Development Of Polyherbal Haematinic Capsules And Its Preformulation Studies

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Abstract: Herbs are famous for their inherent quality. By which it is understood that, those using herbal products are gifted with its curative effects only and are not probably affected by any side effects or so called adverse effects. This proves to be the reason for choosing a polyherbal capsule formulation for treating anaemia. The present study was aimed at developing a capsule formulation from the ethanolic extracts of six famous plants. The extracts were freeze dried and powdered. Preformulation studies were performed. The parameters like Angle of repose, Tapped density, Bulk Density, Hausner’s ratio were determined. The flow properties of powders play an important role when it comes to the solid dosage forms. There are standard values for the different parameters above mentioned. Hence the practically observed experimental values are compared with them. The plants chosen include Murraya koenigii, Moringa oleifera, Phyllanthus embelica, Boerhavvia diffusa, Eclipta prostrate, Tinospora cordifolia. They were selected based on the ethanomedicinal uses, their traditional importance, surplus availability.

Keywords: Herbs, inherent, polyherbal, capsules, anaemia, Ethanolic extracts, Freeze dried, preformulation studies.

I. INTRODUCTION

Leading a healthy life is very vital for every human. This gets disturbed, when the normal state of being is affected. One such disease, that is prevalent in many, irrespective of age (younger/adults/older) is anaemia. Having many inbuilt metabolism to deal with blood and blood loss i.e the menstrual cycle and pregnancy, female are most commonly affected by anemia. Many synthetic formulation are available in market but the some common side effects of them are as follows: epigastric pain ,heart burn, nausea, vomiting, bloating, staining of teeth, metallic taste , constipation, but herbs have none of the above the side effect. This gave me an urge to work under this topic. The herbal medicines gain their popularity due to the absence of side effects. Thus, when many potent herbs are combined in a poly herbal formulation, its gives an added advantage and higher confidence to the patient, that he/ she get cured!

II. MATERIALS AND METHODS

MATERIALS USED

<table>
<thead>
<tr>
<th>S.no</th>
<th>Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Poly herbal plant extract</td>
</tr>
<tr>
<td>2.</td>
<td>Excipients</td>
</tr>
</tbody>
</table>
Magnesium oxide
Calcium Carbonate

<table>
<thead>
<tr>
<th>Common name</th>
<th>Botanical name</th>
<th>Family</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curry leaf</td>
<td>Murraya koenigii</td>
<td>Rutaceae</td>
<td>Leaves</td>
</tr>
<tr>
<td>Drum stick</td>
<td>Moringa oleifera</td>
<td>Moringaceae</td>
<td>Leaves</td>
</tr>
<tr>
<td>Amla</td>
<td>Phyllanthus embelica</td>
<td>Euphorbiaceae</td>
<td>Fruit pulp</td>
</tr>
<tr>
<td>Punarnava</td>
<td>Boerhavia diffusa</td>
<td>Nyctaginaceae</td>
<td>Roots</td>
</tr>
<tr>
<td>Bhringraj</td>
<td>Eclipta prostrata</td>
<td>Asteraceae</td>
<td>Leaves</td>
</tr>
<tr>
<td>Guduchi</td>
<td>Tinospora cordifolia</td>
<td>Menispermaceae</td>
<td>Stem</td>
</tr>
</tbody>
</table>

**Table 1: Materials required**

**Table 2: Plants used in the Polyherbal plant extract**

**COLLECTION OF THE CRUDE DRUGS**

The crude drugs were collected from the following places in the month of June-July, 2016.

<table>
<thead>
<tr>
<th>Name of the plant</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murraya koenigii</td>
<td>Nagapattinam, Tamil Nadu</td>
</tr>
<tr>
<td>Moringa oleifera</td>
<td>Chennai, Tamil Nadu</td>
</tr>
<tr>
<td>Phyllanthus embelica</td>
<td>Nagapattinam, Tamil Nadu</td>
</tr>
<tr>
<td>Boerhavia diffusa</td>
<td>Dhindivanam, Tamil Nadu</td>
</tr>
<tr>
<td>Eclipta prostrata</td>
<td>Dhindivanam, Tamil Nadu</td>
</tr>
<tr>
<td>Tinospora cordifolia</td>
<td>Dhindivanam, Tamil Nadu</td>
</tr>
</tbody>
</table>

**Table 3: Places of Herbal drug collection**

**DRIYING**

The collected herbs were washed thrice with normal tap water. They were allowed to dry under shade for a night. The parts like stem and root were cut into smaller pieces to facilitate the process of drying. The leaves were allowed to dry as such. The fruit amla was cut and seeds were separated. The crude drugs were dried under shade for five to eight days.

**PULVERISING**

The dried crude drugs were pulverized in a private mill at Arumbakkam, Chennai. They were size reduced to a coarse powder.

**EXTRACTION**

About 100g of the crude powder was weighed and subjected to CONTINUOUS HOT PERCOLATION in a soxhlet apparatus using 99% Ethanol as the solvent. The chosen plant parts were extracted individually. The Ethanolic extracts were air dried initially and dried in a Lyophiliser in the laboratory, at Department of Pharmaceutics, College of Pharmacy, Madras Medical College, Chennai-3.

**III. FORMULATION OF CAPSULES**

The dried extracts were weighed accurately to 1gram individually. The weights of the chosen 6 plants extracts get summed up to 6gram of the extracts. Magnesium carbonate and Calcium Carbonate each 2.4 gram were weighed and mixed with the extracts. They act as adsorbents. They were mixed by Trituration method. After trituration, the mixed powder blend was passed through sieve no.26. The fine powder so obtained was subjected to preformulation studies.

**IV. PREFORMULATION STUDIES**

Prior to formulation, it is essential that fundamental physical and chemical properties of the drug molecule and other derived properties of the drug powder are determined. This information decides many of the subsequent events and approaches in formulation development. This first learning is known as Preformulation. It aims to optimize the process of turning a drug into a drug product. During preformulation the physiochemical properties of the drug candidate are determined.

**DETERMINATION OF THE GRANULES PARAMETERS**

- BULK DENSITY
- TAPPED DENSITY
- COMPRESSIBILITY INDEX
- HAUSNER’S RATIO
- ANGLE OF REPOSE

**BULK DENSITY**

The bulk density of a powder is dependent on particle packing and changes as the powder consolidates. A consolidated powder is likely to have a greater arch strength than a less consolidated one and may therefore be more resistant to powder flow.

**Procedure**

Weighed amount of the powder (m i.e mass of the powder) is transferred to a measuring cylinder and its volume V is measured. From the values, the bulk density of the powder is calculated using the following formula:

\[
\text{BULK DENSITY} = \frac{\text{MASS OF POWDER (m)}}{\text{BULK VOLUME (V)}}
\]
**TAPPED DENSITY**

Weighed amount of the powder (i.e. mass of the powder) is transferred to a measuring cylinder and its volume $V$ is measured. The cylinder is tapped mechanically. The volume of 200 tappings is noted. This is called the tapped volume.

$$\text{TAPPED DENSITY} = \frac{\text{MASS OF POWDER (m)}}{\text{TAPPED VOLUME (V)}}$$

**COMPRESSIBILITY INDEX**

It is an indirect method to determine the flow of powders. As it was developed by a scientist called Carr, hence named after the Carr’s index. It is defined as the direct measure of the potential powder or arch or bridge strength and stability. It is calculated by the equation

$$\% \text{ COMPRESSIBILITY} = \frac{\text{TAPPED DENSITY} - \text{BULK DENSITY}}{\text{TAPPED DENSITY}} \times 100$$

**HAUSNER’S RATIO**

Hausner found that the ratio $(V_o/V_f)$ was related quantitatively to interparticulate friction.

$$\text{HAUSNER’S RATIO} = \frac{\text{TAPPED DENSITY}}{\text{BULK DENSITY}} \times 100$$

**ANGLE OF REPOSE**

As there is a relationship between interparticulate cohesion and Angle of Repose, it proves to be a quantifying method of powder flow. There are many different methods of determining it. They are as Fixed height cone, Fixed base cone, Tilting table, Rotating Cylinder. In my present study I performed the Fixed height Cone method. Angle of repose was calculated from the formula:

$$\text{ANGLE OF REPOSE} = \tan^{-1} \left( \frac{h}{r} \right)$$

$h$=height of the pile

$r$=radius of the circle

**OBSERVATION**

$$\text{BULK DENSITY} = \frac{\text{MASS OF POWDER}}{\text{BULK VOLUME}}$$

$$= 9.28 / 14 = 0.6629 \text{ g/ml}$$

$$\text{TAPPED DENSITY} = \frac{\text{MASS OF POWDER}}{\text{TAPPED VOLUME}}$$

$$= 9.28 / 12 = 0.7733 \text{ g/ml}$$

$$\text{COMPRESSIBILITY INDEX} = \frac{\text{TAPPED DENSITY} - \text{BULK DENSITY}}{\text{TAPPED DENSITY}} \times 100$$

$$= (0.7733 - 0.6629 / 0.7733) \times 100$$

$$= 14.28\%$$

$$\text{HAUSNER’S RATIO} = \frac{\text{TAPPED DENSITY}}{\text{BULK DENSITY}} \times 100$$

$$= 0.7733 / 0.6629 = 1.17$$

**FLOW PROPERTY**

<table>
<thead>
<tr>
<th>Angle of Repose</th>
<th>Carr’s Index</th>
<th>Hausner’s Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>25-30</td>
<td>1.00-1.11</td>
</tr>
<tr>
<td>Good</td>
<td>31-35</td>
<td>1.12-1.18</td>
</tr>
</tbody>
</table>

**Table 3: General flow characteristics**

<table>
<thead>
<tr>
<th>Fair</th>
<th>36-40</th>
<th>16-20</th>
<th>1.19-1.25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passable</td>
<td>41-45</td>
<td>21-25</td>
<td>1.26-1.34</td>
</tr>
<tr>
<td>Poor</td>
<td>46-55</td>
<td>26-31</td>
<td>1.35-1.45</td>
</tr>
<tr>
<td>Very poor</td>
<td>56-65</td>
<td>32-37</td>
<td>1.46-1.59</td>
</tr>
<tr>
<td>Very very poor</td>
<td>&gt;66</td>
<td>&gt;38</td>
<td>&gt;1.60</td>
</tr>
</tbody>
</table>

**REFERENCES**


