CLINICAL INVESTIGATION OF HYPOGLYCEMIC EFFECT OF CORIANDRUM SATIVUM IN TYPE-2 (NIDDM) DIABETIC PATIENTS

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ABSTRACT:
The present study was designed to investigate clinically the hypoglycemic effect of Coriandrum sativum in Type-2 diabetes mellitus. After assaying fasting plasma and urinary glucose, 10 patients of type-2 diabetes mellitus with no previous medication, 10 patients of type-2 diabetes mellitus taking oral hypoglycemic agents with history of inadequate control and six control subjects were given low (2.5 g tid) and high (4.5 g tid) doses of powdered part, aqueous extract and alcoholic extract of Coriandrum sativum for 14 days. On 15th day blood and urine samples for glucose were taken. Based on results obtained it was found that Coriandrum sativum has significant hypoglycemic activity in high dose and can be successfully combined with oral hypoglycemic agents in type-2 diabetic patients whose diabetes is not controlled by these agents.

INTRODUCTION
Coriander is an important culinary herb. The fruits and the fresh leaves are widely used for flavouring food and the root can be cooked and eaten as a vegetable (Bunney, 1984).

In the present investigation, the effect of powdered, aqueous and alcoholic extracts of seeds of Coriandrum sativum was investigated clinically in type-2 diabetic patients

MATERIALS AND METHODS
The present study was carried out in the laboratories of Hamdard Institute of Pharmaceutical Sciences, Islamabad and Army Medical College, Rawalpindi. The following criteria was used to include or exclude the patients in the study.

Inclusion Criteria
1. Type 2 diabetic patients with fasting plasma glucose level equal to or greater than 140 mg/dl of blood (WHO study group on diabetes mellitus, 1985, Geneva technical report series 727) (WHO, 1985) without any detectable/visible complications.
2. Type 2 diabetic patients taking oral hypoglycaemic agents with history of inadequate control of blood glucose with these agents.
3. Normal healthy subjects with no family history of diabetes mellitus.

Exclusion Criteria
1. Pregnant or nursing patients.
2. Smokers
3. Patients with GIT, hepatic, cardiovascular, renal or endocrine disorder (other than diabetes mellitus) which can interfere with the absorption, metabolism and excretion of the study plant.
4. Patients with any complication of diabetes mellitus.
5. Patients suffering from type 1 (IDDM) diabetes mellitus.

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Subjects

The selected subjects (patients and controls) were medically examined and given code numbers and were asked to present themselves on a specified date for sample collection. They were requested to come with fasting (no food before 12 hours) and to void their morning urine and to drink 250ml glass of water before coming for testing (Bahajiri et al., 2000). Patients already taking oral hypoglycaemic agents were requested to take their usual medicine and food after sampling.

Blood Sample

Blood samples (3-5 ml) were drawn from each patient and control subject by venepuncture through plastic disposable syringes.
The blood samples were collected in clean oven dried glass bottles which were previously rinsed with 1% sodium fluoride, 3% potassium oxalate solution to prevent coagulation and glycolysis. The plasma was separated after centrifugation. Any sample showing haemolysis was discarded. After separation of plasma, it was transferred to clean, previously acid rinsed, washed and oven dried glass bottles with plastic caps. The plasma glucose estimation was done immediately on the same day by kit method (Trinder, 1969).

**Plant**

Coriandrum sativum seeds were purchased from the local market. Dr. Mir Ajab Khan department of biological sciences Quaid-i-Azam University Islamabad identified the selected plant.

The seeds were shade dried, pulverised by a mechanical grinder and passed through 40-mesh sieve

Filtrate from powdered samples of plants soaked overnight in 95% ethanol and distilled water, were used as alcoholic and aqueous extract respectively for studied plant (Ahmed et al., 1995).

**Aqueous Extract**

After grinding in an electric grinder, the powder was soaked in equal amount of water and stirred intermittently and then left overnight. The macerated pulp was then filtered through a coarse sieve and the filtrate was dried at reduced temperature. This dry mass served as Aq extract of respective plant for experimentation (Vats et al., 2002).

**Alcoholic Extract**

Alcoholic extract was prepared by powdering 1 kg plant material in an electric grinder. The powder was then mixed with 500 ml of alcohol and kept at room temperature for 36 hours. The slurry was stirred intermittently for 2 hours and left overnight. The mixture was then filtered and the filtrate was freed from solvent under partial vacuum (71 mmHg) at 3-45°C to yield pulp. A few drops of silicon emulsion were added near the end of distillation to avoid frothing. The final residue

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**Fig. Comparison of effect on blood glucose in type-2 diabetic patients and control subjects before and two weeks after administration of dry powder part, aqueous and alcoholic extract of Coriandrum sativum.**

Before Administration  |  After Administration
collected was a thick paste. This was dried at reduced temperature. This dried mass served as alcoholic extract for experimentation (Vats et al., 2002).

The fasting blood and urine samples from patients and control subjects were assayed for respective glucose levels.

**General Plan of Study**

10 patients of type 2 diabetes mellitus with no previous medication and 10 type-2 diabetic patients taking oral hypoglycaemic agents (with history of inadequate control) were given dry powdered seeds of Coriandrum sativum for fourteen days. On 15th day blood and urine samples of glucose were taken.

After an interval of one-week fasting blood and urine samples were again taken from these patients.

These patients were given aqueous extract of Coriandrum sativum seeds for 14 days. On 15th day blood and urinary samples of glucose were taken.

After an interval of one-week fasting blood and urine samples for the monitoring of glucose level were again taken from these patients.

These patients were given alcoholic extract of the Coriandrum sativum seeds for 14 days. On 15th day blood and urinary samples of glucose were taken.

Out of the ten patients five received low dose 2.5 g tid and five received high dose 4.5 g tid of the plant.

Six healthy subjects were kept as control. Three subjects received low dose and three subjects received high dose of powdered, aqueous and alcoholic extracts of Coriandrum sativum seeds as described above.

All the patients and control subjects were monitored for any adverse reaction of the plant. Plasma assay of glucose was done by kit method and urinary glucose was estimated by strip method (Burtis & Ashwood, 1998). The data was statistically evaluated (Glazer, 1995).

Mild headache initially was complained by some patients. The basis of headache was psychological.

**RESULTS**

The results are summarized in the following table and graph.

**Untoward Effects**

GIT upsets e.g., nausea, abdominal discomfort (with high dose) and vomiting was reported on administration of first high dose of Coriandrum sativum (4 patients, 80%). Diarrhoea was reported with high dose of Coriandrum sativum (3 patients, 60%) but was mild in nature and disappeared after few days without any treatment.

**DISCUSSION**

Diabetes mellitus has been defined as a syndrome of abnormal carbohydrate metabolism, resulting in hyperglycaemia with acute metabolic complications and chronic vascular, neurogenic and orthopedic complications affecting many organs of the body (Jamil et al., 2001).

A significant decrease was noted in mean concentration of plasma glucose two weeks after administration of high (4.5 g t.i.d) dose of powdered part, aqueous extract and alcoholic extract of Coriandrum sativum. The fall in mean concentration of plasma glucose was more marked in patients taking oral hypoglycaemic agents with history of inadequate control. With addition of high dose of Coriandrum sativum their plasma glucose fell within the normal controlled range of diabetes mellitus. Glycosuria disappeared two weeks after administration of both low and high dose of Coriandrum sativum. These results are in line with work of Gray and Flatt, (1999), who have demonstrated the insulin release and insulin like activity of Coriandrum sativum in streptozocin-diabetic mice.
Mechanism of action

In a study carried out on streptozocin diabetic mice, the coriander reduced hyperglycaemia. An aqueous extract of coriander (1 mg/ml) increased 2-deoxyglucose transport (1.4 fold), glucose oxidation (1.4 fold) and incorporation of glucose into glycogen (1.7 fold) of isolated murine abdominal muscle comparable with 10 (-8) M- insulin. In acute 20 min tests, 0.25-10 gm/ml aqueous extract of coriander evoked a stepwise 1.3-5.7 fold stimulation of insulin secretion from a clonal B-cell line. This effect was abolished by 0.5 mM – diazoxide and prior exposure to extract did not alter subsequent stimulation of insulin secretion by 10 mM-L-alanine, thereby negating an effect due to detrimental cell damage. The effect of extract was potentiated by 16.7 mM-glucose and 10 mM-L-alanine but not by 1 mM-3-isobutyl-1- methylxanthaine. Insulin secretion by hyperpolarized B-cells (16.7 mM-glucose, 25 mM-KCl) was further enhanced by the presence of extract. Activity of the extract was found to be heat stable, acetone soluble and unaltered by overnight exposure to acid (0.1 M – HCl) or dialysis to remove components with molecular mass < 2000 Da. Activity was reduced by overnight exposure to alkali (0.1 M- NaOH). Sequential extraction with solvents revealed insulin- releasing activity in hexane and water fractions indicating a possible cumulative effect of more than one extract constituent. These results demonstrate the presence of antihyperglycemic, insulin releasing and insulin like activity in Coriandrum sativum (Gray & Flatt, 1999).

CONCLUSION

Coriandrum sativum can be combined in high dose with oral hypoglycaemic agents in patients whose diabetes is not controlled with any of these agents. But this high dose may not be well tolerated by some patients.

REFERENCES


