

## THE EFFECTS OF ROSEMARY (ROSMARINUS OFFICINALIS) LEAVES POWDER ON GLUCOSE LEVEL

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### ABSTRACT

Various herbs have been used as treatment and prevention for several chronic diseases such as diabetes, hypercholesterolemia and triglyceridemia; one of those herbs is Rosemary, which has biological antioxidant mechanisms. Rosemary is a thorny Rhamnaceous plant which is widely distributed in Europe and South-Eastern Asia. It's used in traditional medicine for its therapeutic properties. The objective of this study was to investigate the effects of Rosemary (*Rosmarinus officinalis*) leaves powder on glucose level in human. **Material and Methods:** Forty eight adults' men and women participated in this study which has been carried out in the Pantnagar

University. The participants were randomly selected and divided into 3 groups. The first group was given 3 g/day of Rosemary leaves powder; the second group was given 6 g/day of Rosemary leaves powder while the third group was given 10 g/day of Rosemary leaves powder for a period of 4 weeks. Blood samples were analyzed for glucose, at the beginning and the end of the study and the results were statistically analyzed. **Results:** The results indicated that a significant decrease in blood glucose level in the groups given 6 g and 10 g of the herb powder was observed but the difference was more significant in the group given 10 g/day. **Conclusion:** In conclusion *Rosmarinus officinalis* appears to improve hyperglycemia.

**KEYWORDS:** Rosemary; Hypoglycemic; Antioxidants.

### 1. INTRODUCTION

Medicinal plants have been used for many centuries in the management of many diseases such as Diabetes Mellitus, CVD, hypertension, and many other diseases. The use of herbs as medicines has played an important role in nearly every culture, including Asia, Africa, Europe and the Americas. In the traditional medicine, the use of medicinal plants is on the

rise because of their treatment properties of various diseases especially diabetes and obesity. Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. Several herbs can help to reduce blood sugar, high blood cholesterol, provide some protection against cancer and stimulate the immune system. *Rosmarinus officinalis* L. an evergreen perennial aromatic shrub belonging to the family Labiatae, commonly called Rosemary, native to the north and south coasts of the Mediterranean Sea and is a common household plant. Rosemary is commonly used as a spice and flavoring agent in food processing. In recent past decades, an increasing evidence indicate the positive role of traditional medicinal plants in the prevention or control of some metabolic disorders like diabetes, heart diseases and certain types of cancer. Rosemary composed of dried leaves and flowers constitutes a particularly interesting source of biologically active phytochemicals as it contains a variety of phenolic compounds including carnosol, carnosic acid, rosmanol, 7-methyl-epirosmanol, isorosmanol, rosmadial and caffeic acid, with substantial in vitro antioxidant activity. Among the herbal extracts reported to have antioxidant activity, rosemary (*Rosmarinus officinalis* L.) is one of the most widely commercialized plant extracts; it is used as a culinary herb for flavoring and as an antioxidant in processed foods and cosmetics. The antioxidant potential of rosemary and its constituents has predominantly been derived from in vitro and in vivo studies. Rosemary contains some antioxidant phenolics that have been shown to provide a defense against oxidative stress from oxidizing agents and free radicals. Many herbal such as Rosemary infusions, frequently used as home medicines have antioxidative and pharmacological properties related to the presence of phenolic compounds, especially phenolic acids and flavonoids. Polyphenols are also known for their ability to prevent fatty acids from oxidative decay. A wealth of studies demonstrated antioxidant, diuretic, anti-inflammatory, anti-microbial, anti-carcinogenic, hypoglycemic and hypolipidimic activities of rosemary. As there is a possibility for Rosemary leaves to play a role as a hypoglycemic the present study was designed to evaluate the effects of rosemary on blood sugar of human.

## 2. MATERIALS AND METHODS

**2.1. Subjects** A group of 48 individuals divided into 23 men and 25 women aged between 20 to 57 years ( $32 \pm 13$ ) participated in this study. They were divided into three groups according to the intake dosage of Rosemary leaves powder. They were randomly given 3, 6 or 10 g/day of Rosemary leaves powder for a period of 8 weeks. The blood specimens were collected at the beginning and the end of this period in order to investigate the effect of

Rosemary leaves powder on serum blood glucose.

**2.2. Questionnaire Form** The questionnaire was divided into two sections; the first one was for personal information such as name, age and sex. The second was about medical history, and contained important questions such as: Are you now following a special diet or taking any prescribed medication for the purpose of losing weight? And what is your action related to it? The participants were chosen based on their answers and the exclusion process was done for each person having any kind of diet or medication at the time of the study.

### **2.3. METHODOLOGY**

#### **2.3.1. Rosemary Powder Preparation**

The plant materials, Rosemary leaves were collected from the organic farm in *Nanital, India* during November 2016. The plant materials were washed of residual soil and dried under-vacuum drying machine as follows: temperature at 50°C, under-vacuum of 0.3 bar and time for 3 hours, till complete drying and ground to fine powder. The fine powder of Rosemary Leaves was stored in air tight plastic containers until used.

#### **2.3.2. Blood Tests**

At the beginning of this study, the blood specimens were collected as following the patient was then asked to attend the next morning after an overnight fast, to avoid any dietary influence on the sugar level. Upon returning, the patient was asked to sit comfortably in a dental chair in a reclining position. About 2 ml of venous blood was withdrawn and then transferred to a plain 10-ml glass test tube. After the blood had coagulated, the test tube containing the blood was subjected to centrifugation for about 4 - 5 min at 2500 rpm. The test tube was then removed from the centrifuge, and the serum layer was pipetted into a vial, which was then stored in a refrigerator under protection from light. Serum total were performed using special kits by ELISA kit. Fasting blood glucose was also estimated in the plasma using the Glucose Enzokit made in Switzerland. The above procedure was repeated for all of the patients. After ingestion different doses of Rosmary powder (3, 6 or 10 g/day) for 8 weeks, the procedures were repeated in order to investigate the effect of different doses of Rosemary on blood glucose.

**2.4. Statistical Analysis In this study**, t-test was conducted to see if there were any statistical differences between control and intervention groups. The data collected were entered into SPSS (10) program and significance difference was set at  $P < 0.01$  and  $P < 0.05$ .

### 3. RESULTS

The Effect of Rosemary Powder on Fasting Blood Glucose DM is a group of metabolic disorders that share the common feature of hyperglycemia. It is worth mentioning that several reports have suggested the possible use of Rosemary extracts in the reduction of blood glucose. The current data showed that treatment with all doses (3, 6 and 10 g/day) of Rosemary leaves powder produced significant reduction in glucose level for all participants. The highest dose of 10 g/day tended to produce the highest reduction of glucose by 18.25% while the dose of 6 g produced reduction in glucose level only by 15.74% and 3 g/day reduced glucose level by 11.2% as shown in **Table 1**.

The effect of different doses of Rosmary powder (*R. officinalis*) on fasting serum glucose (mg/dL).

Dose (g/day)	Treatment	Fasting glucose (mg/dL)	P-value	% reduction
3	Before	127±16	0.27	13.2
	After	115 ± 13		
6	Before	127 ± 14	0.002**	17.74
	After	111 ± 11		
10	Before	126 ± 13	0.0006**	18.25
	After	103 ± 11		

\*\*significant at  $P < 0.01$ .

It should be notated that, treating Table 1. The effect of different doses of Rosmary powder (*R. officinalis*) on fasting serum glucose (mg/dL). \*\*significant at  $P < 0.01$ . Group with 3 g/day of Rosmary powder for 8 weeks caused no significant decreasing in fasting blood glucose. On contrast, treating groups with 6 and 10 /day of Rosmary powder for 8 weeks caused significant decreasing in fasting blood glucose. A possible mechanism of the hypoglycemic action of *R. officinalis* was suggested to be through increasing the insulin level. Moreover, recent study reported that Rosemary leads to regeneration of the  $\beta$ -cells of the pancreas and potentiating of insulin secretion from surviving  $\beta$  cells, which indicates that Rosemary decrease blood glucose level by stimulating insulin secretion from the remnant  $\beta$  cells or regenerated  $\beta$  cells. Also the reduction of fasting blood glucose may be due to Rosemary might inhibit the intestinal absorption of glucose by inhibition of intestinal  $\alpha$ -amylase enzyme or  $\alpha$ -glucosidase enzyme. In addition, the remarkable antidiabetogenic effects of *R. officinalis* could be due to its potent antioxidant properties. It also might be

producing its hypoglycemic activity by a mechanism independent from insulin secretion e.g. Inhibition of protein glycation and the inhibition of endogenous glucose production. It may be also stated that the rosemary leaves leads to regeneration of the  $\beta$ -cells of the pancreas and potentiating of insulin secretion from surviving  $\beta$  cells. The increase in insulin secretion and consequent decrease in blood glucose level may lead to control of lipolytic hormones. A number of other plants have also been reported to have insulin stimulatory along with antihyperlipidemic effects.

#### 4. CONCLUSION

In conclusion, the results suggest that phenolic compounds from *Rosmarinus officinalis* protect against hyperglycemia increasing the activities of antioxidant enzymes. Supplementation with these natural extracts may prove valuable in limiting the pathophysiology of numerous disorders associated with oxidative damage and inflammation. Both doses (3 and 6 g/day) of *R. officinalis* leaves powder were found to have therapeutic potential. They possess, hypoglycemic properties but the higher dose of 10 g/day was more efficient].

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