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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

S.no	Ingredients
1.	Poly herbal plant extract
2.	Excipients

	Magnesium oxide Calcium Carbonate

Table 1: Materials required

Common name	Botanical name	Family	Part used
Curry leaf tree	Murraya koenigii	Rutaceae	Leaves
Drum stick tree	Moringa oleifera	Moringaceae	Leaves
Amla	Phyllanthus embelica	Euphorbiaceae	Fruit pulp
Punarnava	Boerhavvia diffusa	Nyctaginaceae	Roots
Bhringraj	Eclipta prostrata	Asteraceae	Leaves
Guduchi	Tinospora cordifolia	Menispermaceae	Stem

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.

Name of the plant	Place
Murraya koenigii	Nagapattinam, Tamil Nadu
Moringa oleifera	Chennai, Tamil Nadu
Phyllanthus embelica	Nagapattinam, Tamil Nadu
Boerhavvia diffusa	Dhindivanam, Tamil Nadu
Eclipta prostrate	Dhindivanam, Tamil Nadu
Tinospora cordifolia	Dhindivanam, Tamil Nadu

Table 3: Places of Herbal drug collection

DRYING

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 cyclinder and its volume V is measured. From the values, the bulk density of the powder is calculated using the following formula:

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

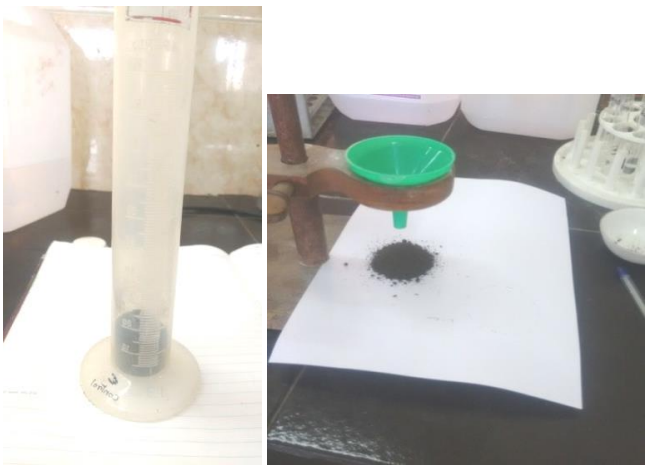

Figure 1

TAPPED DENSITY

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

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

COMPRESSIBILITY INDEX

It is an indirect method to determine the flow of powders. As it was developed by a scientist called Carr, henced 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.

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

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, Titlting table, Rotating Cyclinder. In my present study I performed the Fixed height Cone method. Angle of repose was calculated from the formula:

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

h=height of the pile
r=radius of the circle

OBSERVATION

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

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

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

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

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

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

$$= 14.28\%$$

$$\text{HAUSNER'S RATIO} = \frac{\text{TAPPED DENSITY}}{\text{BULK DENSITY}}$$

$$= 0.7733 / 0.6629 = 1.17$$

FLOW PROPERTY	ANGLE OF REPOSE	CARR'S INDEX	HAUSNER'S RATIO
Excellent	25-30	<10	1.00-1.11
Good	31-35	11-15	1.12-1,18
Fair	36-40	16-20	1.19-1.25
Passable	41-45	21-25	1,26-1.34
Poor	46-55	26-31	1.35-1.45
Very poor	56-65	32-37	1.46-1.59
Very very poor	>66	>38	>1.60

Table 3: General flow characterstics

Figure 2

V. RESULTS AND DISCUSSION

The aim of the current study was thus fulfilled as the plants were subjected to ethanolic extraction and formulated into granules. Preformulation study was performed. It was found out that the formulated powder that is to be filled in the capsule has good flow characterstics. The above statement is emphasized by the experimental values as follows: bulk density, tapped density, compresaability index, hausner's ratio, 0.6629 g/ml, 0.7733 g/ml, 14.28%, 1.17 respectively. Finally the powder was filled in capsule shell size 0 (#0) by hand operated capsule filling machine.

Ingredients	Amount gm/ capsule	Amount gm/ 20 capsules
Poly-herbal Extract	0.3	6.0
Magnesium oxide	0.125	2.5
Calcium Carbonate	0.125	2.5

Table 1.3: Composition of the Poly-herbal Capsule

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