INTRODUCTION
Diazepam orodispersible tablets were prepared to achieve quick onset of action and for maximum bioavailability. The purpose of the present research was to compare the effect of different superdisintegrants on the mouth dissolving property of diazepam tablets. Orodispersible tablets of diazepam were prepared using chitosan, sodium carboxy methyl cellulose, alginic acid, crospovidone and sodium starch glycollate as superdisintegrants by direct compression technique. Prepared tablets were evaluated for weight variation, hardness, friability, content uniformity, wetting time, in vitro dispersion time, in vitro disintegration time and dissolution studies. Disintegration time from all the prepared formulation was found to be in following order: F2<F5<F1<F4<F3. Disintegration time was found to be rapid in F2 formulation. The in vitro dissolution time was found to be 99.91% in 10 minutes for the formulation F2. Crospovidone showed faster disintegration of tablets among all other superdisintegrants.

KEY-WORDS: Diazepam, orodispersible tablet, direct compression, crospovidone, superdisintegrants

MATERIALS AND METHODS

Materials
Diazepam was received as a gift sample from Ronak Pharmaceuticals pvt Ltd., Patan. Chitosan, magnesium stearate, talc, orange flavour, sodium carboxy methyl cellulose (sodium CMC), alginic acid, micro crystalline cellulose (MCC), crospovidone and sodium starch glycollate (SSG) were purchased from Central Drug House (P) Ltd., New Delhi.

METHOD

Tablets were prepared by direct compression technique. The composition orodispersible tablet of Diazepam was shown in Table 1. Weighed quantities of Diazepam along with appropriate concentrations of superdisintegrants along with excipients were weighed and mixed in geometric progression in a dry and clean mortar. Then the blend was passed through sieve no 60 for direct compression. The powder blend for direct compression was then compressed into tablets using 8 mm convex faced punches in a 10 Station Rotary Tablet Machine. These Fabricated tablets were evaluated.

EVALUATION

Weight variation test

20 tablets were selected at random, individually weighed and the average weight was calculated. None of the tablets deviated from the average weight by more than ±7.5%.

Hardness test

Tablets require a certain amount of strength or hardness and resistance to friability to with stand mechanical shocks. The hardness of tablet was measured by Monsanto hardness tester.

Friability

Twenty tablets were weighed and placed in a Roche friabilator and the equipment was rotated at 25 rpm for 4 min. The tablets were taken out, dedusted, and reweighed. The percentage friability of the tablets was calculated by

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

Content uniformity

The content of diazepam was determined according to the method described by BP for diazepam tablets. In brief, 1 ml of water was added to one diazepam tablet, stood for 15 min, then 80 ml of a 0.5% (w/v) solution of sulfuric acid in methanol. The obtained solution was stirred for 15 min and
In vitro dissolution studies were performed using type II
In Vitro
In vitro dispersion time was measured by dropping a tablet in
A piece of tissue paper folded twice was placed in a small
Wetting time
Formulations were prepared by direct compression
Dissolution Studies
Cumulative drug release from all the prepared formulation
time
found to be in range of
fast dissolving tablet.
disintegration time indicating suitability of formulation fo
but all formulated batches have shown very low
standards the dispersible tablet must disintegrate within 3 min
limits.
0.65
formulations were found in the range of
the formulated tablets. Content uniformity in all the
range of 3.2 to 3.6 kg/cm
±
formulations evaluated for variation in weight a
variation in drug content,
RESULTS
released was determined using standard curve. Dissolution
filtered solution was measured by U
was withdrawn at specific time intervals. Absorption of
0.5
37
°
phosphat
T
the disintegration time of the tablets was determined as per
Indian Pharmacopoeia monograph. The time required for
disintegration of six tablets from each batch placed in each
tube of disintegration test apparatus were measured at 37±0.5°C using 900 ml of distilled water. The time required to
obtain complete disintegration of all the six tablets was
noted.

Dissolution Studies
In vitro dissolution studies were performed using type II
(paddle) dissolution apparatus at 100 rpm, and 900 ml of
phosphate buffer (pH 6.8) was used as a dissolution medium.
Temperature of dissolution medium was maintained at
37±0.5°C. Five milliliters aliquot of the dissolution medium
was withdrawn at specific time intervals. Absorption of
filtered solution was measured by UV–visible spectrophotometer at 275 nm, and the percent of drug
released was determined using standard curve. Dissolution
rate was studied for the prepared formulations.

RESULTS
Formulations were prepared by direct compression
techniques using different disintegrating agents are shown in
Table 1. Parameters like weight variation, hardness, friability,
drug content, wetting time, in vitro dispersion time and in
vitro disintegration are mentioned in Table 2. All
formulations evaluated for variation in weight and results
indicated that for all formulations exhibit very low weight
variation which lies within the pharmacopoeia limits i.e. ±
7.5%. The tablets measured hardness was found to be in the
range of 3.2 to 3.6 kg/cm². The percentage friability was less
than 1% for all formulation ensuring mechanical stability of
the formulated tablets. Content uniformity in all the
formulations were found in the range of 9.61 ± 0.33 to 9.94 ±
0.65 indicating the compliance with the pharmacopoeia
limits. In Vitro disintegration time was found to be in range of
18 to 31 second. According to the pharmacopoeia standards the dispersible tablet must disintegrate within 3 min
but all formulated batches have shown very low
disintegration time indicating suitability of formulation for
fast dissolving tablet. Disintegration time from all the
prepared formulation was found to be in following order:
F2>F5>F1>F4>F3. Disintegration time of various
formulations is mentioned in Figure 1. Wetting time was
found to be in range of 24 to 36 second. In vitro dispersion
time was found to be in range of 21 to 36 second. %
Cumulative drug release from all the prepared formulation
was found to be in following order: F2>F1>F3>F5>F4. %
Cumulative drug release from F1, F2 and F5 formulations
were found to be in 10 minute and from F3 and F5
formulations were found to be in 12 minutes. Formulation F2
shows fast disintegration and high % Cumulative drug
release.

DISCUSSION
Different formulations were prepared using 10%
superdisintegrant like chitosan, sodium carboxy methyl
 cellulose, alginic acid, crospovidone and sodium starch
glycollate. The tablets prepared by direct compression
technique were found to have adequate hardness, friability,
content uniformity, wetting time and in vitro dispersion time.
Prepared tablets disintegrate within few seconds without need
of water; thereby enhance absorption resulting in increased
bioavailability and increased patient compliance. Among all
the superdisintegrant crospovidone showed maximum effect
of disintigration. Effect of superdisintegrant from all the
prepared formulation was found to be in following order:
Crospovidone>SSG>Sodium CMC>Chitosan>Alginic acid.
The formulated tablet F2 showed fast disintegration and in
vitro dissolution. Therefore these tablets which possess rapid
disintegration may be useful for pediatric and geriatric
population.

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Table 1: Composition of orodispersible tablets of Diazepam

<table>
<thead>
<tr>
<th>BATCH CORD</th>
<th>INGREDIENT (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diazepam</td>
</tr>
<tr>
<td>F1</td>
<td>10</td>
</tr>
<tr>
<td>F2</td>
<td>10</td>
</tr>
<tr>
<td>F3</td>
<td>10</td>
</tr>
<tr>
<td>F4</td>
<td>10</td>
</tr>
<tr>
<td>F5</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2: Evaluation of Diazepam orodispersible tablets

<table>
<thead>
<tr>
<th>TESTS</th>
<th>BATCH CORD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
</tr>
<tr>
<td>Weight variation (mg)</td>
<td>Pass</td>
</tr>
<tr>
<td>Hardness kg/cm²</td>
<td>3.3</td>
</tr>
<tr>
<td>% Friability</td>
<td>0.49</td>
</tr>
<tr>
<td>Content uniformity (mg)</td>
<td>9.74 ± 0.43</td>
</tr>
<tr>
<td>Wetting time (second)</td>
<td>29</td>
</tr>
<tr>
<td>In Vitro dispersion time (second)</td>
<td>28</td>
</tr>
<tr>
<td>In Vitro Disintegration Time</td>
<td>24</td>
</tr>
</tbody>
</table>

Table 3: In vitro dissolution studies of orodispersible tablets of Diazepam

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>%Cumulative drug release</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
</tr>
<tr>
<td>2</td>
<td>54.34 ± 0.87</td>
</tr>
<tr>
<td>4</td>
<td>63.76 ± 0.46</td>
</tr>
<tr>
<td>6</td>
<td>78.65 ± 0.29</td>
</tr>
<tr>
<td>8</td>
<td>95.96 ± 0.84</td>
</tr>
<tr>
<td>10</td>
<td>98.87 ± 0.35</td>
</tr>
<tr>
<td>12</td>
<td>-</td>
</tr>
</tbody>
</table>
Figure 1: In vitro disintegration profile of F1 to F5.

Figure 2: In vitro release profile for F1 to F5.

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