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# PREPARATION AND EVALUATION OF POLYHERBAL ANTI-DIABETIC FORMULATION (CHURNA)

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## ABSTRACT

Diabetes is a long metabolic disease of the lipid, protein, and carbohydrate metabolism that is characterized by elevated postprandial blood sugar levels and increased fasting. The aerial parts of *Clitoria ternatea*, leaves *of Psidium gaujava,* leaves of *Moringa oleifera and* seeds of *Trigonella foenum graecum* are used in the present study for determining their anti-diabetic property. The aim of the present study is to formulate a polyherbal formulation as Churna and evaluate its antidiabetic potential using in-vitro chemical assay by alpha amylase inhibition method. The quality of polyherbal formulation was evaluated as per the guidelines of WHO. The study was conducted to investigate the alpha amylase inhibitory potential of prepared polyherbal formulation. The test sample and standard acarbose showed % alpha amylase inhibition of 23.49 %- 35.76 % and 20.19 % - 33.25 % on varying concentrations from 10-50 microgram/ml with an IC50 value of 31.2498 and 25.6689 respectively. Thus, our findings indicate that the prepared polyherbal formulation shows antidiabetic property and can be used in the treatment of Diabetes Mellitus.

**KEYWORDS:** Diabetes, Ash Value, Alpha Amylase, Anti-diabteic activity.

## I. INTRODUCTION

Since the beginning of recorded human medicine, plants have been utilized to cure serious illnesses. This approach is still in use today to find novel medication possibilities. Worldwide, the usage of natural health products made from plants is growing. It is well known that over 80 % of people living in underdeveloped nations use traditional medicine, which mostly consists of herbal remedies.[2]

Diabetes is a long-term metabolic disease of the lipid, protein, and carbohydrate metabolism that is characterized by elevated postprandial blood sugar levels and increased fasting. By 2025, the percentage of people worldwide expected to have diabetes would rise from 4% in 1995 to 5.4%. According to WHO predictions, poorer nations will bear the majority of the burden. Research carried out in India over the past ten years has demonstrated that not only is diabetes prevalence high, but it is also rising quickly among urban populations. In India, the number of grown-ups with diabetes is thought to reach 33 million. By 2025, this figure is likely planning to rise to 57.2 million. A complicated metabolic condition called diabetes mellitus is brought on by either insufficient or malfunctioning insulin. Because there are insufficient beta cells in the body, insulin becomes insufficient, leading to type 1 diabetes (insulin dependent).

Several medicinal plants have been utilized empirically in antidiabetic therapies and have recently been reported to be helpful in diabetics worldwide. The primary mechanism by which the antihyperglycemic effect of plants acts is through stimulating insulin production, blocking the intestinal absorption of glucose, or facilitating the action of metabolites in insulin -dependent activities. There are about 400 plant species with hypoglycaemic action that have been documented in the literature, yet, the quest for novel natural antidiabetic medications remains appealing due to the presence of compounds in these plants that show safe and alternative effects on diabetic's mellitus. Glycosides, alkaloids, terpenoids, flavonoids, carotenoids, etc. are found in most plants and are common linked to antidiabetic effects.[9]

In spite of the fact that pathophysiology of diabetes remains to the completely caught on, test confirmations recommend the inclusion of free radicals with in the pathogenesis of diabetes 5 and more imperatively with in the advancement of diabetic complications.

## II. MATERIALS AND METHODS

### Plant Materials and Collection

The fresh aerial parts of Clitoria ternatea, fresh leaves of Psidium gaujava, fresh leaves of Moringa oleifera, seeds of Trigonella foenum greacum used in the present study was gathered from Kunnummal, Kondotty, Vengara and from a local market in Kottappuram respectively.

### Authentication of plants

Authentication of the plants Clitoria ternatea Linn, Psidium guajava Linn, Moringa oleifera Lam was authenticated by senior botanist Dr. A. K Pradeep, Assistant Professor, Department of Botany, University of Calicut. A voucher of specimen numbers; 178280, 178281, 178282 have been submitted respectively and preserved at the Calicut University herbarium, University of Calicut.

### Preparation of formulation

Procure the four herbal ingredients. Shade dried separately after washing them with distilled water to remove impurities. Pulverise each ingredient separately with the help of suitable mechanical pulveriser. Pass the powder through the sieve number 80 to get fine powder. Weigh, equal quantity of each powder separately and mix thoroughly. Sieve the mixed fine powder and transfer to the air tight container. It can be labelled and stored in a cool dry place.

## III. Evaluation

### Organoleptic evaluation

Organoleptic evaluation means the study of crude drugs using organs of senses. It includes the analysis of colour, odour, taste, size, shape and so on. The organoleptic characters like colour, odour, taste, appearance and texture of herbal churna will be evaluated as per the WHO guidelines for evaluation of crude drugs.

### Physical evaluation

### Determination of pH

The pH of 1% solution of formulated churna will be determined using pH meter (Elico pH meter).

### Determination of moisture content

The moisture content of churna will be found using Hot Air Oven.

$$\%\text{Moisture content} = \frac{\text{Intitial Weight-Final weight}}{\text{Intitial Weight}} \times 100$$

**Determination of Ash value**

**Total Ash value**

Weigh 2 gms of churna accurately in a previously ignited and tarred silica crucible. The material will be then ignited by gradually increasing the heat to 500-600 degree C until, it appeared white indicating absence of carbon. It is then cooled in a desiccator and total ash in mg per gm of air-dried material is calculated by the following formula,

$$\%\ \text{Total Ash} = \frac{\text{Weight of Ash}}{\text{Weight of sample}} \times 100$$

**Acid insoluble ash value**

To the crucible containing total ash, 25 ml of dilute HCl will be added and boil gently for 5 minutes, then about 5 ml of hot water added and transferred in to crucible. Insoluble matter, will be collected on an ashless filter paper. This will be then washed with hot water until filtrate is neutral and the filter paper along with the insoluble matter will be transferred into crucible and ignited to constant weight. The residue will be allowed to cool and then weighed.

$$\%\ \text{Acid insoluble ash} = \frac{\text{Weight of Acid insoluble ash}}{\text{Weight of sample}} \times 100$$

**Determination of extractive values**

**Water soluble extractive value**

5 gms of churna accurately weighed and placed inside a glass stoppered conical flask. It is then macerated with 100 ml of chloroform water for 18 hours. It can be filtered and 25 ml of the filtrate can be transferred into a china dish and it was evaporated to dryness on a water bath. It was then dried to 105 º C for 6 hours, cooled and finally weighed.

$$\%\ \text{of Water-soluble extract} = \frac{\text{Weight of residue}}{\text{Weight of drug}} \times 100$$

**Alcohol soluble extractive value**

Ethanol was used as the solvent instead of chloroform water, and the rest of the procedure was

carried out as the same as that of water-soluble extractive value.

**Chemical evaluation**

**Preparation of extracts**

The prepared formulation will be macerated by cold maceration process using ethanol and water. Extract was decanted, filtered, and concentrated. Keep the extract in a desiccator for the complete removal of solvents. The extracts obtained will be then packed in air tight container and labelled.

**Alpha amylase inhibition assay (In vitro Anti-diabetic chemical assay)**

The assay will be carried out by utilizing the DNSA reagent. A volume of 500µl of enzyme solution will be mixed with 1 ml of various concentrations of extract and will be incubated at 37º C for 10 minutes.500 µl of the starch solution will be added to each test tube and they incubated for 10 minutes at 37º C. The reaction will be terminated by the addition of 1 ml of DNSA solution and incubated for 5 minutes in a boiling water bath. It will be cooled, diluted with 10 ml of water, and measured at 540 nm in UV Spectrophotometer. The control represents 100 % enzyme activity. Absorbance due to the test sample will be eliminated by incorporating appropriate control without enzyme and starch. Acarbose was used as standard.

$$\% \text{ Inhibition} = [(A_{540}{}^{\text{Control}} - A_{540}{}^{\text{Test}}) / A_{540}{}^{\text{Control}}] \times 100$$

Whereas, $A_{540}{}^{\text{Control}}$ - Absorbance at 540 nm of the control

$A_{540}{}^{\text{Test}}$ – Absorbance at 540 nm of the test sample

## VI. RESULTS

**Organoleptic evaluation**

| Parameter | Result |
|---|---|
| Colour | Light green |
| Odour | Characteristic |
| Taste | Slightly bitter |
| Texture | Fine powder |

**Physical evaluation**

| S. No. | Physical Parameters | Values |
|---|---|---|
| 1 | pH | 7 |
| 2 | Moisture content | 4 % |
| 3 | Ash Values | |
| | I. Total ash<br>II. Acid insoluble ash | 5.5 % w/w<br>1.5 % w/w |

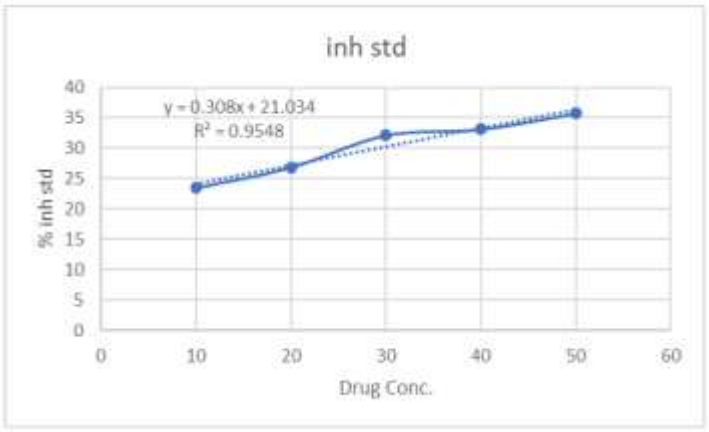
| | | |
|---|---|---|
| 4 | Extractive values | |
| | I. Water soluble extractive value<br>II. Alcohol soluble extractive value | 5.6 % w/w<br>3.4 % w/w |

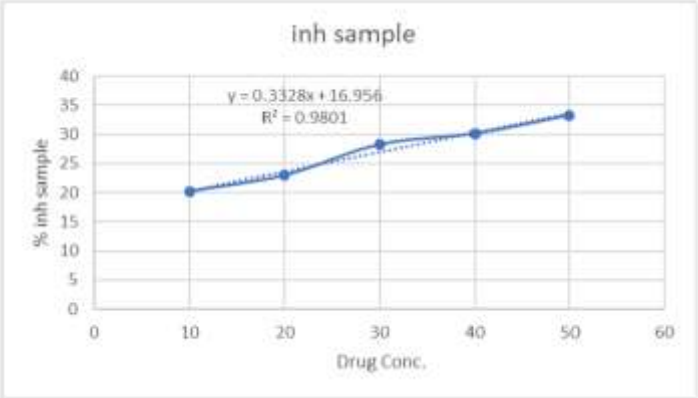
**Chemical evaluation**

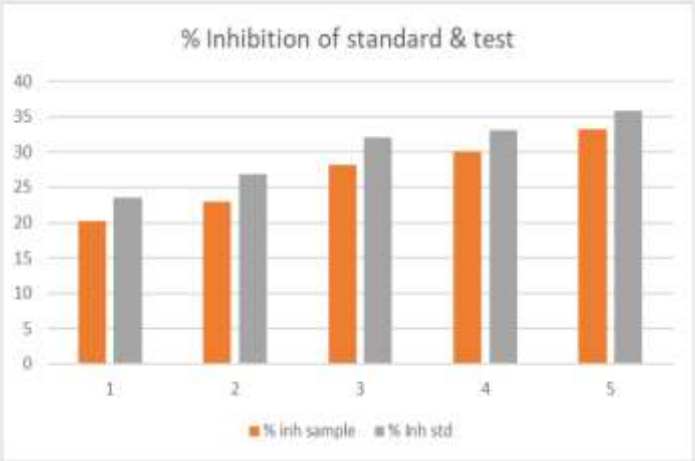
| S. No. | Concentration (µg/ml) | % Inhibition of standard (Acarbose) | % Inhibition of churna extract |
|---|---|---|---|
| 1 | 10 | 23.49 | 20.19 |
| 2 | 20 | 26.86 | 22.94 |
| 3 | 30 | 32.14 | 28.22 |
| 4 | 40 | 33.12 | 30.1 |
| 5 | 50 | 35.76 | 33.25 |
| | IC50 value(µg/ml) | 31.2498 | 25.6689 |


*Figure 1:* **Various concentration of test.**


*Figure 2:* **Various concentration of standard.**






## V. CONCLUSION

In the present study "Formulation and evaluation of polyherbal antidiabetic churna", the polyherbal antidiabetic churna using aerial parts of Clitoria ternatea, leaves of Psidium gaujava, leaves of Moringa olifera and seeds of Trigonella foenum graecum was formulated and its evaluation was performed.

- In this formulation, various evaluation parameters such as organoleptic parameters like colour, odour, taste, texture, physical parameters like pH, moisture content, Total ash value, Acid insoluble ash value, Water soluble extractive value. Alcohol soluble extractive value and antidiabetic activity was evaluated.
- The pharmacological study of in vitro antidiabetic activity of the prepared polyherbal formulation was performed based on Alpha amylase inhibition chemical assay.
- The test sample and standard acarbose showed % alpha amylase inhibition of 23.49 %- 35.76 % and 20.19 % - 33.25 % on varying concentrations from 10-50 microgram/ml with an IC50 value of 31.2498 and 25.6689 respectively.
- The IC50 value of churna extract is nearly comparable with standard acarbose and thus

canbe regarded as an excellent alpha amylase inhibitor.

- Thus, our study findings manifest that antidiabetic potential of polyherbal formulation is comparable with Acarbose and can be effectively used in the management of diabetes mellitus.

## VI. AKNOWLEDGEMENT

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