

## Formulation and Evaluation of Cinnamon Capsules for Treatment of Diabetes

*Vaibhav Tak, Raju Surve, N. P. Savant*  
D K Patil Institute of Pharmacy, Loha. Nanded. 431708

*\*Corresponding Author*  
Email Id: vaibhavantak211978@gmail.com

### ABSTRACT

Capsule is the solid dosage form which is used to produce the desire effect in body. Capsule is suitable for those administration of those drugs which are unsuitable in other type of the dosage form like Tablet, injections, cream and lotions etc. The aim of this investigation is to prepare and evaluate the herbal cinnamon capsule. Cinnamon is the main ingredient in our cinnamon capsule and cinnamon is mainly used to reduces the blood sugar level. In this formulation we can used the other ingredients also which can be help to improve the immunity. Other ingredients are Turmeric, fenugreek, cumin, talc etc. The formulated capsule was evaluated for its organoleptic and physical properties as per standards specified by Bureau of Indian Standards and compare with marketed capsule formulation. The incidence of type II diabetes is increasing across the world. Dietary modifications help the patients to control blood glucose. Traditional herbs and spices are commonly used for control of glucose among which cinnamon (Rou Gui; *Cinnamomum cassia*) has the greatest effect. Research has shown that adding cinnamon to diet can help to lower the glucose level. The aim of this study was to determine the effect of cinnamon on the glucose level in blood.

**Keywords:** Cinnamon, Diabetes, Fasting blood sugar, Herbal medicine.

### INTRODUCTION

Herbal medicines are referred to the use any part of the plants for healing and treating diseases purposes. Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood glucose. Hyperglycemia, also called raised blood glucose or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels. The diverse, spicy aroma of cinnamon inner bark, *Cinnamomum cassia*, is the spice sold as cinnamon in the United States Ceylon cinnamon, *Cinnamomum zeylanicum*, which is stated to as true or sweet cinnamon The main constituents of cinnamon are cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oils. They all contribute to the odors and to the several biological activities observed with cinnamon.

### BIOLOGICAL SOURCES

#### Cinnamon

- **Common Name:** Dalchini, Cinnamon Bark
- **Biological Source:** Obtained From Dried Inner Bark of the "*Cinnamomum Zeylanicum*".
- **Family:** Lauraceae
- **Chemical Class:** It Is Aldehyde Group of Volatile Oil
- **Chemical Constituents:** Volatile Oil, Cinnamic Aldehyde, Terpene, Starch.



*Fig. 1:- Cinnamon powder*

## Turmeric

- **Common Name:** Haldi, Indian Saffron, Turmeric, Haridra
- **Biological Source:** Turmeric is The Dried Rhizome of *Curcuma Longa*
- **Family:** Zingiberaceae
- **Chemical Constituents:** Curcumin, Essential Oil, Bisabolene Derivatives, fatty acids.



*Fig 2: Turmeric*

## Fenugreek

- **Common Name:** Methi, Methika, Chandrika.
- **Family:** *Fabaceae*
- **Chemical Constituents:** Trigonelline, Trimethylamine, Neurin, Choline.
- **Biological Source:** Methi Consists of The Dried Ripe Seed of *Trigonella Foenum Graecum*.



*Fig 3: Fenugreek*

## Cumin

- **Common Name:** Cumin & Jeera
- **Biological Source:** It is Obtained from the Seed of the Herb *Cuminum Cymium*
- **Family:** *Apiaceae*
- **Chemical Constituents:** Cumin aldehyde, Cymene, Myrcene, Sabinene.



*Fig 4: Cumin*

## MATERIALAND EQUIPMENT

### Herbal Ingredients

- Cinnamon bark
- Turmeric
- Cumin seeds
- Fenugreek seeds
- Talc

### 1) Additives/Excipients: Talc

### 2) List of Lab Instruments/Equipments

- Bulk density calculator
- Weighing balance
- Measuring cylinder
- Bureat stand
- Funnel
- Graph paper
- Test tube

## Preformulation Study

a) **General Appearance** Physical examination like color, odor, taste is done by organoleptic inspection.

b) **Bulk Density:** It refers to packing of particles in powder sample. Bulk density is used to determine the amount of powder sample that occupies the volume in g/ml. Weighed quantity of powder sample was transferred into 100ml measuring cylinder. The volume occupied by powder material was measured. Bulk density was calculated by using formula;

$$\text{Bulk Density} = \text{Weight of Powder} / \text{Bulk Volume}$$

c) **Tapped Density:** Weighed accurate quantity of powder sample was transfer into a graduated measuring cylinder. Volume occupied by the powder was noted down. Then cylinder was subjected to 100-300 taps in tap density apparatus. Tapped density was calculated by using formula;

$$\text{Tapped Density} = \text{Weight Of The Powder} / \text{Tapped Volume}$$

d) **Angle of Repose:** The Angle of repose is the angle between the slope of the pile and the horizontal surface correlates with the strength of particle-particle interactions and, therefore, is measured to infer flowability.

$$\text{Angle of repose } (\theta) = \tan^{-1}(h/r)$$

e) **Carr's Index (Compressibility):** The compressibility index and Hausner's ratio was measures the property of powder to be compressed. The packing ability of powder material was evaluated from change in volume, which is due to rearrangement of packing occurring during tapping. It was indicated as Carr's compressibility index was calculated by following

$$\text{Carr's Index} = \frac{\text{Tapped Density} - \text{Bulk Density}}{\text{Tapped Density}} \times 100$$

f) **Hausner's Ratio:** The Hausner Ratio is a number that is correlated to the flowability of a powder or granular material. It is named after the engineer Henry H. Hausner. The Hausner ratio is calculated by the formula where is the freely settled bulk density of the powder, and is the tapped bulk density of the powder.

$$\text{Hausner's Ratio} = \frac{\text{Tapped Density}}{\text{Bulk Density}}$$

g) **Solubility:** In ethanol, solubility is the ability of a solid, liquid, or gaseous chemical substance (referred to as the solute) to dissolve in solvent (usually a liquid) and form a solution.

## Formulation Procedure of Cinnamon Capsule

- 1) Weight accurately all the active pharmaceutical ingredient and excipients with the help of weighing balance.
- 2) Then reduces the size of the ingredient with the help of the mixer grinder or with the help of mortar and pestle.

- 3) Then that power of each ingredient is passed through the sieve no. #40 and then sieve no. #30.
- 4) Then again weight the powder of ingredient.
- 5) Get the required amount of API and the excipient and mixed it properly.
- 6) Get the 20 empty hard gelatine capsule shell and fixed it into the capsule filling device.
- 7) Then add the mixture of powder into the capsule filling machine and filled the capsule properly.
- 8) After filling the capsule, the cap of the capsule fixed it properly.

### **Evaluation Parameters of the Cinnamon Capsule**

1) **Organoleptic Evaluation:** Organoleptic evaluation (colour, odour, taste) are done by sensory and visual inspection.

#### **2) Weight Variation Test**

- In this test the 20 intact capsules are individually weight and the average weight is determined. The test required are met if none of the individual weight are less than 90% or more than 110% of the average.
- If the original 20 do not met this criterion the individual weight are determined. This are average and difference are determined between each individual net content and the average.
- The test requirement is met (1) if not more than 2 of the individual difference are greater than 10% of the average or (2) if in no case any difference is greater than 25%.
- If more than 2 but less than 6 net weight determined by the test deviate by more than 10 % but less than 25% the net content is determined for an additional 40 capsules and the average is calculated for the entire 60 capsules.
- 60 deviations from the new average are calculated. The requirement is met (1) if the difference does not exceed 10% of the average in more than 6 of the 60 capsules and (2) if in no case any difference exceed 25%.

## **RESULT**

**Table 1: Solubility Test**

<b>Ingredients</b>	<b>Solubility</b>
Cinnamon	Insoluble
Turmeric	Soluble
Cumin	Insoluble
Fenugreek	Insoluble

**Table 2: Organoleptic Character**

<b>Formulation</b>	<b>Evaluation</b>	<b>Observation</b>
Cinnamon capsule	Colour	Brown
Cinnamon capsule	Odour	Spicy
Cinnamon capsule	Taste	Sweet and earthy

**Table 3: Formulated cinnamon capsule successfully passed the organoleptic character evaluation test and give the desire colour, odour and taste.**

Sr. No	Test	Cinnamon	Turmeric	Cumin	Fenugreek
1	Colour	Brown	Yellow	Brown	Brownish yellow
2	Odour	Fragrant	Aromatic	Woody	Maple syrup like
3	Taste	Aromatic	bitter	Slightly sweet	Tangy bitter
4	Bulk density (gm/ml)	0.373	0.50	0.3731	0.5681
5	Tapped density (gm/ml)	0.471	0.357	0.4310	0.657
6	Carr's index	20.80	23.89	13.43	13.50
7	Hausners ratio	1.262	1.314	1.155	1.156
8	Angle of repose	35.71	36.22	35.53	39.22

**Table 4: Weight Variation Test**

Sr.No	Individual weight of capsule	Deviation	% deviation
1	260	3.5	1.34
2	270	-6.5	-2.4
3	275	-11.5	-4.18
4	265	-1.5	-0.56
5	270	-6.5	-2.4
6	275	-11.5	-4.18
7	260	3.5	1.34
8	255	8.5	3.33
9	260	3.5	1.34
10	250	13.5	5.4
11	255	8.5	3.33
12	270	-6.5	-2.4
13	265	-1.5	-0.56
14	260	3.5	1.34
15	255	8.5	3.33
16	260	3.5	1.34
17	270	-6.5	-2.4
18	265	-1.5	-0.56
19	270	-6.5	-2.4
20	260	3.5	1.34

➤ Average weight of capsule = Weight of all capsules/20  
= 5270 / 20  
= **263.5**

➤ % Deviation = Deviation of capsule / individual weight of capsule × 100

The formulated capsule was successfully passed the weight variation test and all capsule are comes under the official limit which is given by Indian pharmacopeia which is as follows:

Weight of capsule	Official limit
Less than 300mg	10%
300 mg or more	7.5%

The formulation and evaluation of cinnamon capsule was successfully done. The cinnamon capsule successfully passed the evaluation test and their values are comes under the range of official values.

## CONCLUSION

The conclusion of the study on the formulation and evaluation of cinnamon capsules likely highlighted the effectiveness of the formulation in delivering the desired therapeutic effects of cinnamon. It probably discussed the successful encapsulation of cinnamon extract, ensuring stability. The prepared cinnamon capsule successfully pass the weight variation evaluation test and come under the official limit which is given by the Indian pharmacopeia. Any limitations or areas for further research might also have been mentioned to provide a comprehensive overview of the study's findings.

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