

## THE EFFECT OF SESAME OIL (*OLEUM SESAMI*) ON BLOOD GLUCOSE LEVELS OF RABBITS\*

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### S U M M A R Y

Sesame oil (*Oleum Sesami*) is used for the treatment of diabetes mellitus in traditional medicine in Turkey at Konya and its surroundings. In this study, the effect of *Oleum Sesami* to the glucose levels of normal rabbits was investigated. Sesame oil was administered in doses 1 ml/kg, 2 ml/kg, 4 ml/kg and 8 ml/kg to normal rabbits. The blood glucose levels were estimated before and 2, 4 and 6 hours after the administration of sesame oil. Blood glucose levels were determined by the o-toluidine method. Under the experimental conditions employed in our study, it was observed that sesame oil is not effective in lowering the blood glucose levels of normal rabbits.

### Ö Z E T

Susam yağı, Türkiye'de Konya ve civarında şeker hastalığına karşı halk ilacı olarak kullanılmaktadır. Bu çalışmada, susam yağının normal tavşanların kan şekeri düzeyleri üzerine etkisi incelendi. Bu amaçla susam yağı 1 ml/kg, 2 ml/kg, 4 ml/kg ve 8 ml/kg dozlarında normal tavşanlara verildi. Tavşanların kan glukoz düzeyleri 0, 2, 4 ve 6 saat sonra o-toluidin metoduna göre tayin edildi. Elde edilen bulgulardan, susam yağının nor-

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mal tavşanların kan glukoz düzeylerini düşürmede anlamlı bir etkisi olmadığı saptandı.

**Key words:** Sesame oil, *Oleum Sesami*, Diabetes mellitus.

## INTRODUCTION

Diabetes mellitus is a chronic condition which affects the metabolism of carbohydrate, protein, fat, electrolyte and water. Consequences of this disease are frequently associated with irreversible functional and structural changes in cells, particularly those of vascular system and manifests as arterial degeneration including coronary and cerebral artery diseases and obliterative arterial disease in legs (1).

Long before the use of insulin, indigenous remedies have been used for the treatment of diabetes mellitus. There is an increasing demand by patients to use natural products with antidiabetic activity. This is because, insulin can not be used orally and continuous insulin injections have many side effects and toxicity. Besides certain oral hypoglycaemic agents are not effective in lowering the blood sugar in chronic diabetic patients (2). There are many medicinal plants known to be used in the treatment of diabetes mellitus (3,4) and a number have been screened positive for their hypoglycaemic effect (5-7). Most of these plants were found to belong to the chemical groups: alkaloids (8), flavonoids (9), glycoprotein (10), steroid (11), polypeptide (12), polysaccharide (13), terpenoid (14) and sulphur oils (15). Among the different species of plants used in Turkey by diabetic patients, *Laurus nobilis* leaves (16), chard (*Beta vulgaris* L. var. *cicla*) (17), parsley (*Petroselinum crispum*) (18), *Zizyphus jujuba* leaves (19) have been found to be effective in decreasing the blood glucose level.

Sesame (*Sesamum indicum* L.) is a plant of the *Pedaliaceae* family. Sesame is one of the world's most important oil seed crops. Sesame has long been categorized as one of the traditional health foods in Japan, China and other East Asian countries. This plant is widely distributed in Asia and Europea particularly India and Turkey and it has been grown in field. Sesame oil is produced from mature sesame seeds by press. Sesame oil (*Oleum Sesami*) is widely used in traditional medicine as hypoglycemic agent (one coffee cup for three days is recommended by diabetic patients) in Turkey at Konya and its surrounding (20). Not only is it a source of edible oil, the seed itself provides a nutritious food for humans. The oil and seeds of sesame are used as antidiabetic (20), antioxidant (21), antimutagenic (22), hypolipemic (23), hypocholesterolemic (24), purgative (25). Also, sesame oil is one of the important edible oils in Turkey. The constituents of sesame oil have been che-

mically investigated which include tocopherol (26), sterol (27), saponin (28), phenolic acid (29), triterpene alcohol (30), flavonoid (31), oxalates (32), glycosides (33), oligo saccharides (34) and asarinin (35).

In this study, the effect of sesame oil to the glucose levels of normal rabbits were investigated.

## RESULTS AND DISCUSSION

In this study, the possible hypoglycemic effect of the sesame oil on normal rabbits was investigated. The effect of sesame oil on blood glucose level of normal rabbits is presented in Table 1 and hypoglycemic activity of in Table 2.

The mean blood glucose levels of rabbits at various time intervals after oral administration of sesame oil and 0.9 % NaCl are shown in Table 1.

The blood glucose level of rabbits treated with 1 ml/kg of sesame oil at zero hour was 78.36 % mg. It was slightly lowered at 2, 4 and 6 hours. The mean percent decrease (Table 2) in blood glucose levels produced by 1 ml/kg of sesame oil at 2, 4 and 6 hours were 4.24, 6.10 and 3.57 respectively. Maximum reduction was observed at 4 h, at which time the percentage variation in blood glucose was about 6.10 for the sesame oil (1 ml/kg). Statistically, these reductions were non significant as compared with zero level ( $p = 0.952$ ) (Table 1 and 2).

The dose of 2 ml/kg sesame oil induced insignificant decrease in glycemia after oral administration ( $p = 0.946$ ) (Table 1). The mean percent decrease in blood glucose levels produced by 2 ml/kg sesame oil at 2 h and 4 h were 2.52 and 3.44 respectively (Table 2).

Administration of 4 ml/kg of sesame oil produced a non significant decrease in blood glucose 2, 4 and 6 hours (Table 1). Maximum reduction was observed at 2 h, at which time the percentage variation in blood glucose was about 5.58 for sesame oil (4 ml/kg) (Table 2).

When the 8 ml/kg sesame oil was given, maximum reduction was observed 4 h, at which time the percentage variation on blood glucose was about 5.72 % (Table 2). The results in blood glucose decrease were insignificant in all doses given (Table 1).

Under the experimental conditions employed in our study, it was observed that sesame oil has no effect in lowering blood glucose level in normal rabbits. Thus the traditional use of this drug in folk medicine can be only on empirical grounds.

**Table 1 :** Effect of sesame oil on blood glucose in normal rabbits

Groups	Treatment and Dose (ml/kg)	Blood Glucose Level (mg%) *				P
		0 h	2 h	4 h	6 h	
1	Control (0.9%NaCl)	76.78±13.86	74.74±10.41	75.30±10.68	79.12±9.62	0.740
2	Sesame oil (1 ml/kg)	78.36±14.92	75.04±12.47	73.58±14.57	75.56±13.38	0.952
3	Sesame oil (2 ml/kg)	87.97±11.54	85.75±12.06	84.94±11.41	88.35±9.01	0.946
4	Sesame oil (4 ml/kg)	95.28±5.94	89.96±8.88	91.71±7.08	92.98±7.60	0.720
5	Sesame oil (8 ml/kg)	92.10±10.33	87.38±5.24	86.83±4.25	87.50±5.90	0.600

\* Mean ± SD

**Table 2 :** Hypoglycemic activity after oral administration of sesame oil

Groups	Dose	% Change of Blood Glucose Level		
		2 h	4 h	6 h
Control	1ml/kg(0.9%NaCl)	- 2.63	-1.93	+ 3.05
Sesame oil	1ml/kg	- 4.24	- 6.10	- 3.57
Sesame oil	2ml/kg	- 2.52	- 3.44	+ 0.43
Sesame oil	4ml/kg	- 5.58	- 3.75	- 2.41
Sesame oil	8ml/kg	- 5.12	- 5.72	- 4.99

## EXPERIMENTAL

### Materials and Methods

In this study, healthy albino rabbits weighing 2-3 kg, 1-1,5 years old, were used. The animals were fed with commercial feed with free access to tap water. Animals were fasted overnight (approximately 16 h) (water ad libitum) prior to administration of sesame oil and control solution. All blood samples were withdrawn by puncture from the marginal ear vein. The rabbits were divided into five groups of five animals each. After taking blood samples (0.1 ml) for determination of blood glucose level of the fasted animals, Group 1 (control group) were given 1 ml/kg saline (0.9 % NaCl) orally. Groups 2, 3, 4 and 5 were given the sesame oil 1 ml/kg, 2 ml/kg, 4 ml/kg and 8 ml/kg respectively.

Blood samples were drawn from the marginal ear veins of the rabbits, and collected the test tubes, before and after oral administration of the sesame oil (0, 2, 4 and 6 hours).

Blood glucose levels were estimated by the o-toluidine method (36) each determination was carried out in duplicate. In this study, the percentage change in glycemia calculated by applying the following:

$$\% \text{ Change of Glycemia: } G_x - G_0 / G_0 \times 100$$

The blood glucose the concentration was determined and noted as initial glycemia ( $G_0$ ). Then, the sample was administered orally and glucose values were determined at 0, 2, 4, and 6 hours ( $G_x$ ).

The results are given as mean  $\pm$  SD and Student's t test was used to determine the significance of the differences in blood glucose levels between the various groups.

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