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The Impact of Ivy (*Convolvulus arvensis L.*) Leaves Extract on Biological Markers of Hyperglycemic Rats

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Abstract:
The problem of hyperglycemia has grown to be a significant obstacle for worldwide health issues. Drug resistance to treatments for diabetes and cytotoxicity have caused scientists worldwide to turn their attention from artificial to medicinal herbs. The current investigation aimed to find out how Ivy leaves extract affected the biological markers of diabetic rats. Thirty male adult albino rats (150 ±10 g) were used and divided into five groups (6 rats each). The first group was kept as a negative control group and was given the basal diet, but alloxan injections were given to the other four groups to cause hyperglycemia; the second group was given only a basal diet and served as a positive control group, which as the other three groups received a daily oral dose of ivy leaves extract 50, 100, and 150 mg/kg B.W. The results of treated rats showed a decrease in relative organ weight, liver enzymes, kidney function, serum glucose level, and lipid profile. At the same time, BWG, F.I., FER, and HDL-c were improved by rising compared to the positive control group when ivy leaf extract 50, 100, or 150 mg/kg B.W. was administered orally. The Ivy leaves extract had the best results when used at 150 mg/kg B.W. Conclusion These findings support the extract's traditional usage in the treatment of diabetes by indicating that it contains bioactive substances that can lower persistent hyperglycemia while avoiding complications.

Keywords*: Ivy leaves, diabetes mellitus, serum glucose*

Introduction

A series of physiological dysfunctions known as diabetes mellitus are characterized by hyperglycemia that is caused by either insulin resistance, insufficient insulin secretion, or high glucagon production (1). According to the Diabetes Atlas 2021, diabetes will be

pervasive throughout the world in 2021. 1 in 10 or 537 million people aged 20 to 79 had diabetes. In 2030, it will anticipate that this number will reach 643 million (2). Untreated hyperglycemia can result in a wide range of significantly, potentially fatal problems, including harm to the kidneys, heart, eyes, nerves, and peripheral vascular system. Thus, it is essential to properly and rapidly treat hyperglycemia to prevent illness complications and enhance patient health care (3). Many people are increasingly interested in using medicinal herbs, plants, or their extracts because some medications might have undesirable effects (4).

Ivy (*Convolvulus*) is a genus of the *Convolvulaceae* family, sometimes known as the bindweed or glory family. This family, which has over 250 species of flowering plants and can be found as trees, shrubs, and herbs, is one of the most economically and medicinally significant groups (5). Ivy is a green climbing plant that is frequently seen on the sides of trees, homes, and walls. It is also frequently utilized as a garden accent and as a decorative element on the sides of buildings and walls. Ivy leaf has also been utilized for a long time as a medicinal herb (6). Studies on this plant's phytochemistry revealed that the presence of steroid hormones, phenolic acids (caffeic, chlorogenic, neochlorogenic, dicaffeoyl-quinic, rosmarinic, dihydroxybenzoic protocatechuic, and p-coumaric), flavonoids quercetin, kaempferol, rutin, isoquercitrin, astragalin, and kaempferol in ivy leaves extract (7-9). The antibacterial, anthelmintic, antileishmanial, in vitro antispasmodic, hemolytic, anticarcinogenic/antitumor, and antifungal characteristics of ivy leaves extract are only a few examples of prior studies that have shown the medicinal benefit of this plant. The anti-elastase, anti-hyaluronidase, secret lytic, spasmolytic, antibacterial, and hepatoprotective properties of an Ivy leaves extract were also demonstrated. Only a small number of studies have looked into its antidiabetic potential in addition to all these medical applications (10).

The present study examined the effects of different levels of ivy leaf extract on the biological and biochemical parameters of hyperglycemic rats.

Material & Methods

Plants:

Ivy was obtained from Agriculture Research Center, Giza, Egypt.

Preparation of ivy leaves extract

The Ivy leaves were washed carefully with tap water, then dried in the shade and milled into fine powder. The ivy leaves were dried at a certain temperature and crushed and then passed through a sieve and then 3150 ml ethyl alcohol 70% to 350 grams of ivy powder were placed in an airtight container and then it was shaken at intervals, lasts for 4 days and then filtered. The extract was put in a water bath on a low heat until the alcohol was volatilized.

Basal diet

The El-Gomhoria Company for Trading Drugs, Chemicals, and Medical Instruments provided the casein, vitamins, minerals, cellulose, choline chloride, methionine, ethylene glycol, and ammonium chloride that were obtained for the experiment.

Experimental animals

The work was carried out at the Faculty of Home Economics, Menoufia University, Egypt. On the adaptation period, thirty male albino rats (150±10 g) were given a standard diet for 7

days. The standard diet was Perpetrated according to AHN (1993) (11). Salt and vitamins mixtures were prepared according to Hegested *et al*.(12) and Campbell *et al*.(13). The rats were kept in their own wire cages in a typical lab setting. As exterior look, form, color, and distribution of the rats' hair, as well as their daily physical activity, were all noted. Rats were given a diet in specialized feeding containers to prevent contamination and food loss. Additionally, rats were given water via a glass tube that was inserted through wire cages and supported on one side by upside-down bottles. Each day, the provided food and water were examined.

Induction of hyperglycemic

According to the technique reported by **(14)**, normal, healthy male albino rats were given an intraperitoneal injection of freshly prepared alloxan monohydrate in normal saline (150 mg/kg body weight) to induce hyperglycemia. To confirm the development of diabetes, the blood glucose level was tested before and 72 hours later the injection with alloxan. Diabetes was defined as having a fasting blood glucose level above 200 mg/dl, and diabetic rats were employed in this study.

Experimental design

For seven days straight, all rats were fed on a basal diet produced in accordance with AIN (1993). After the adaptation periods, the rats divided into 5 groups (Each group of 6 rats) as follows:

Group (1): Control negative, normal rats fed on basal diet.

Group (2): Control positive hyperglycemic rats fed on basal diet.

Group (3): Hyperglycemic rats were fed on basal diet and treated with ivy extract (50 mg/kg B.W) oral dose daily.

Group (4): Hyperglycemic rats were fed on basal diet and treated with ivy extract (100 mg/kg B.W) oral dose daily.

Group (5): Hyperglycemic rats were fed on basal diet and treated with ivy extract (150 mg/kg B.W) oral dose daily.

Blood sampling

At the end of the study (28 days), blood samples were obtained using the portal vein technique by utilizing a micro capillary glass tube. Blood was then collected into a dry, clean centrifugal tube and allowed to coagulate in a water bath (37°C) at room temperature for 30 minutes. The blood was properly aspirated and put into transparent, tight-fitting plastic tubes and kept frozen at (-20°C) until analysis. The serum was separated from the blood after 10 minutes of centrifugation at 4000 rpm to determine glucose levels for 15 minutes.

Organs

The Drury and Wallington **(15)** procedures for removing the liver, kidney, heart, lungs, and spleen were followed which were washed in saline solution and weighing them.

Biochemical evaluation

Every day of the study period, the amount of food consumed was recorded, as well as weekly determined of body weight. At the end of the experiment, biological evaluation was performed using the following formulae to calculate body weight gain (BWG), feed intake (FI), feed efficiency ratio (FER), and relative organ weight in according to the method described by Chapman *et al.* (16):

BWG (g/d/r) = (Final weight – Initial weight) ÷28
FER = Body weight gain (g/d/r) ÷ Feed intake (g/d/r).
Relative organs weight = (Organ weight ÷ Final weight) ×100.

Biochemical analysis

According to Trinder (17), glucose was measured using an enzymatic test and chemical kits. Alkaline phosphatase (ALP), alanine aminotransferase (ALT), and aspartate aminotransferase (AST) were determined using the methods by Henry (18), Thomas (19), and Moss (20), respectively.

According to AL-Shinnawy (21), Huang *et al.,*(22), and Fossati *et al.,*(23), respectively, uric acid, creatinine, and uric acid levels were determined in serum using commercial kits.

High-density lipoprotein (HDL-c) was measured using the methods recommended by Allain *et al.,* (24), Fossati and Prencipe (25), and Contois (26), respectively. According to DeLong *et al.,* (27) methods, low-density lipoprotein (LDL-c) and very low-density lipoprotein (VLDL-c) were calculated as follows:

VLDL-c = TG/5
LDL-c (mg/dl) = Total cholesterol - (HDL + VLDL-c).

Statistical analysis

Using a computer program (costate), the experimental data were treated to an analysis of variance (ANOVA) for a completely randomized design. Duncan's multiple range tests were performed to assess the differences between means at the level of 95%. Fasting and Altman(28) regarded the difference between treatments to be significant if it was $P \leq 0.05$.

Results and Discussion

It is clear from Table (1) that as a result of the injection with alloxan body weight gain (BWG), feed intake (FI) and feed efficiency ratio (FER) decreased compared to the negative control group. The use of this extract in the doses shown, these results improved by increasing, and G5 (150 mg/kg B.W) recorded the highest results compared to the injected group. It is evident that due to diabetes mellitus reduced BWG, FI and FER This agrees with (29-31). FER reduced significantly ($p<0.05$) when rats injected with alloxan and Increased when administration ivy leaves extracts Bansal *et al*.(32)

The effects of ivy leaf extract on the relative organ weights of the liver, heart, kidney, spleen, and lungs in hyperglycemic rats are shown in Table (2). When compared to the negative control group, all relatives (liver, heart, kidney, spleen, and lungs) exhibited a significant rise ($P \leq 0.05$) due to hyperglycemia. The ivy leaf extract restored the increase of relative organs . In accordance with Khan *et al.,* (33), who stated that studies of organs revealed the protective effect of Ivy via maintaining the normal organ architecture the best result for relative (liver, heart, kidney, spleen, and lungs) weight was recorded for ivy leaf extract (150 mg/kg B.W.) when compared with the positive control group.

Table (1): The effect of Ivy leaves extract on biological changes (BWG, FI, and FER) in hyperglycemic rats.

Parameters Groups	BWG (g/d/r)	FI (g/d/r)	FER
G_1: Negative control	10.12^{a} ±0.99	15.61^{a}±0.06	0.64^{a} ±0.0605
G_2: Positive control	3.23^{e}± 0.29	15.13^{d}±0.03	0.21^{e} ±0.019
G_3: Ivy leaves extract (50 mg/kg B.W)	4.1^{d}±0.35	15.24^{c}±0.02	0.26^{d} ±0.023
G_4: Ivy leaves extract (100 mg/kg B.W)	5.14^{c}±0.44	15.45^{b}±0.04	0.34^{c}±0.029
G_5 : Ivy leaves extract(150 mg/kg B.W)	7.25^{b}± 0.85	15.47^{b}± 0.05	0.46^{b} ±0.041
LSD	0.593	0.0705	0.0315

**Each value represent mean of six replicates ± SD. Mean under the same column bearing different Superscript letters are significantly different at P ≤ 0.05.*

Table (2): The effect of Ivy leaves extract on internal organs (liver, heart, kidney, spleen, and lungs) of hyperglycemic rats.

Organs Groups	Liver%	Heart%	Kidney%	Spleen%	Lung%
G_1:Negative control	2.43^{e}±0.21	0.37^{e}± 0.035	0.634^{e}± 0.023	0.353^{e}±0.031	0.683^{c} ±0.027
G_2:Positive control	4.99^{a}±0.32	0.56^{a}± 0.051	0.997^{a} ± 0.055	0.811^{a}±0.057	0.826^{a} ±0.079
G_3:Ivy leaves extract (50 mg/kg B.W)	3.37^{b}±0.31	0.50^{b}± 0.032	0.885^{b}± 0.046	0.771^{b}±0.051	0.779^{b} ±0.041
G_4: Ivy leaves extract (100 mg/kg B.W)	3.11^{c}±0.29	0.43^{c}±0.031	0.811^{c}± 0.037	0.652^{c}±0.046	0.649^{cd}±0.039
G_5: Ivy leaves extract (150 mg/kg B.W)	2.76^{d}±0.23	0.39^{d}±0.33	0.717^{d}± 0.029	0.475^{d}±0.039	0.633^{d}±0.032
LSD	0.0926	0.0156	0.0243	0.0191	0.0387

**Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).*
**Each value is represented as mean ± standard deviation (n =3).*

The effects of Ivy leaves extract on serum glucose level hyperglycemic rats were demonstrated by the data in Table (3). The collected results demonstrated that there was a significant differences in the higher glucose levels found in the positive control group compared to the negative control group. The values were correspondingly 150.7±1.73 and 84.53 ±2.18 mg/dl respectively. The mean values in the treated groups (G3, G4, and G5) were significantly ($p<0.05$) lower than those in the positive control group (125.34 ±1.32, 107.3± 4.24, and 90.95± 2.18 mg/dl, respectively). Group G5 had the best treatment (150 mg/kg B.W.). These data support the findings of Cazarolli *et al*. (34), who Found that the Ivy induced a highly significant drop in post-prandial serum glucose levels as compared to the standard group and diabetic control, respectively. Ivy inhibited -glycosidase activity more effectively and significantly than the common drug acarbose . Ivy leaves have been shown by Al-Ishaq *et al*., (35) to be able to prevent diabetes and its consequences by regulating the activity of hepatic enzymes, glucose metabolism, and lipid profiles.

Table (3) The effect of ivy leaves extract on serum glucose level hyperglycemic rats

parameters Groups	Glucose (mg/dl)
G_1: Negative control	$84.53^{e} \pm 2.18$
G_2: Positive control	$150.7^{a} \pm 1.73$
G_3: Ivy leaves extract (50 mg/kg B.W)	$125.34^{b} \pm 1.32$
G_4: Ivy leaves extract (100 mg/kg B.W)	$107.3^{c} \pm 4.24$
G_5: Ivy leaves extract (150 mg/kg B.W)	$90.95^{d} \pm 2.18$
LSD	4.967

** Each value is represented as mean ± standard deviation (n = 3).*

**Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).*

Table (4) revealed the effect of Ivy leaves extract on liver enzymes (ALT, AST, and ALP) for hyperglycemic rats. For alanine aminotransferase (ALT), it is obvious that hyperglycemia raised ALT compared to control negative from (35.68±1.214 to 54,54±2.809 U/L). Meanwhile, the antioxidant effect of ivy leaves extracts phenolic compounds, lea to decrease of ALT activity, the highest effect was found for G5 (150 mg/kg B.W). There are a significant (p≤ 0.05) differences between (G3,G4 and G5) and the negative control group. From the results in Table (4) it could be observed that the AST activity was elevated. The increases due to hyperglycemia induced which increased from 37.66±1.05 to 55.35 ± 3.7U/L compared to control negative. While the groups G1, G3, G4 and G5 are significantly difference (p≤ 0.05) from the positive control group, there is no statistically significant (p>0.05) between the G3, G4, and G5 groups.

Regarding alkaline phosphates ALP, it was observed that the mean values of the positive control group and negative control group, which were 90.7±5.631 and 59.3±3.67U/L, respectively. The mean values of the G3, G4, and G5 groups were noticeably lower than those of the positive control group. These results support the findings of Balamurugan and Muthusamy (36) who indicated that the ethanolic extract of Ivy had hepatoprotective action, considering the highest reduced limit for G5 (150 mg/kg B.W). It possesses antioxidant properties and protects the liver from hepatotoxicity caused by carbon tetrachloride. In addition, Qadir *et al.* (37) showed that Ivy extract (200 and 500 mg/kg) exhibited a significant (P≤0.05) decrease in the levels of liver enzymes and total bilirubin raised by paracetamol. Also, Ali *et al.* (38), who reported that Ivy caused a considerable drop in ALT and that research supported the hepato-protective properties, obtained comparable results.

Table (5) showed the effect of Ivy The effect leaves extract on kidney functions (creatinine, urea, and uric acid) level in hyperglycemic rats was demonstrated by the data in Table (5). It was noted that hyperglycemia caused a significant increase in the serum creatinine (ranging from 0.64 ± 0.06 to 1.22 ± 0.09 mg/dl). Given that the highest decreased limit was obtained for G5 (150 mg/kg B.W.) and G4 (100 mg/kg B.W) with non-significant (p>0.05) experimental groups G3, G4, and G5 showed significant reduction in serum creatinine activity ranging from 0.93 ± 0.035 to 0.72 ± 0.011 mg/dl compared with positive control group.

Table (4): The effect of Ivy leaves extract on liver enzymes (ALT,AST, and ALP) in hyperglycemic rats

Groups	ParameALT (U/L)	AST (U/L)	ALP (U/L)
G_1: Negative control	35.68^{e} ±1.214	37.66^{c}±1.05	59.3^{d}±3.67
G_2: Positive control	54.54^{a} ±2.809	55.35^{a} ± 3.7	90.7^{a}±5.631
G_3: Ivy leaves extract (50 mg/kg B.W)	46.313^{b} ±1.74	42.01^{b} ± 1.1	73.1^{b}±1.01
G_4: Ivy leaves extract (100 mg/kg B.W)	42.296^{c} ±1.09	40.71^{b}±0.09	70.03^{bc}±1.024
G_5: Ivy leaves extract (150 mg/kg B.W)	39.386^{d} ±1.30	39.33^{b} ± 0.077	67.01^{c}±1.261
LSD	2.893	3.470	3.893

**ALT=Alanine aminotransferase, AST=Aspartate aminotransferase ALP= Alkaline phosphatase*

** Each value is represented as mean ± standard deviation (n = 3).*

** Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).*

The data in Table (5) reflect the rats used in experiments' serum urea. It was shown that hyperglycemia caused the serum urea activity to increase from 20.3 ±1.23 to 32.2± 2.46 mg/dl. When compared to the positive control group, the experimental diets G3, G4, and G5 significantly (p≤ 0.05) reduced serum urea activity, with the largest decreased recorded for G5 (150 mg/kg B.W.) and G4 (100 mg/kg B.W.), This sentence became wrong according to the modified in the table. The serum uric acid Values experimental rats is shown in Table (5). It is obvious that hyperglycemia caused the serum uric acid activity to increase from (0.893 ± 0.05 to 1.91 ± 0.68 mg/dl). Considering that the G3, G4, G5, and negative control group have non-significant (p≤ 0.05) differences between them, the experimental diets G3, G4 and G5 revealed a substantial decrease in blood uric acid activity ranging from (0.99 ± 0.071 to 0.74 ± 0.055 mg/dl). These findings concur with those of Kandasamy and Ashokkumar (39) who found that treatment with ivy leaves extract significantly reduced serum levels of creatinine, uric acid, and other substances when compared to the paracetamol group. Ivy leaf extract therapy also decreased the histological changes brought on by paracetamol. To prevent the renal damage caused by paracetamol, ivy leaf extract may be utilized.

Additionally, renal functional indicators (urea, creatinine, and uric acid) in plasma and urine of diabetic nephrotoxic In rats are increased significantly (p≤ 0.05) (40). Because ivy leaves have a higher concentration of phytochemicals such flavones, phenolic compounds, B-glycan, and phytosterols, feeding them extract led to lower serum uric acid and creatinine levels (41). In comparison to the paracetamol group, treatment with ivy leaf extract significantly reduced serum concentrations of creatinine, uric acid, and BUN (42).

Table (6) was shown the effect of Ivy leaves extract on serum triglycerides (T.G) and total cholesterol (T.C) of rats injected with alloxan. The positive control group's serum T.G levels were greater than those of the negative control group; their respective values were 136.7± 3.56 and 69.3± 4.23 mg/dl with a significant (p≤0.05) difference between them. There were significant differences (p≤ 0.05) between G3, G4 and G5 the values were 105.3± 3.313, 88.3± 3.052 and 78.60± 2.175mg/dl, respectively.

Table (5): The effect of Ivy leaves extract on kidney functions (creatinine, urea, and uric acid mg/dl) in hyperglycemic rats.

Parame Groups	Creatinii (mg/dl	Urea (mg/dl)	Uric Acid (mg/dl)
G_1: Negative control	0.64^{d} ±0.	20.3^{d} ±1.23	0.893^{b}±0.05
G_2: Positive control	1.22^{a} ±0.	32.2^{a} ± 2.46	1.91^{a} ±0.68
G_3 : Ivy leaves extract (50 mg/kg B.W)	0.93^{b}±0.	25.6^{b} ± 0.94	0.99^{b}±0.071
G_4 : Ivy leaves extract (100 mg/kg B.W)	0.83^{bc} ±0.	23.096^{c}±0.8	0.87^{b}±0.063
G_5 : Ivy leaves extract (150 mg/kg B.W)	0.72^{cd}±0.	21.5^{d}±1.1	0.74^{b}±0.055
LSD	0.161	1.247	0.591

**BUN= Blood urea nitrogen*

**Each value is represented as mean ± standard deviation (n = 3).*

**Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).*

Data in the same Table (6) showed that the serum TC levels for the positive control group was greater than those for the negative control group, at 160.3 ± 6.66 and 98.5 ± 7.413 mg/dl, respectively. There were non-significant differences betweenG3 and G4; the values were 117.1 ± 0.891 and 116.7 ± 0.505 mg/dl. And was non significant (p≤ 0.05) differences between G4 and G5 which recorded 116.7 ± 0.505 and 107.5± 0.92 mg/dl, respectively. These findings supported those by Bunkrongcheap et al. (43), who stated that ivy extract increased TG and TC excretion in the feces. Ivy is a very beneficial dietary fiber for decreasing cholesterol with many possible applications.

Table (6): The effect of Ivy leaves extract on serum triglyceride and serum total cholesterol of hyperglycemic rats.

Parameters Groups	T.G (mg/dl)	T.C (mg/dl)
G_1: Negative control	69.3^{e} ± 4.23	98.5^{d} ± 7.413
G_2: Positive control	136.7^{a} ±3.56	160^{a} ± 6.66
G_3: Ivy leaves extract (50 mg/kg B.W)	105.3^{b} ± 3.313	117.1^{b} ± 0.891
G_4: Ivy leaves extract (100 mg/kg B.W)	88.3^{c} ± 3.052	116.7^{b} ± 0.505
G_5: Ivy leaves extract (150 mg/kg B.W)	78.60^{d} ± 2.175	107.5^{c} ± 0.92
LSD	1.413	6.487

** Each value is represented as mean ± standard deviation (n = 3).*

** Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).*

The effect of ivy leaf extract on lipid profile (HDL-c, LDL-c, and VLDL-c) in hyperglycemic rats was demonstrated by the data in Table (7). The result demonstrates that, with a significant difference (P≤0.05), the HDL-c of the rats in the negative control group had the greatest value when compared to the positive control group. The mean values were, respectively, 58.67± 2.87 and 37.05 ±1.035 mg/dl. While G3 had the lowest HDL among the treated groups, G5 had the highest value (150 mg/kg B.W.) with a significant difference (P≤0.05).

In contrast, LDL-c, and VLDL-c levels in the positive control group of rats were significantly higher than those in the negative control group (P≤0.05) These findings are in line with those published by Fahy *et al.* (44), who claimed that ivy leaf extracts might be utilized to create medications to halt cardiovascular illnesses, which are mostly brought on by raised serum

LDL-c, TG, TC, and VLDL-c levels with decreased serum HDL-c. according to Azman *et al.* (45) Ivy exhibited a potent antioxidant effect in halting the breakdown of lipid in muscle feeding. Extract from Ivy is a natural food antioxidant.

Table (7): The effect of Ivy leaves extract on lipid profile in hyperglycemic rats

Parameters Groups	HDL (mg/dl)	LDL (mg/dl)	VLDL(mg/dl)
G_1: Negative control	58.67^{a} ± 2.87	25.98^{d}± 7.38	13.86^{e}± 0.80
G_2: Positive control	37.05^{e}± 1.035	95.61^{a}± 6.063	27.34^{a}± 2.45
G_3: Ivy leaves extract (50 mg/kg B.Wt)	39.7^{d} ±1.022	56.34^{b}± 1.012	21.06^{b} ± 0.97
G_4: Ivy leaves extract (100 mg/kg B.Wt)	42.3^{c}± 1.995	56.74^{b}±0.033	17.66^{c}± 0.73
G_5: Ivy leaves extract (150 mg/kg B.Wt)	45.1^{b} ±1.801	46.68^{c}±0.778	15.72^{d} ± 1.19
LSD	1.445	6.404	0.541

**Each value is represented as mean ± standard deviation (n = 3).*

**Mean under the same column bearing different superscript letters are different significantly (p ≤ 0.05).*

Conclusions

The findings confirmed the widespread use of this herbal drink by demonstrating the anti-hyperglycemic activity of ivy leaves extract and exhibiting that it is a rich source of phytochemicals, as reviewed in prior studies, which are known to exhibit antidiabetic effects and other biological properties that can be helpful for patients with chronic hyperglycemia.

Conflict of interest

The authors say that they have no conflicts of interest related to the publication of this work. This article is based on a master's thesis that was submitted to the Department of Nutrition and Food Science, Faculty of Home Economics at Menoufia University in Shebin El-Kom City, Egypt.

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تأثير مستخلص أوراق اللبلاب على المؤشرات الحيوية للفئران المصابة بأرتفاع سكر الدم

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الملخص العربي:
أصبحت مشكلة ارتفاع السكر في الدم عقبة رئيسية أمام القضايا الصحية في جميع أنحاء العالم. تسببت مقاومة الأدوية لعلاج مرض السكر والسميه الخلويه في تحويل انتباه العلماء في جميع أنحاء العالم من العقاقير الصناعية إلى الأعشاب الطبيعية. الهدف من البحث الحالي هو معرفة تأثير مستخلص أوراق اللبلاب على المؤشرات الحيويه للفئران المصابة بمرض السكر.تم استخدام ثلاثين من ذكور فئران الألبينو البالغة (١٥٠ جم ± ١٠) وتم تقسيمها إلى ٥ مجموعات (٦ فئران لكل مجموعة). المجموعة الأولى كمجموعة ضابطة سالبة ، تم تغذيتها على النظام الغذائي الأساسي فقط ، بينما تم حقن المجموعات الأربع الأخرى بواسطة الألوكسان للحث على ارتفاع السكر في الدم. المجموعة الثانية تغذت على الوجبة الغذائية الأساسية فقط وظلت كمجموعة ضابطة إيجابية ، أما المجموعات الثلاث الأخرى فتغذت على الوجبة الغذائية الأساسية بالإضافة الي مستخلص أوراق اللبلاب ٥٠،١٠٠،١٥٠ (مجم / كجم من وزن الجسم) بجرعة يومياً. أدى حقن الألوكسان إلى خلل في التحليلات البيوكيميائية والمؤشرات البيولوجية مقارنة بالمجموعة الضابطه السالبة. على العكس من ذلك، فإن استخدام مستخلص أوراق اللبلاب٥٠،١٠٠،١٥٠ملجم / كجم من وزن الجسم بالفم أدى إلى تحسين نتائج الحقن بالألوكسان ، حيث أظهرت نتائج الفئران المعالجة انخفاضًا في وزن الأعضاء النسبية إنزيمات الكبد ووظائف الكلى وسكر الدم و دهون الدم ، باستثناء HDL،FER،FI،BWG ، مقارنة بمجموعة الضابطه الموجبة. تم تسجيل أفضل النتائج لمستخلص أوراق اللبلاب 150 (مجم / كجم من وزن الجسم). المستخلص: هذه النتائج تشير إلى أن هذا المستخلص يحتوي على مركبات بيولوجيًا قادرة على تقليل ارتفاع السكر في الدم المزمن مع منع مضاعفاته ، مما يبرر استخدامه التقليدي في إدارة مرض السكري.

الكلمات المفتاحية: أوراق اللبلاب، داء السكري، سيرم جلوكوز.