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THE HYPOGLYCEMIC EFFECT OF VOLATILE OIL OF SOME EGYPTIAN PLANTS

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SUMMARY

LD^{50} of some volatile oils of Anethum graveolens (common dill), Foeniculum vulgare (fennel), Artemisia herba-alba (wormseed plants) and Salvia officinalis (sage) were 1350, 1075, 937.5 and 1950 mg/kg b. wt., respectively in mice following subcutaneous injection. The volatile oil extract of dill and fennel decreased the blood glucose level of normal rats at one hour. While, that of sage and wormseed plants produced a significant hypoglycemia in rats at one and three hours. The high blood glucose level of alloxan diabetic rats were significantly decreased at one and three hours after injection of the oily extract of dill, fennel, wormseed plants and sage.

It is concluded that the volatile oil of common dill, fennel, wormseed plants and sage have an antidiabetic effect.

INTRODUCTION

The history of volatile oils in the world was closly related to the old civilization in Egypt, India, Iraq and China. Volatile oils were widely used in some cosmetic preparations such as perfumes, soap, tooth paste and shaving cream (Fluck and Schib, 1973). Other essential oils also used in food industries as food flavourings, Pizza meat, sausage and in the pickle industry (Grieve, 1959).

The aromatic plants as well as their volatile oils were widely used in folk remedy such as sage which was used as stimulant, astringent , tonic and carmenative (Roberto, 1984).

Fennel can be employed as substitute for cod-liver oil in scrofula , rickets and anaemia and the oil of dill was used in the flatulence of inflants and was useful as vehicle for children's medicine generally (Grieve, 1959).

The present work was carried out to investigate the effect of some Egyptian aromatic plants (sage, common dill, fennel, wormseed plants) on the glucose level in normal and diabetic albino rats.

MATERIAL AND METHODS

The volatile oils of leaves of common dill, fennel wormseed plants and sage were separated by steam distillation acording to the method of Balbaa et al., (1981).

Experiment 1:

Median lethal dose (LD 50) of common dill, fennel, wormseed plants and sage was determined as described by (Kerber, 1941). In this experiment, five groups of five mature mice each, were used for each extract. . Different doses of the oily extracts (500, 000, 500, 000 and 500 mg/kg b. wt for dill; 500, 750, 1000, 15000 and 2000 mg/kg b.wt. for fennel and wormseed plants and 1000, 1500, 2000, 2500 and 3000 mg/kg b.wt. for sage) were injected subcutaneously. Toxic symptoms and mortality rate were recorded and the LD^{50} of the tested extract of each plant was calculated.

Experiment 2:

Forty adult male albino rats weighing between 125-150 g. body weight were used. The rats were divided into eight groups, five rats each. The rats were fasted 12 hours then injected subcutansoulsy with two dose levels for each extract (1/50 and 1/10 of LD^{50}). The dose levels were 7 and 135 mg/kg b.wt. for common dill, 21.5 and 107.5 mg/kg b.wt. for fennel 18.75 and 93.75 mg/kg b.wt. for wormseed plants and 39 and 195 mg/kg b.wt. for sage.

Blood samples were collected on sodium floride by supra-orbital sinus puncture before injection (zero time), 1,3 and 6 hours post-treatment from the fasted rats. Plasma was separated and used for glucose determiation according to method of Trinder (1969).

Experiment 3:-

forty adult albino rats weighing between 125-150g body weight were used. The rats were divided into eight groups, five rats each. diabetes was induced in these rats by intraperitoneal injection of (alloxan 150mg/kg b.wt.). Two days after alloxan injection, the rats were fasted 12 hours then the oilly extract of each tested was injected subcutaneously as single inj with the same doses as in experiment two. samples rat were collected from each di fasted rat at times similar to the experime for glucose determination.

Differences in blood glucose level determined by using t-test at two levels P and P<0.01 (Snedecor and Cochran, 1967).

RESULTS

LD^{50} of volatile oil of dill, fennel, worm plants and sage were 1350, 1075, 937.5 and mg/kg b.wt., respectively in mice follo subcutaneous injection.

Data presented in Table (1) showed that volatile oil extract of dill and fennel at the dose levels decreased the blood glucose leve normal rats at one hour, while, that of sage wormseed plants effective in lowering bl glucose level at one hour at the low dose three hours at the high dose.

the blood glucose level of the two d alloxanized rats was significantly higher than normal rats (Pretreatment groups) (Table 1 2).

The volatile oil extract of dill, sage, fennel a wormseed plants at the two dose levels we effective in decreasing the blood glucose level the alloxan diabetic rats at one and three hou post-injection (Table 2).

DISCUSSION

Insulin substitutes from plant sources were mad during World War II, when insulin was nc available in many countries . Therefore, th

Table (1):Effect of volatile oil of some medicinal plants on blood glucose level of normal rats (n = 5)

Tested Plants	Dose mg/kg b.wt	Blood glucose (mg/100 ml)			
		Pre-treatment	Post- treatment		
			1 hour	3 hours	6 hours
Common dill (Anethum graveolens)	27	89.8 ± 1.56	60.0 ± ** 1.73	89.0 ± 1.95	89.4 ± 2.32
	135	89.0 ± 2.30	53.2 ± ** 2.15	87.6 ± 2.98	89.4 ± 2.25
Fennel (Foeniculum vulgare)	21.5	90.0 ± 2.00	61.4 ± ** 2.34	88.6 ± 2.32	88.8 ± 2.28
	107.5	87.6 ± 2.29	60.0 ± ** 1.64	89.8 ± 1.93	90.8 ± 2.27
Wormseed plants (Artemisia herba alba)	18.75	89.2 ± 1.86	59.8 ± ** 2.1	87.2 ± 2.52	89.8 ± 2.38
	93.75	87.8 ± 2.42	51.6 ± ** 2.66	70.4 ± ** 1.72	92.2 ± 2.27
Sage (Salvia officinalis)	39.00	89.5 ± 2.63	59.0 ± ** 2.03	90.2 ± 1.77	89.8 ± 2.82
	195.0	89.4 ± 1.87	57.2 ± ** 2.44	76.4 ± ** 2.63	87.6 ± 2.50

Values expressed as Mean ± SE .

n = number of animals in each group .

** Values significantly differes at P < 0.01 .

Table (2): Effect of volatile oil of some medicinal plants on blood glucose level in alloxan diabetic rats (n = 5) .

Tested Plants	Dose mg/kg b.wt	Blood glucose (mg/100 ml)			
		Pre-treatment	Post- treatment		
			1 hour	3 hours	6 hours
Common dill (Anethum graveolens)	27	222.4 ± 3.36	128.0 ± ** 4.64	188.5 ± ** 3.31	223.8 ± 3.34
	135	221.6 ± 3.33	120.0 ± ** 3.54	169.8 ± ** 2.69	222.6 ± 4.61
Fennel (Foeniculum vulgare)	21.5	220.8 ± 4.90	135.0 ± ** 3.54	163.6 ± ** 5.52	221.4 ± 4.89
	107.5	219.8 ± 3.96	131.2 ± ** 2.56	152.0 ± ** 4.64	215.0 ± 3.54
Wormseed plants (Artemisia herba alba)	18.75	221.8 ± 4.65	126.6 ± ** 2.66	170.0 ± ** 3.54	222.2 ± 4.62
	93.75	223.4 ± 4.31	117.6 ± ** 3.57	161.5 ± ** 3.31	217.0 ± 5.39
Sage (Salvia officinalis)	39.00	223.0 ± 4.64	135.0 ± ** 3.54	178.6 ± ** 3.31	220.6 ± 3.59
	195.0	220.2 ± 4.35	124.8 ± ** 3.61	154.0 ± ** 4.30	200.6 ± 3.79

Values expressed as Mean ± SE .

n = number of animals in each group .

** Values significantly differes at P < 0.01 .

antidiabetic effect of volatile oil of dill, sage fennel,and worm seed plants was investigated in normal fasting and alloxan hyperglycemic rats.

The present study showed that, the volatile oil of common dill caused a significant decrease in the blood glucose level of normal fasting and alloxan hyperglycemic rats. The volatile oil of common dill administered orally for three and four weeks significantly decreased the blood glucose level of alloxan diabetic rats (Ahmed, 1991 and Fayad. 1993).

The fennel was used for treatment of diabetes mellitus (Grieve, 1959). In the present study, the volatile oil of fennel significantly decreased the blood glucose level of fasting normoglycemic and alloxan hyperglycemic rats. These results agree with Ahmed (1991) and Fayad (1993). the former found that the essential oil fennel significantly of fennel decreased the blood glucose level of alloxan diabetic rats, while the latter showed that the volatile oil of fennel decreased the blood glucose level in normal and diabetic rats.

Artemisia afra linn was used in diabetic patient (Watt and Cerdina, 1962). The oral administration of volatile oil of artemisia herba alba significantly decreased the blood glucose level in alloxan diabetic rats (Husni and Ammar, 1988 and Fayed, 1993). Data from this study showed that the volatile oil of artemisia herba alba significantly decreased the blood glucose of normal fasting and alloxanized rats.

In the present investigation, the volatile oil of sage decreasd the blood glucose level in the normal fasting and alloxan diabetic rats. These results agree with Jimenez et al. (1986) and Shabana et al. (1991). Jimenez et al. (1986) showed that the maximal hypoglycemic activity was recorded 90 minutes after administring the infusion of the flowering apex of saliva lavandulifolia in both normoglycemic and alloxan hyperglycemic rabbits. Moreover, Shabana et al., (1991) found that salvia aegyptiaca extract produced a hypoglycemic effect at one and three hours post-injection in normal fasting rats and a persistant (3 days) hypoglycemic effect in alloxanized rats.

In addition, Fayad (1993) found that the volatile oil of saliva aegyptiaca produce hypoglycemic effect in alloxanized rats.

The hypoglycemic action of the salvia lavandulifolia may be the result of several synchronous mechanism, (a) deceasd intestinal absorption of glucose, (b) increased peripheral uptake of glucose and (c) hyperplasia of the pancreatic islet cells (Zarzuelo et al., 1991). Moreover, Perfumi et al. (1991) concluded that salvia fructicosa leaves caused a hypoglycmia in alloxanized hyperglycemic rabbits by reducing the intes inal absorption of glucose.

In conclusion, the present study showed that volatile oil of common dill, fennel, wormseed plant and sage have a hypoglycemic effect.

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