacopoeial limits for deviation for tablets of more than 250 mg are ±5%. The average percentage deviation for all tablet formulations was found to be within the specified limits and hence all formulations complied with the test for weight variation.
Uniformity of drug content
Good uniformity in drug content was found within and among the different types of tablet formulations. The values ranged from 95% to 105% of labeled amount.

Hardness and friability
The tablets showed hardness values ranging from 7 to 9 kg/cm². However these values alone cannot be considered as absolute indicator of their strength. Another measure of a tablet’s strength is friability. Conventional compressed tablets that lose less than 1% of their weight are generally considered acceptable. In present study, the friability values for all the tablet formulations were found to be <1%, indicating that the friability is within the prescribed limits.

Swelling index
The extent of swelling was measured in terms of % weight gain by the tablet. The swelling behavior of formulations F1, F2, F3, F4 and F5 were studied which was found 30%, 45%, 55%, 60% and 80% respectively. This increase in swelling index from formulation F1 to F5 shows that due to incorporation of hydrophilic polymer i.e. HPMC, tablet absorbs more amount of phosphate buffer pH 7.4.

In vitro dissolution studies for sustained release matrix tablets
The in vitro drug release results for tablets containing 1.7%w/w polymer concentration indicated that, the cumulative percent drug release for formulation F-1 was 22.56 during first hour. Also at the end of 8 hours, the cumulative percent drug release from the same was found 100.00.

The in vitro drug release results for tablets containing 3.3%w/w polymer concentration indicated that, the cumulative percent drug release for formulation F-2 was 12.03 during first hour. Also at the end of 8 hours, the cumulative percent drug release from the same was found 100.00.

The in vitro drug release results for tablets containing 7.0%w/w polymer concentration indicated that, the cumulative percent drug release for formulation F-3 was 7.70 during first hour. Also at the end of 8 hours, the cumulative percent drug release from the same was found 100.00.
The *in vitro* drug release results for tablets containing 13.3% w/w polymer concentration indicated that, the cumulative percent drug release for formulation F-4 was **7.58** during first hour. Also at the end of 8 hours, the cumulative percent drug release from the same was found **85.63**.

The *in vitro* drug release results for tablets containing 20% w/w polymer concentration indicated that, the cumulative percent drug release for formulation F-5 was **3.54** during first hour. Also at the end of 8 hours, the cumulative percent drug release from the same was found **83.72**.

Thus, some of the formulations have shown burst release effect in first hour. It may be due to fast release of drug from external layers initially. In later stages, due to penetration of more fluid, the viscous gel layer of hydrophilic polymer expanded considerably and acted as effective barrier for drug diffusion. Secondly, since the blends have incorporated increasing proportions of hydrophilic polymer i.e. HPMC (from F1- F-5), the rate was further found to be retarded. At the end of 8 hours, the mechanism of polymer erosion became predominant and allowed drug release by the process called ‘leaching’.

Thus, drug release retardation among trial formulations F-1-F-5 i.e. containing 1.7 to 20% w/w polymer blend was found to be in following order.

F-5 > F-4 > F-3 > F-2 > F-1.

Finally, dissolution data for all the trial formulations with different polymers was fitted into various kinetic models for depicting the mechanism of release of drug from the matrix tablets.

The best-fit models for various formulations were found as follows-

Formulations F2, F3, F5 and control tablets of glibenclamide showed Korsmeyer-Peppas as best fit model, while formulation F1 and F4 showed Higuchi’s matrix model as best fit model.

The Peppas model indicates that the probable mechanism for drug release is diffusion through polymer matrix coupled with polymer erosion, while the Higuchi matrix model for the drug release indicates that the release of drug predominately is a diffusion-controlled process through polymer matrix.
The method used for tablet formation was a simple direct compression of all powder ingredients. The compression forces were sufficient to form tablets.

Thus it can be concluded that, The control tablet formulation without polymer does not indicate retardation of drug release. All formulations showed retardation of drug release. The effect was more pronounced as the concentrations of polymers were increased. Thus the retardation was in order

20% > 13.9% > 7.0% > 3.3% > 1.7%.

**TABLES**

**Table.1 Composition of different formulation codes**

<table>
<thead>
<tr>
<th>Formulation code</th>
<th>Drug (mg)</th>
<th>HPMC (mg)</th>
<th>MCC (mg)</th>
<th>Magnesium Stearate (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>10</td>
<td>5</td>
<td>280</td>
<td>5</td>
</tr>
<tr>
<td>F2</td>
<td>10</td>
<td>10</td>
<td>275</td>
<td>5</td>
</tr>
<tr>
<td>F3</td>
<td>10</td>
<td>20</td>
<td>265</td>
<td>5</td>
</tr>
<tr>
<td>F4</td>
<td>10</td>
<td>40</td>
<td>245</td>
<td>5</td>
</tr>
<tr>
<td>F5</td>
<td>10</td>
<td>60</td>
<td>225</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table.2 Data for evaluation of powder blends**

<table>
<thead>
<tr>
<th>Formulation codes</th>
<th>Angle of Repose (θ)</th>
<th>Loose Bulk Density (LBD) (g/ml)</th>
<th>Tapped Bulk Density (TBD) (g/ml)</th>
<th>Carr’s Compressibility Index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>29.53±0.06</td>
<td>0.69±0.01</td>
<td>0.83±0.03</td>
<td>16.87±0.010</td>
</tr>
<tr>
<td>F2</td>
<td>20.03±0.06</td>
<td>0.74±0.01</td>
<td>0.89±0.02</td>
<td>16.86±0.017</td>
</tr>
<tr>
<td>F3</td>
<td>28.40±0.50</td>
<td>0.74±0.02</td>
<td>0.84±0.01</td>
<td>13.50±0.005</td>
</tr>
<tr>
<td>F4</td>
<td>27.53±0.06</td>
<td>0.40±0.01</td>
<td>0.45±0.03</td>
<td>12.12±0.005</td>
</tr>
<tr>
<td>F5</td>
<td>29.87±0.06</td>
<td>0.50±0.01</td>
<td>0.57±0.03</td>
<td>12.27±0.005</td>
</tr>
</tbody>
</table>

**Table.3 Physical evaluation data for the compressed tablets**

<table>
<thead>
<tr>
<th>Formulation codes</th>
<th>Thickness (mm)</th>
<th>Hardness (Kg/cm²)</th>
<th>Friability (%)</th>
<th>Uniformity of Drug Content (%)</th>
<th>Weight Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control tablet</td>
<td>4.30±0.006</td>
<td>7.0±0.00</td>
<td>0.60±0.006</td>
<td>97.92±0.08</td>
<td>Complies</td>
</tr>
<tr>
<td>F1</td>
<td>4.356±0.006</td>
<td>7.1±0.28</td>
<td>0.59±0.012</td>
<td>98.90±0.09</td>
<td>Complies</td>
</tr>
<tr>
<td>F2</td>
<td>4.236±0.011</td>
<td>7.6±0.57</td>
<td>0.34±0.019</td>
<td>97.40±0.30</td>
<td>Complies</td>
</tr>
<tr>
<td>F3</td>
<td>4.15±0.008</td>
<td>8.1±0.28</td>
<td>0.47±0.014</td>
<td>99.21±0.35</td>
<td>Complies</td>
</tr>
<tr>
<td>F4</td>
<td>4.19±0.029</td>
<td>8.0±0.01</td>
<td>0.40±0.020</td>
<td>102.1±0.29</td>
<td>Complies</td>
</tr>
<tr>
<td>F5</td>
<td>4.34±0.003</td>
<td>8.5±0.12</td>
<td>0.13±0.011</td>
<td>99.89±0.32</td>
<td>Complies</td>
</tr>
</tbody>
</table>
Table 4: Swelling Index of different formulations

<table>
<thead>
<tr>
<th>Time (Hrs)</th>
<th>Swelling Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-1</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 5: Standard curve of glibenclamide in Phosphate buffer pH 7.4 at 226 nm

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Concentration (μg/ml)</th>
<th>Absorbance</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0.1620</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>0.2662</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>0.3249</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>0.4094</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>0.5090</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>0.6199</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>0.7163</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>0.7907</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>0.8765</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>0.9687</td>
<td></td>
</tr>
</tbody>
</table>

Correlation coefficient $r^2 = 0.997$
Slope = 0.045
Intercept = 0.067
Straight line equation: $y = 0.045x + 0.067$

Table 6: Dissolution data of sustained release matrix tablets

<table>
<thead>
<tr>
<th>Time (Hrs)</th>
<th>Cumulative Percent Drug Release</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F-1</td>
</tr>
<tr>
<td>1</td>
<td>22.561</td>
</tr>
<tr>
<td>2</td>
<td>53.095</td>
</tr>
<tr>
<td>4</td>
<td>72.278</td>
</tr>
<tr>
<td>6</td>
<td>98.277</td>
</tr>
<tr>
<td>8</td>
<td>100.00</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
</tr>
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</table>

Table 7: Kinetic treatment to dissolution data of different formulation codes

<table>
<thead>
<tr>
<th>Release mechanism</th>
<th>Value</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero order</td>
<td>$R^2$</td>
<td>0.917</td>
<td>0.974</td>
<td>0.964</td>
<td>0.906</td>
<td>0.994</td>
</tr>
<tr>
<td></td>
<td>Slope</td>
<td>39.23</td>
<td>27.97</td>
<td>13.33</td>
<td>7.918</td>
<td>-15.62</td>
</tr>
<tr>
<td>First order</td>
<td>$R^2$</td>
<td>0.852</td>
<td>0.921</td>
<td>0.919</td>
<td>0.838</td>
<td>0.812</td>
</tr>
<tr>
<td></td>
<td>Slope</td>
<td>2.105</td>
<td>2.358</td>
<td>2.473</td>
<td>2.519</td>
<td>2.701</td>
</tr>
<tr>
<td>Higuchi</td>
<td>$R^2$</td>
<td>0.946</td>
<td>0.985</td>
<td>0.969</td>
<td>0.953</td>
<td>0.983</td>
</tr>
<tr>
<td></td>
<td>Slope</td>
<td>2.896</td>
<td>-12.32</td>
<td>-34.89</td>
<td>-42.83</td>
<td>-72.83</td>
</tr>
<tr>
<td>Korsmeyer-Peppas</td>
<td>$R^2$</td>
<td>0.966</td>
<td>0.989</td>
<td>0.979</td>
<td>0.898</td>
<td>0.995</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>0.489</td>
<td>0.590</td>
<td>0.783</td>
<td>1.132</td>
<td>1.53</td>
</tr>
</tbody>
</table>
FIGURES

![Swelling Index of Formulations F1 to F5](image1)

Fig. 1. Comparative swelling index of formulation F1 to F5

![Standard Curve of Glibenclamide](image2)

Fig. 2. Standard curve of glibenclamide in phosphate buffer pH 7.4 at 226 nm

![Zero Order Release of Formulations F1 to F5](image3)

Fig. 3. Comparative zero order release of formulation F1 to F5
SUMMARY AND CONCLUSION

An ideal dosage regimen in the drug therapy of any disease is one, which immediately attains the desired therapeutic concentration of drug in plasma (or at the site of action) and maintains
it constant for the entire duration of treatment. This is possible through administration of conventional dosage form in a particular dose and at a particular frequency. But as reported in literature conventional drug delivery has its own limitations, which switch over the formulator to developed new formulation. This overcomes the drawbacks associated with conventional dosage drug delivery system. The past decade has seen major advances in developing a drug through concept and technique of controlled and targeted drug delivery system.

Therefore an ideal controlled drug delivery system is the one, which delivers the drug at a predominant rate, locally or systemically, for a specific period of time. Despite of number of approaches to deliver a drug in systemic circulation at predetermined rate and maintain clinically effective concentration over prolong period of time. Sustained release indicates an initial release of drug sufficient to provide a therapeutic dose soon after administration, and then a gradual release over an extended period.

From the literature survey of clinical pharmacokinetic and pharmacodynamic evaluation of sustained release matrix drug delivery systems of glibenclamide, it was intended that the side effects of the glibenclamide can be overcome by delivering glibenclamide in the form of sustained release tablet. It was desired to design a sustained release tablet using polymeric matrix. This allows one to control the overall release of drug via an appropriate choice of polymers.

Sustained release matrix tablets were prepared by direct compression method by using appropriate ratio of HPMC as a rate controlling polymer.

Powder blends of different formulations were prepared and characterized for their flowing properties. The powder blends of all formulations having good flowing properties.

In the present study a total of 5 formulations of sustained release matrix tablets were formulated and subjected to different in-vitro evaluation parameters such as appearance, thickness, hardness, friability, drug content.

Results revealed that prepared formulations showed good physical characteristics and no drug-polymer interaction.
Swelling behaviour of sustained release matrix tablets showed increase in % weight gain in phosphate buffer Ph 7.4 due to increase in amount of hydrophilic polymer.

*In-vitro* release study was performed by using USP type-2 dissolution apparatus in 900 ml of phosphate buffer pH 7.4 at 50 rpm and 37 ± 0.5°C.

*In-vitro* release data showed that there is retardation of drug release with increase in amount of polymer.

Thus, drug release retardation among trial formulations F-1-F-5 was found to be in following order.

F-5 > F-4 > F-3 > F-2 > F-1.

Finally, dissolution data for all the trial formulations with different polymers was fitted into various kinetic models for depicting the mechanism of release of drug from the matrix tablets.

The best-fit models for various formulations were found as follows-

Formulations F2, F3, F5 and control tablets of glibenclamide showed Korsmeyer- Peppas as best fit model, while formulation F1 and F4 showed Higuchi’s matrix model as best fit model.

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