

Article

Study the effect of olive leaf extract and mango peel extract in treatment the diabetic disease in the mice

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ABSTRACT

The current study aimed to find out the effect of olive leaf extract and mango peel extract on diabetic mice. Diabetes was created in the mice by using intravenously alloxan 100 mg/kg for injection. The experimental mice were divided into four groups, where the first group was considered normal controls, while the second group was diabetic control. The third group represents the diabetic group treatment with olive leaf extract 100 mg/kg B.w i.p 5 days and the four groups diabetic group treatment with mango peel extract 100 mg /kg .B.w i.p 5 days. According to the biochemical observations, the levels of serum glucose, there was a significant decrease in serum glucose of the diabetic group under treatment with olive leaf extract lower than blood glucose level for diabetic mice treated with mango peel extract compared with the control group .use herbal treatment olive leaf extract to diabetic mice helps maintain normal sugar level in the blood.

Keywords:- olive leaf, mango peel, diabetic disease.

INTRODUCTION

Diabetes is a chronic metabolic disease characterized by a relative or absolute lack of insulin, leading to hyperglycaemia¹. long-term complications of hyperglycemia affecting the eyes as retinopathy, kidneys, nerves as neuropathy and blood vessels. There are several different classifications of diabetes, the most common being type 1 and type 2. Type 1 diabetes is an autoimmune disease leading to the destruction of the insulin-producing pancreatic beta cells in the islets of Langerhans. that is called insulin-dependent diabetes mellitus (IDDM) or juvenileonset diabetes develops when the body's immune system destroys pancreatic βcells , the only cells in the body that produce the hormone insulin that regulates blood glucose. Type 1 diabetes is most commonly diagnosed in children and young adults, and by the time of diagnosis, patients have very little endogenous insulin production. Insulin, therefore, has to be replaced by regular subcutaneous injections, Type 2 diabetes was first described as a component of metabolic syndrome in 1988².

Type 2 diabetes also called non– insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes, accounts for about 90% to 95% of all diagnosed cases of diabetes. It usually begins as insulin resistance, a disorder in which the cells do not use insulin properly, and as the need for insulin rises; the pancreas gradually loses its ability to produce it. is the most common form of diabetes characterized by hyperglycemia, insulin resistance, and relative insulin deficiency? This type is the interaction between genetic, environmental, and behavioral risk factors^{3,4}. Mechanism of diabetic complications has been suggested that oxidative stress may contribute to the pathogenesis of different diabetic complications⁵. However, 537 million adults (20-79 years) are living with diabetes around the world in 2021.

Diabetes Atlas today herbal drugs are mostly used in the treatment of diabetes^{6,7}, where one of these hypoglycemic plants is the olive leaf and mango peel, the olive tree is one of the most important trees in Mediterranean countries⁸. Olive leaf extract is a natural source of wellness with therapeutic properties, olive leaf has extensive use in traditional herbal medicine (gastroprotective, neuro-protective, antimicrobial, anticancer, anti-inflammatory, anti-nociceptive, antioxidant^{9,10}. Mango is an evergreen tree with a lot of traditional medicinal resources apart from its very famous fruits The largest mango-producing countries are India, China, Thailand, Indonesia, Pakistan, Mexico, Brazil, Bangladesh, Nigeria, and the Philippines.

Mango leaves are a potential source of minerals, viz. nitrogen, potassium, phosphorus, iron, sodium, calcium, magnesium, and vitamins, viz. A, B, E, and C. A major bio-macromolecule present in mango leaves is protein. Extracts of the mango leaves have been utilized for traditional medicines to cure diabetes, bronchitis, diarrhea, asthma, kidney, scabies, respiratory problems, syphilis, and urinary disorders ^{11,12}.

MATERIALS AND METHODS

Olive leaf extracts preparation

Take an olive leaf from the garden and rinsed it with tap water for 10 min and then drain, The dried leaves were powdered using a coffee grinder and then extraction. 50 g of the processed plant was extracted in 250 ethanol (70%) using the soxhlet apparatus. The obtained extract was then evaporated at 37C° in the incubator and the resultant crude extract was frozen at -20C° until use ¹³.

Mango peel extracts preparation

Mango taken from the vegetable market and rinsed with water and removed mango peel was and drained, the dried peel grinding by using a grinder after that extraction by taking 50 g of the powder of mango peel was extracted in 250 of ethanol (70%) using the soxhlet apparatus. The obtained extract was then evaporated by using rotary evaporator and the resultant crude extract was frozen at -20C° until use.

Table1.preparation of plants extraction

Plants extraction	Olive leave extract	Mango peel extract
Plants weight	50gm	50gm
Solvents and concentration	Ethanol 70%	Ethanol 70%
Volume of solvents	250ml	250ml

Experimental animals

The study was conducted on a randomly mice obtained from the ministry of science and Technology. The animals were selected at the weight between (25-27) gm, and healthy. The mice are placed in plastic cages with appropriate conditions of temperature as well as ventilation. Animals were also given a special diet and water. the animals were starved for 12 hours, and then intraperitoneal injection with alloxan (British company BHD) at a dose of (0.1 g / kg of body weight) by dissolving 1 g of alloxan in 10 ml of normal saline , control animals injected with 1 ml of normal saline and given water and food normally (14). Animals with a glucose level greater than 200mg/100ml were considered diabetic.

Experimental design

The mice were randomly distributed, using (20) adult mice, we divided the mice into 4 groups, including the control group (5mice per group) and caged separately:

1. Group 1 (untreated control).
2. Group 2 mice have received alloxan 1 ml (i.p.injection).
3. Group 3 Alloxan diabetic mice ingected Ip with 100mg/kg olive leaf extract for 4 weeks.
4. Group 4 Alloxan diabetic mice ingected Ip with 100mg/kg mango peel extract for 4 weeks.

Table2.Distribution of animals (in vivo)

groups	Name of treatment	Name of groups
Group1	Untreated mice	Control negative
Group2	Mice injected alloxan only	Control positive Diabetic mice
Group3	Injected Mice with alloxan injected Ip with OLE	Diabetic mice treated with OLE
Group4	Injected Mice with alloxan inected Ip with MPE	Diabetic mice treated with MPE

Biochemical estimation

Blood samples were collected in laboratory tubes of each first, second, third and four group respectively from fasting mice. After that the blood samples were separated by centrifuge for 15 minutes and measured sugar by used biochemical test (fast blood sugar)by used linear kit in the laboratory .

Statistical analysis

This study has been calculated mean \pm SE of four groups, n = 5 mice in all groups. Statistical analysis of data was performed using one-way analysis of variance (ANOVA) with a Tukey's - test and the results were considered statistically significant at $P < 0.05$.

RESULTS

In this research, the effect of alloxan was studied on the blood glucose level of mice, and it was observed that the glucose level was higher than its normal level in the blood compare it with the level of glucose in the blood of animals that did not take alloxan as shown in table 3.

Table3. effect of alloxan on the blood glucose level of the mice

Groups	Treatment	Serum blood sugar	Mean,SE
Group1	Untreated mice	82-90mg/ml	86.2 \pm 1.4
Group2	Mice treated with alloxan	213-230mg/ml	218.4 \pm 3.1

And a study the effect of two natural plant extracts OLE and MPE on animals that had a high level of sugar, The results explained decrease in the blood sugar level of the animals that were treated with the OLE and MPE as shown in table 4.

Table 4. effect of OLE and MPE on the blood glucose level of the diabetic mice

Groups	Treatment	Serum blood sugar	Mean,SE
Group1	Mice treated with OLE	88.1-91mg/ml	87.02 \pm 1.3
Group2	Mice treated with MPE	88-97mg/ml	93.8 \pm 1.5

A comparison was made between the effect of both extracts OLE and MPE on the glucose level and it was noticed the group of diabetic mice treated with olive leaf extract given reduced the blood glucose level higher than the group of diabetic mice treated with mango peel extract

compared to control group. The statistical analysis revealed that there was a significant difference in the between different groups blood glucose levels for the diabetic mice treated with olive leaf extract were significantly ($p < 0.05$) lower than diabetic mice treated with mango peel extract as shown in table 5.

Table 5. comparison between the effect of OLE and MPE in treatment the diabetic disease in the mice comparison with control -ve and control +ve groups.

Groups	weeks			
	1 st	2 nd	3 rd	4 th
Control -ve	90.6±0.26 c B	92.9±0.27 c B	91.6±0.16 b C	93±0.22 a B
Diabetic mice without treatment (control+ve)	218.6±0.4 c B	219.8±0.37 b B	220.8±0.37 b C	223.6±0.4 a AB
Diabetic mice treatment with OLE	87±0.7 a A	84.8±0.66 a A	85.2±0.73 a A	84.6±0.87 a A
Diabetic mice treatment with MPE	93.8±0.37 a A	94.2±0.66 a A	93.4±0.8 b B	90.4±0.67 c C

DISCUSSION

The study finding of using olive leaf extract and mango peel extract to treat diabetic mice presents a good agreement with ^{16,17}. In comparison, olive leaf extracts recorded ($p < 0.05$) lower than mango and control treatment, which agreed with ¹⁸. This reduction of blood glucose levels by olive leaf extract may happen as a result increase in the excretion of sugar from the body or an increase in insulin release from the pancreas ¹⁹. The low level of sugar is due to the ability of phenolic compounds to delay the decomposition and absorption of sugars by inhibiting the action of the glucosidase enzyme²⁰. This discrepancy between the two plants is due to a difference in the process of synthesizing the chemical compounds of the plants ²¹. Ethanol was used solvent for the extraction of bioactive compounds form for olive leaf and mango peel, its less toxic than other solvents ¹⁵. Due to the ability of these phytochemical compounds to fight free radicals and regulate the functioning of cells within the body, the extract is effective in pharmaceutical use and the prevention of many diseases^{22,23}.

CONCLUSION

The objective of this study was to use olive leaf extract and mango peel extract to treat the diabetic mice, where the peel ethanol extract showed a decrease in the blood glucose level for the diabetic mice treated with it compared with the control group.

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