FORMULATION AND EVALUATION OF FAST DISSOLVING METRONIDAZOLE TABLET

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ABSTRACT

The oral estimation structures are the most common system for taking medication despite having a couple weights like moderate maintenance and along these lines onset of movement is drag out. This can be overcome by administrating the prescription in liquid from in the mean time, various APIs have compelled level of dauntlessness in liquid structure. In this way, Effervescent Tablets goes about as a choice estimations structure. The present work is taking into record the arrangement of gurgling granules of metronidazole ie F1 to F4. Four arrangements were prepared using particular, diluents and superdisintegrants by the wet granulation procedure. The prepared tablets of all the formulations were evaluated for precompression parameters like angle of repose, bulk density, tapped density and compressibility index and physical characters like tablet hardness, friability, weight variation, buoyancy lag time. The formulations showed good flow property and Carr’s index. Angle of repose ranged from 30±1.02° to 34±2.39°, Carr’s index ranged from 4.0±0.62 to 6.25±1.12 and the Hausner ratio ranged from 1.0±1.14 to 1.06±2.29. The state of tablets of all definitions stayed white, smooth, curved confronted round with no unmistakable splits. The thickness of tablets was extended between 2.44±2.11mm to 3.56±1.56mm separately. The hardness of the tablets found in between 5.2±1.29to 6.4±1.34kg/cm². The friability was discovered to be 4.34±1.07 % to 6.38±1.91%, which is a sign of palatable mechanical resistance of the tablets. The medication content estimations demonstrated values in the scope of 95.8% to 99.2% which reflects great consistency in medication content among distinctive definitions. Every one of the tablets breezed through weight variant test as the % weight variant was 8.11±0.76 to 9.86±1.54mg and effervescent time shown 6±2.13 to 10±1.45 second. Out of that we wear optimized formulation was F2.

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INTRODUCTION

The oral estimation structures are the most well known strategy for taking pharmaceutical despite having a couple of disadvantages like moderate maintenance and along these lines onset of action is drag out. This can be overcome by administrating the solution in liquid from on the other hand, various APIs have obliged level of robustness in liquid structure. Thusly, Effervescent Tablets goes about as a choice measurement structure. Starting late, fast dissolving medicine movement structure have started grabbing notoriety and affirmation as new solution transport system, in light of the way that they are definitely not hard to manage and lead to better consistence. Normally, elderly people experience inconvenience in swallowing the tablet. Frothing tablets are uncoated that all things considered contain destructive substances and carbonates or bicarbonates and which react rapidly in the region of water by releasing carbon dioxide. They are proposed to be separated or scattered in water before use. Gurgling structures as tablets are typifying a supportive pros, pulverizing administrators, and a frothing system which crumble rapidly in water to yield a fast dissolving containing a completely separated therapeutic authorities and a method for their status. The tablet is incorporated into a glass of water just before association and the drug game plan or scrambling is to be tanked speedily. The tablet is instantly broken isolated by internal opportunity of CO$_2$ in water in view of association between tartaric destructive and citrus extricate with salt metal carbonates or bicarbonates in region of water. Due to opportunity in CO$_2$ gas, the crumbling of API in water furthermore taste veiling effect is made strides. The upsides of frothing tablets differentiated and other oral estimation structures fuses an open entryway for formulator to improve taste, a more sensitive action on understanding's stomach and publicizing perspectives. Metronidazole is a nitroimidazole against microbial pharmaceutical used particularly for anaerobic small life outlines and protozoa [1-4].

MATERIALS AND METHODS

Metronidazole was a gift sample from Hetero Drug, Hyderabad. Sodium carbonate, citric acid, camphor, crosspovidone, sodium bicarbonate and other excipients were procured from RFCL limited A-3 Okla. new Delhi.

Experimental/ Methodology

Measured amounts of fixings were triturated to fine powder independently in a mortar and pestle and went through strainer no.40. The sedate alongside, citrus extract, sodium carbonate, camphor and crosspovidone are consistently blended to which supreme liquor is added to shape a sound mass. The weight mass was gone through sifter no #16 and wet granules were passed and dried at temperature of 40$^\circ$C for 60min. the dried granules were gone through sifter no 18 and mixed with obliged measure of sodium bicarbonate and talc are included and compacted into tablet of pre decided rate utilizing pressure machine (table 1). [5-9].

Table 1: Formulation of floating effervescent tablet of metronidazole.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>F1(mg)</th>
<th>F2(mg)</th>
<th>F3(mg)</th>
<th>F4(mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metronidazole</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Citric acid</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Sodium bicarbonate</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Sodium carbonate</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Cross povidone</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Camphor</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Total weight</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

EVALUATION OF FLOATING DRUG DELIVERY SYSTEM

Different parameters that should be assessed in gastro retentive definition drifting bubbling tablet incorporate precompression assessment like stream properties, mass thickness, tapped thickness, Hauser proportion, and Carr's record. Post pressure assessment coating slack time, gliding length of time, swelling record and disintegration profiles, by and large performed in recreated gastric liquids at 37$^\circ$C. [5]

Precompression evaluation

Angle of Repose

Edge of rest is controlled by utilizing channel technique; the precisely measured circles are taken in pipe. The stature of channel is balanced in such a path, to the point that the tip of pipe just touches the zenith of store of mixes. The mixes are then permitted to move through pipe unreservedly on to surface. The distance across of powder cone was measured; point of rest is figured by utilizing after mathematical statement. [5]

\[ \theta = \tan^{-1} \left( \frac{h}{r} \right) \]

Where, h, r and \( \theta \) are the stature, sweep and edge of rest of the powder heap

Mass Density and Tapped Density

Precisely weighed of the example was exchanged to the measuring barrel of mass thickness mechanical assembly and noticed the volume as mass volume. The mechanical assembly was balanced for 100 tapping and noticed the last volume as tapped volume.[6]

\[ \text{Mass thickness} = \frac{\text{mass of powder}}{\text{mass volume (Vb)}} \]

\[ \text{Tapped density} = \frac{\text{mass of powder}}{\text{tapped volume (V) x 100}} \]
Carr's file:
The Carr's file of the powder was controlled by utilizing equation: [6]
Carr's file (%) = \[\frac{(TBD - LBD) \times 100}{TBD}\]
Where, TBD is the aggregate mass thickness and LBD is the free mass thickness

Hausner's Ratio
The Hausner's proportion and Carr's list are measures of the stream properties of powders. A Hausner's proportion of <1.25indicates a powder that is free streaming while >1.25 demonstrates poor stream capacity. [6]

Hausner's proportion = tapped thickness/Bulk thickness

Post pressure assessment[5-9]
The drifting conduct was assessed with resultant weight estimation. The investigation was done in two distinctive media, deionised water and reenacted feast, with a specific end goal to screen conceivable contrast. The mechanical assembly and its component are clarified prior in this article. The outcomes demonstrated that higher atomic weight polymers with slower rate of hydration had upgraded skimming conduct and it was watched all the more in reproduced dinner medium contrasted with deionized water. [5]

Weight Variation Test [6]
Twenty tablets were arbitrarily chosen from every group and separately weighed. The normal weight and standard deviation of 20 tablets was ascertained.

Hardness [6]
The hardness of the center tablets and covered tables were measured utilizing the Pfizer hardenessanalyzer. Six tablets from every definition were haphazardly chosen and utilized. The normal hardness and the standard deviation were computed. It is communicated in Kg/cm².

Thickness [6]
Thickness of the center tablets and covered tablets were measured by utilizing screw gage. Ten tablets from every definition were haphazardly chosen and utilized. Thickness is communicated in millimeters.

Friability test [6]
Twenty tablets were weight and put in the Electro lab friabilator and device was turned at 25 rpm for 4 min. After upheaval the tablets were de-cleaned and weight. Rate friability was figured from the misfortune in weight as given in mathematical statement as underneath. The weight reduction ought not to be more than 1%.

\[\text{Friability} = \frac{\text{Initial weight} - \text{last weight}}{\text{basic weight}} \times 100\]

Estimation of Floating Capacity [5]
Three individual tablets are put in individual flagon containing 400ml of 0.1(N) HCL arrangements. At that point the time in minutes for every tablets to go from the base to the highest point of the jar (drifting slack time) and the time for which tablets continually skim on the water surface (term of skimming) are measured. The specimen mean and standard deviation are then ascertained.

RESULTS AND DISCUSSION
Precompression parameters of Metronidazole granules:
The prepared tablets of all the formulations were evaluated for precompression parameters like angle of repose, bulk density, tapped density and compressibilityindex and physical characters like tablet hardness, friability, weight variation, buoyancy lag time. The formulations showed good flow property and Carr’sindex (Table no 2). Angle of repose ranged from 30±1.02° to 34±2.39°, it indicated that flow property was not good but we add tale to improve of flowing of granule from hopper to die cavity , Carr’s index ranged from 4.0±0.62 to 6.25±1.12 and the Hausner ratio ranged from 1.0±1.14 to 1.06±2.29.

Post pressure parameters of Metronidazole tablets
The state of tablets of all definitions stayed white, smooth, curved confronted round with no unmistakable splits. The thickness of tablets was measured by vernier calipers and was extended between 2.44±2.11mm to 3.56±1.56mm separately. The hardness of the tablets was measured by Monsanto analyzer (Thermo Lab, Mumbai, India) and was in between 5.2±1.29 to 6.4±1.34kg/cm². The friability was measured by friabilator (Roche friabilator) and was discovered to be 4.34±1.07 % to 6.38±1.91%, which is a sign of palatable mechanical resistance of the tablets. The medication content estimations demonstrated values in the scope of 95.8% to 99.2% which reflects great consistency in medication content among distinctive definitions. Every one of the tablets breezed through weight variety test as the % weight variety was 8.11±0.76 to 9.86±1.54mg inside Pharmacopoeial cutoff and effervescent time shown 6±2.13 to 10±1.45 second (table no 3).
Table 2: Precompression flow properties of metronidazole granules.

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Angle of repose</th>
<th>Carr’s Index</th>
<th>Hauser’s Ratio</th>
<th>Flow property</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>30±1.02</td>
<td>4.0±0.62</td>
<td>1.0±1.14</td>
<td>Good</td>
</tr>
<tr>
<td>F2</td>
<td>32±0.56</td>
<td>4.25±3.21</td>
<td>1.04±0.52</td>
<td>Passable</td>
</tr>
<tr>
<td>F3</td>
<td>34±1.23</td>
<td>6.25±1.12</td>
<td>1.06±2.29</td>
<td>Passable</td>
</tr>
<tr>
<td>F4</td>
<td>34±2.39</td>
<td>3.42±1.40</td>
<td>1.03±1.31</td>
<td>Passable</td>
</tr>
</tbody>
</table>

n=3

Table 3: Post compression properties of Metronidazole floating tablets.

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Thickness (mm)</th>
<th>Hardness (Kg/cm²)</th>
<th>Friability (%)</th>
<th>Effervescence Time (Sec)</th>
<th>Weight variation (mg)</th>
<th>Drug Content %</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>3.32±1.39</td>
<td>5.8±0.67</td>
<td>4.34±1.07</td>
<td>10±1.45</td>
<td>8.36±1.32</td>
<td>95</td>
</tr>
<tr>
<td>F2</td>
<td>2.44±2.11</td>
<td>5.6±0.59</td>
<td>6.38±1.91</td>
<td>8±0.63</td>
<td>9.86±1.54</td>
<td>98</td>
</tr>
<tr>
<td>F3</td>
<td>3.30±0.52</td>
<td>6.4±1.34</td>
<td>6.12±0.96</td>
<td>8.5±1.36</td>
<td>8.11±0.76</td>
<td>96</td>
</tr>
<tr>
<td>F4</td>
<td>3.56±1.56</td>
<td>5.2±1.29</td>
<td>6.25±1.15</td>
<td>6±2.13</td>
<td>8.63±1.43</td>
<td>99</td>
</tr>
</tbody>
</table>

n=3

CONCLUSION
The definition of Floating Effervescent tablet of metronidazole had been arranged by wet granulation methodology with an objective to keep the manifestations like gastric ulcer of normal standard tablets of tablet of metronidazole. The orchestrated frothing definition was thought to see very much arranged in the occasion of swallow limit and show better medicinal effect as a result of speedy release appeared differently in relation to the publicized tablets of tablet of metronidazole. The present work is taking into account the detailing of foaming granules of metronidazole ie F1 to F4. Four plans were readied utilizing distinctive, diluents and super disintegrates by the wet granulation system. The readied granules were assessed for stream property (like edge of rest, mass thickness, tapped thickness and Hausner's proportion), Effervescence time. The planned foaming granules displayed fabulous stream properties and mass thickness suitable for unit measurements. The low dampness substance of the details upheld the soundness of the plans. Every one of the details displayed foam time under 10 sec. out of that we got best formulation was F2

Authors’ Statements

Competing Interests
The authors declare no conflict of interest.
REFERENCES


