



## HYPOGLYCEMIC EFFECT OF A POLY HERBAL EXTRACT ON NORMAL AND STREPTOZOTOCIN INDUCED DIABETIC RATS

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### ABSTRACT

The objective of this study is to induce experimental diabetes mellitus using Streptozotocin in normal adult Wistar rats and study the anti-diabetic activity of polyherbal formulation by comparison of changes in body weight, consumption of food and water, volume of urine and levels of glucose between normal and diabetic rats. Diabetes mellitus (DM) is a common endocrine disorder. Hypoglycemic agents from natural and synthetic sources are available for treatment of diabetes. Indian medicinal plants have been found to be useful to successfully manage diabetes. The effect of ethanolic extract of poly herbal formulation containing leaves and seeds of *Trigonella foenum-graecum*, fruits of *Momordica charantia*, and fruits of *Emblica officinalis* was investigated in normal, glucose load conditions and streptozotocin (STZ)-induced diabetic rats. Significant hypoglycemic activity was exhibited by the poly herbal formulation.

**Keywords:** Polyherbal formulation, Streptozotocin, blood glucose levels, hypoglycemic effect

### INTRODUCTION

Diabetes mellitus (DM) is common endocrine disorder affecting more than 150 million people worldwide and this number is likely to increase to 300million by the year 2025,<sup>(1)</sup> out of which more than one- fifth are Indians. According to the International Diabetes Federation, India has been declared as the diabetes capital of the world<sup>(2)</sup>. Plants have been used as sources of drugs for treatment of diabetes in developing countries where the cost of conventional medicines is a burden to the population<sup>(3)</sup>.

Despite the introduction of hypoglycemic agents from natural and synthetic sources, diabetes and its secondary complications continue to be a major medical problem. Many indigenous Indian medicinal plants have been found to be useful to successfully manage diabetes. One of the great advantages of medicinal plants is that these are readily available and have no side effects.<sup>(4)</sup> World Health Organization (WHO)<sup>(5)</sup> has suggested the evaluation of the potential of plants as effective therapeutic agents, especially in areas in which we lack safe modern drugs. The objective of present study was to investigate the effect of ethanolic extract of poly herbal formulation containing leaves and seed of *Trigonella foenum-graecum*, fruits of *Momordica charantia*, fruits of *Emblica officinalis* in glucose load conditions in normal rats and streptozotocin (STZ)-induced diabetic rats.

### Plant material

Leaves and seeds of *Trigonella foenum-graecum*,<sup>(6)</sup> fruits of *Momordica charantia*<sup>(7)</sup> and fruits of *Emblica officinalis*<sup>(8)</sup> were collected from Visakhapatnam, in Andhra Pradesh, Authenticated by Dr.Venkataramaiah, Reader in Botany, V.R.C College, Nellore.

### Extraction

Leaves and seed of *Trigonella foenum-graecum*, fruits of *Momordica charantia* and fruits of *Emblica officinalis* were coarsely powdered and extracted in a Soxhlet apparatus exhaustively.

### Animals

Albino Wistar rats weighing 150-200gms of both sexes were used. Animals were housed in standard environmental conditions.

### Induction of diabetes in rats

Six adult Wistar rats weighing 150-200 grams (75-90 days old) were used for inducing diabetes. The animals were injected by

streptozotocin at the dose of 60 mg/kg b.w. Intravenously. Streptozotocin induces diabetes within 3 days by destroying the beta cells of pancreas<sup>(9)</sup>. Diabetic animals and non-diabetic control group were kept in metabolic cages individually and separately and under feeding and metabolism control.

### Glucose tolerance test

Fasted rats were divided into groups of six. Group I served as normal control and received distilled water with Tween 80. Group II received the standard drug Glibenclamide as an aqueous suspension at a dose of 3 mg/kg b.w<sup>(11)</sup>. Group III received 300mg/kg and IV to VI received different extracts at a dose of 500mg/kg b.w as a fine Tween 80 suspension. After 30 minutes of extract administration, the rats of all groups were orally treated with 2g/kg of glucose. Blood samples were collected from the rat tail vein just prior to glucose administration and at 30, 60 and 90 minutes after glucose loading. Blood glucose levels were measured immediately by using Gluco-meter.

The animals were divided into seven groups and each group consisted of 6 rats.

1. Normal control (vehicle only)
2. Diabetic control (untreated rats)
3. Diabetic rats treated with Glibenclamide 3 mg/kg
4. Diabetic rats treated with *Trigonella foenum-graecum* extract 500 mg/kg b.w
5. Diabetic rats treated with fruits of *Momordica charantia* extract 300 mg/kg
6. Diabetic rats treated with fruits of *Emblica officinalis* extract 500 mg/kg b.w
7. Diabetic rats treated with mixture of three extracts 500mg/kg b.w

### Determination of Plasma glucose and insulin

Blood samples were collected between 9am to 11 pm from the Para orbital venous plexus of non fasting animals, using heparinized hematocrit capillary tube. The plasma was quickly separated by centrifugation was assayed<sup>(10)</sup> and stored at -20°C. Plasma glucose was measured by glucose-oxidase method<sup>(12)</sup>. Plasma immuno reactive insulin was determined by radio immuno assay.

### Statistical analysis

The results of the study were subjected to one-way analysis of variance followed by Dunnett's t-test for multiple comparisons. Values with  $P < 0.05$  were considered significant.

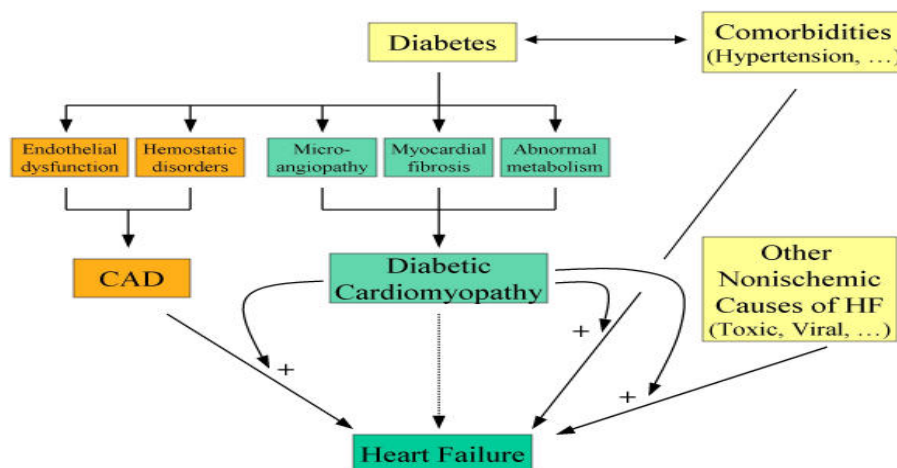
### RESULTS AND DISCUSSION

The results obtained from anti diabetic activity study are presented in a tabular form Based on the reported folklore use of poly herbal extract of *Trigonella foenum graecum*, *Momordica charantia* and *Emblca officinalis* in the treatment of diabetes, these extracts were tested for their anti-diabetic activity separately in three different

groups of rats. Then the mixture of the three extracts were subjected to the test on different groups of rats. The poly herbal combination of extracts showed synergistic activity i.e., the glucose levels were lowered more significantly by the mixture when compared to the individual extracts.

### CONCLUSION

From this study we conclude that the poly herbal combination of extracts of *Trigonella foenum graecum*, *Momordica charantia* and *Emblca officinalis* showed synergistic activity, as the glucose levels were lowered more significantly by the combination of extracts when compared to the individual extracts when used alone.



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