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Effect Of Gum Arabic And Olive Leaf Extract On Blood Sugar And Antioxidant Level In Healthy And Experimental Diabetic Male Rats

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ABSTRACT

This study intends to consider the non-public properties of the aqueous crude extract of gum Arabic and Olive leaf extract that became investigated in fasting fitness rats and alloxan–diabetic rats. Blood samples had been accumulated from the tail of rats and serum glucose became measured all through the experiment. A considerable discount in blood glucose of diabetic animals (116.62 ± 6.83) mg/dl in case of management of gum Arabic and Olive leaves in assessment with diabetic manipulate (91.08 ± 5.21) mg/DL. Ordained to evaluate in vivo the hypoglycemic effect of gum Arabic and olive leaves and their amalgamation treatments. Forty-two male rats had been inconsistently into seven companies of six each: prepare to non-diabetic, non-dealt with diabetic, diabetic dealt with (10 g/kg/day), olive leaves extract, gum Arabic manipulate to diabetic dealt with (10 mg/kg/day), an amalgamation of olive leaves extract and gum Arabic, diabetic dealt with became recommended with the aid of using feeding rats on excessive fat-excessive glucose weight-reduction plan for four weeks. Biochemical assessment has found that gum Arabic extract and olive leaves can alleviate the severity of depressing glucose n, hyperglycemia, and dyslipidemia secretion. Crude extract confirmed fantastic interest for all the enzymatic processes tested. Enzymatic antioxidants SOD and CAT display fantastically interesting degrees of dismutase of the plant.

Keywords: glucose secretion, diabetes, Antioxidant enzyme, Gum Arabic, olive leaves.

INTRODUCTION

Some countries of unique human beings use herbs and leaves of timber as conventional options, like extravagance unique styles of illnesses. Herbs have been taken into consideration to indicate the ability to remedy opportunities for numerous various styles of diseases (1). Diabetes mellitus (DM) is a metabolic disease characterized via way of means hyperglycemia because of faulty insulin movement, insulin secretion, or both. Institution of problems characterized are complicated and combined via way of means of hyperglycemia that has reached epidemic proportions inside the present century (2). Diabetes Type 2 is taken into consideration via way of means of hyperglycemia, peripheral resistance to the movement of insulin, and are eventual destruction of insulin-generating β-cells inside the pancreas (3). Diabetic sufferers are at an amplified chance for kidney harm, cardiovascular disorder, blindness, nerve and limb amputations. Diabetics below large chance

for early unique cancers first-rate to the immunological disturbances caused via way of means of uncommon metabolism. Chubbiness is a prime predisposing thing inside the improvement of diabetes. In heavy populations, inflammatory molecules produced via way of means of adipose tissue and expanded move of loose fatty acid (FFA) play a vital position in generating peripheral insulin resistance in addition to growing harm to the insulin-generating β-cells. Herbal drugs remedial supplied were advised for the recovery of diabetes. Herbal tablets are prescribed extensively because of their usefulness, much fewer aspect results, and relatively low cost (4). Because it comes from the Acacia tree, gum Arabic is also known as gum acacia. The acacia grows in a region of Africa that stretches from Senegal to Sudan (5). Gum Arabic (GA) is a member of the Fabaceae family, which includes gum acacia. GA is a sticky dried exudate obtained mostly from the stems and branches of Acacia Senegal, a water-soluble nutritious fiber.Polysaccharides with high-molecular-weight magnesium, calcium, and potassium salts make up the majority of the mixture. The viscosity influence of such fibers slows carbohydrate digestion and absorption, moderating glycemic index and weight loss(6).In experimental mice, GA inhibits glucose absorption in the stomach by interacting with the quantity of sodium-glucose transporter-1 (SGLT1) on the membrane (7). GA is taken into consideration as a vital herbal product with antioxidant, anti-hyperlipidemic, and hypoglycemic movement roles (8). Olives timber, one in every of many neighborhood flowers considerable in unique countries, aren't the simplest used for meals intake however have additionally been extensively utilized in numerous approaches because of the remedy of desire for plenty varieties of illnesses, such as diabetes (9) individuals are willing to use those choices to control distinctive varieties of disorder due to recommended antioxidant and anti-inflammatory properties, in addition to particular insulin-sensitizing qualities (10). Using olive leaf extract (OLE) to manipulate DM is an opportunity for a diabetes control approach (11). The olive tree is substantially valued via way of means of the Arab-Muslim human beings and is taken into consideration a blessed tree due to the fact it's miles referred to numerous instances within the Holy Quran (12). Several kinds of research have established that the leaves of Olea europaea L. include a beneficent quantity of bioactive compounds (14, 15). The current study, which is a meta-evaluation of the effects of gum Arabic and olive leaf extract on blood sugar and antioxidants in diabetic rats, is possibly the first of its kind in the world. The research evaluates and statistically analyzes randomized controlled trials (RCTs) of OLE's hypoglycemic effects in diabetic rats, as well as OLE's effects on the lipid profile.

MATERIALS AND METHODS

Experimental animals

Twenty-four healthy adult male norvegicus rats (200-250 g body weight) were purchased from the central animal house of Faculty of Biological Dep., Alqufah University, Iraq. before any treatments rats were modified for two weeks under standard laboratory conditions than kept for 12-hour light-dark cycle, at a reasonable temperature of 20-25°C, and unrestricted access to food and water Following the housing period, rats were randomly divided into seven groups. Each group consisted of six rats that were fed conventional rat chow and purified water and were treated as usual controls.

Extract preparation

Preparation of aqueous extract of Gum Arabic

The fine particles were obtained from a reputable local market, cleaned, and checked for contaminants. After being rinsed with water, they were desiccated at a location away from direct sunlight. The gum Arabic was extracted by dissolving 10 gm in 100 ml of distilled water after complete drying.

for Preparation of aqueous extract of olive leaves

The leaves were collected from olive trees from Wasit governorate in autumn (in November) because the cambium is very active and thin-walled and gets detached easily. Then washed with water to remove dust and suspended material, after that dry it at room temperature for three days, and then grounded to powder. Take 50 gm of olive leaves powder in 250 ml of distilled water.

Induction of diabetes

The induction of diabetes was performed in the second group (G2, 3, 4 & 5), which included thirty-two rats, after they withheld food for about 12-hours then the rats are injected with alloxan prepared at the time of injection (100 mg/Kg) of body weight, into the peritoneal cavity (IP), at an amount of (1mm) of physiological saline solution (Katsumata, et al., 1992). Provided to the standard rat chow and glucose (5 %) added to drinking water then the rats were allowed to take food and water sufficiently. After that test, strips were used to confirm the appearance of glucose, and in the end, the rats showed a blood sugar level (200mg/100 cm3) also show signs of extreme fatigue and frequent urination were considered to have diabetes (Alarcon et al., 2002).

Experimental design

In this current study, male laboratory rats were divided into seven following groups: -

Control group I (G1): normal rats fed on standard rat chow and drinking distilled water only at an amount of (1) ml throughout the period of experiment and became the control group.

Group II (G2): was sub-partitioned into six males with diet-induced diabetic rats by alloxan at a concentration of 100 mg/Kg, of bodyweight this quantity dissolved in (1) ml of Dis. water where the dosed duration of the experiment.

Group III (G3): diabetic rats treated with gum Arabic dis. water extract (10g/ 100 ml), at the concentration of 10% at the rate of (1) ml (Almohaimeed et al., 2018).

Group IV (G4): diabetic rats treated with olive leaves (50mg/ 250 ml), at the concentration of 10% at the rate of (1) m (Burkey et al., 2005).

Group V (G5): diabetic rats treated with a mixture of gum Arabic extract and olive leaves with a concentration of 10%.

Group VI (G6): It consists of six healthy males and does with gum Arabic the concentration of 10%.

Group VII (G7): It includes six healthy males and does with an aqueous extract of olive leaves at a concentration of 10% of body weight at the rate of)1) ml. orally administered for 30 days. All treatments were administered once daily and orally for 4 weeks. The amount was used to weekly according to weight changes to maintain the symmetry of dosage per kg of body weight in rats during the whole period of the experiment.

Blood samples

Treatment them for four weeks, all rats were decollated then blood samples were serene from the heart directly by the Cardiac Puncture method by using officinal injection sterile and divorced by centrifugation at 3000 rpm for 20 mins. The resultant supernatant was collected to be freshly taken to the laboratory for biochemical parameters assessment.

Statistical analysis

SPSS 16 was used for statistical analysis, which included one-way ANOVA and post hoc Duncan's multiple range tests (SPSS, Chicago, Ill). The data were presented as meanSEM, with a statistical significance of P0.05.

RESULTS AND DISCUSSION

The consequence of supplied gum Arabic and olive leaves on the glucose

Medicinal plants were used to prevent cardiovascular illnesses by using traditional medicine as natural healing pharmaceuticals with therapeutic unique effects, as well as inflammation problems and cancer risk reduction. Furthermore, the availability of energetic chemical compounds as agents for medication production gives healing plant life a unique place in the pharmaceutical sector (16).Furthermore, they're intensive for the food and cosmetic industry as additives, due to their protecting effects because of the survival of antioxidants and antimicrobial mechanisms (17). As proven in Table 1, supply rats with diet-induced diabetes with remarkably increased glucose. However, frequently in treatment combination groups using gum Arabic and olive leaves for treatments extenuated the intensity of hyperglycemia to a great extent. Value of glucose was within regular in the healthful control group then designation elevated within Denotation dropped near to regular results in the diabetes control group, and denotation declined near to regular results in the diabetic treated groups. Representative of the exceptional anti-diabetic impact of a combination of gum Arabic extract and olive leaves, as well as their synergistic effects with olive leaves, resulting in improved outcomes (18).

Effect of gum Arabic and olive leaves on serum glucose

The diabetic control group had higher serum glucose levels, indicating aberrant secretion, as seen in Table 1. While there was a considerable reduction in glucose secretion in the treated groups, especially in the combined-treatment groups,specifically in combined-treated groups, relating to the development of improperly excessive glucose levels that represent diabetes and amelioration of the glucose ratio (19).

Table 1: Means ± SD of serum levels of alloxan and glucose in rats fed high fat high glucose diet and treated with gum Arabic and olive leaves.

Group	Glucose (m/dl)
G1	91.08 ± 5.21
G2	253.73 ±34.33
G3	162.89 ±12.89
G4	140.00 ± 7.35

G5	116.62 ± 6.83
G6	92.04 ± 5.06
G7	93.17 ± 6.75
L.S.D	**26.01**

Effect of gum Arabic and olive leaves on serum lipid profile.

In comparison to the normal healthy group, the diabetic control group had severe dyslipidemia, as seen by increases in blood TC, TAG, LDL-C, and VLDL-C, as well as a decrease in HDL-C levels (see table2).On the other hand, exhibited a significant amelioration in the high fat diet-induced dyslipidemia that diabetic groups treated with gum Arabic extract, and olive leaves (20).

Table 2: Means ± SD of lipid profile (TC-TAG-HDL-LDL-VLDL) in rats fed high fat high fructose diet and treated with gum Arabic and/ or olive leaves

Group	**Lipid Profile (m/dl)**				
	Triglycerides	**Cholesterol**	**HDL**	**Triglycerides**	**Cholesterol**
G1	132.12 ± 5.09	94.21 ± 4.54	44.59± 4.02	96.46 ± 11.49	26.40 ± 1.01
G2	182.15 ± .73	217.70±12.10	28.46± 4.80	180.05 ± 2.40	36.43 ± 0.54
G3	159.93 ± 7.21	153.70 ± 5.61	36.58± 1.39	147.07 ± 0.61	31.98 ± 1.44
G4	156.58 ±1.63	138.37 ± 9.09	40.62± 1.50	139.17 ± 3.36	31.28 ± 0.37
G5	147.12 ± 6.10	113.04±10.69	44.57± 4.29	124.15 ± 3.26	29.45 ± 1.20
G6	133.19 ± 0.23	98.17 ± 1.99	43.36± 2.78	112.16±14.34	26.77 ± 0.18
G7	133.86 ±1.40	102.96 ±7.70	43.81± 3.27	98.02 ± 5.06	26.77±0.28
L.S.D	**1.49**	**13.05**	**5.80**	**14.18**	**4.76**

Effect of gum Arabic and olive leaves on enzyme activity

Gum Arabic and/or olive leaves, a traditional medicinal plant, were researched for their antioxidant potency in terms of antioxidant enzymatic potentials to support their traditional medicinal use.In this study, the activity of antioxidant enzymes from gum Arabic and/or olive leaves, namely catalase (CAT) and superoxide dismutase (SOD), was measured (Table 3). For all of the enzymes examined, the plant extract demonstrated high enzyme activity.As a result, we can say that gum Arabic and/or olive leaves contain antioxidant enzymes in their tissues, and that we were able to extract the enzymes by providing the necessary circumstances(21).

Table 3: Means ± SD of enzyme active in rats fed high fat high treated with gum Arabic and/ or olive leaves

Group	**Enzyme activity**	
	SOD U/L	**CAT U/L**
G1	1.31 ± 13.9	98.98 ± 572.22
G2	0.62± 5.89	56.41 ± 399.33
G3	2.32 ± 8.55	35.72 ± 411.57

G4	1.17 ± 8.13	26.21 ±471.49
G5	1.41 ± 12.8	23.81 ±490.88
G6	2.15 ± 13.5	29.09 ± 575.53
G7	0.85± 13.35	49.05 ± 583.95
L.S.D	**2.67**	**52.34**

DISCUSSION

Nearly 800 plants with anti-diabetic potential have been identified using ethnobotanical data (21). Regarding the impact of gum Arabic and olive leaves on glucose concentration in diabetes mellitus, we have registered an insignificant decrease in the random blood glucose concentration in rats (22). Other studies concluded massive blood glucose concentrations have been decreased after gum Arabic treatment in mice and Indian human subjects. Also confirmed the large impact of olive leaves in reducing blood glucose concentration in rats examine to gum Arabic. However, the mixed gum Arabic and olive leaves dose turned into greater effective in glucose (23). We have indicated that Arabic gum and olive leaves dose considerably decreased lipid profile (TC-TAG-HDL-LDL-VLDL). Our study revealed that the gum Arabic and olive leaves significantly decreased the activity of enzymes. Found that both are reduced hyperglycemia and hyperlipidemia (24). Moreover, the combination of gum Arabic with olive leaves extract led to good synergistic effects. The previous study show that SOS activity was reported to be 21.02 units per gram of tissue for gooseberry, 6.58 units per gram of tissue for grapes, 30.45 units per gram of tissue for orange, and 6.91 units per gram of tissue for tomato, respectively (26). The decrease in CAT activity is thought to be a common response to a variety of stimuli(27).Under stressful conditions, CAT activity is thought to be reduced due to suppression of enzyme synthesis or a change in the assembly of enzyme subunits (28). It could also be linked to degradation produced by induced peroxisomal proteases, or it could be caused by photo-inactivation of the enzyme.SOD and CAT activities were significantly higher in the olive tree and gum Arabic than in these samples. It is possible that Gum Arabic and olive trees have a high-quality antioxidant capability based on enzyme activity results (29).

CONCLUSIONS

Gum Arabic and olive leaves ameliorate reduce blood glucose levels, hyperglycemia, and hyperlipidemia. So show that indicates their antidiabetic effects. The probable device of achievementof chewing gum Arabic obstructs carbohydrates digestion and hinders glucose absorption in the colon via an interface with the sodium-glucose transporter-1 during the viscosity effect of its fibers (SGLT1). At the same time, olive leaves as an antidiabetic were found to alter -cell regeneration, insulin secretion, and the activities of glucose metabolism enzymes. A mixture of gum Arabic extract with olive leaves present more advantageous effects, It is an essential indication of antioxidant capacity because it correlates with a lower glycemic index and a lower chance of becoming involved in cellular defense against reactive oxygen species in living organisms. In this investigation, we determined the activity of two distinct antioxidant enzymes. (SOD and CAT enzymes) in gum Arabic extract with olive leaves the plant. Our outcome showed that gum Arabic extract with olive leaveshas a high antioxidant capacity Based on the findings, we can deduce that the plant is used to treat disorders caused by oxidative stress since it is a promising source of natural antioxidants.

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