Influence of Citrullus Colocynthis Pulp Extract on some Biochemical Parameters of Experimental Diabetic Female Rats

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Abstract: The present study designed to investigate the effect of Citrullus colocynthis pulp extract on serum glucose level and some biochemical parameters of experimental diabetic female rats. Female rats included: the first group was orally administrated with a normal saline (1 mL/ kg⁻¹ body weight), the second group was given only C. colocynthis pulp extract (200 mg /kg⁻¹ body weight), the third group (diabetic group) were given normal saline (1 mL/ kg⁻¹ body weight) and the fourth group (diabetic group with extract) were given C. colocynthis extract (200 mg /kg⁻¹ body weight). The results indicated a significant decrease in level of glucose of rats in second group that treated with extract compared with the first and third groups. Also, the results were indicated a significant decrease in levels of cholesterol and AST, also decrease triglyceride and ALT levels in second and fourth groups compared with first and third groups.

Keywords; Citrullus Colocynthis, Diabetes Mellitus;

1. Introduction

Diabetes Mellitus DM is a chronic metabolic disorder characterized by extensive complications. It is the largest endocrine disease in the world associated with increased morbidity and mortality [1]. Globally, the estimated incidence of DM and projection for year 2010, as given by International Diabetes Federation is 239 million [2], considered as one of the five leading causes of death in the world [3]. The World Health Organization (WHO) reported that 300 million peoples would suffer from diabetes mellitus by the year 2025 [4].

Medicinal plants provide a valuable therapeutic alternative [5]. Despite the fact that insulin has become one of the most important therapeutic drugs for diabetes mellituse, efforts are continuing to
find insulin alternatives from other sources. In fact, apart from classical chemically prepared antihyperglycemics, the used of traditional medicinal plants with hypoglycemic effect has gained worldwide popularity. More than 400 traditional plant treatments have been reported for diabetes mellitus, but only a few have received a scientific and medical assessment. [6,7].

Experimental diabetes in animals has given great insight into the physiological and biochemical disruption of diabetes. Diabetes caused by alloxan in rats presents many features that appear in people with uncontrolled diabetes. Alloxan is widely used to provoke diabetes because of the fact that it causes severe necrosis in β- cells with insulin secretion deficiency as a result [8].

*Citrullus colocynthis* (Cucurbitaceae), commonly known as "bitter apple", "colosynth" consider as a tropical plant that grows broadly in the Arabian countries and widely in other parts of the world. In traditional medicine, this plant has been used to treat constipation' [9], Diabetes [10], edema, fever, jaundice cancer, bacterial infections, cancer and is used as an abortion [11], and it is used against liver diseases [12], antioxidant [13]. *Citrullus colocynthis* plants claims to have hypoglycemic properties as reviewed from various literature [14,15].

The aim of research is to investigate the Influence of *Citrullus colocynthis* seedless pulp extract on serum glucose and some biochemical parameters of normal and diabetic female rats.

2. Materials and Methods:

Plant collection: 'Fresh *Citrullus colocynthis* fruits were collected from (Um unige in South of Iraq (100 Km out Thi-qar province, Iraq). Mature black seeds were manually separated from the pulp. Then, the pulp was dried and minced with a powder mill in preparation for extraction. The Preparation of the extract: The pulp powder was extracted from individual *Citrullus colocynthis* for three times at room temperature with water/ethanol mixture (80/20, v/v) for 6 h each round [16,17]. The filtrate was collected and concentrated under vacuum at temperature (not exceeding 50°C) and then dissolved in normal saline that freshly prepared to a final concentration of (200 mg mL$^{-1}$) for later use.

Laboratory animals: Female rats (190-272 g) were obtained from the animal house of Department of Biology, College of Science, University of Thi-Qar, Iraq. The rats were housed in standard metal cages' (6 rats/cage). 'Rats were divided into (four groups) comprising six animals in each group. All treatments of experimental rats were given orally by using cavage needle at a single dose day$^{-1}$. The rats were treated for 21 days as follows:

1. The first group treated orally with normal saline (1 mL/ kg$^{-1}$ body weight) for 21 days.
2. The second group were treated orally with 1 mL of *Citrullus colocynthis* pulp extract (200 mg / kg$^{-1}$ body weight day$^{-1}$) for 21 days.
3. The third group (Diabetic group) treated only with normal saline (1 mL/ kg$^{-1}$ body weight).
4. The fourth (Diabetic group with extract) treated only with *Citrullus colocynthis* pulp extract (200 mg kg$^{-1}$ of body weight day$^{-1}$) for 21 days.

Preparation of diabetic rats: To achieve steady state levels of serum glucose, normal rats were fasted for 18 h [18]. dissolved alloxan monohydrate (Sigma, USA) in tap water was administered intraperitoneally (125 mg kg$^{-1}$).

3. Results and Discussion

The results explained that blood glucose level of female rats treated with *Citrullus colocynthis* pulp extract decreased significantly (P<0.01) compared with first, and third groups. In same table, the second group showed a significant decreased of blood glucose level compared with the first group, while the third group indicated a significant increased in this parameter compared with first and second groups, Table 1.
Table (1) Influence of *Citrullus colocynthis* pulp extract on blood glucose level of female rats

| Animal groups | Blood glucose |
|---------------|---------------|
| First group   | 152±1.45b     |
| Second group  | 119±0.57d     |
| Third group   | 293±2.51a     |
| Fourth group  | 133±2.51c     |

-The values are expressed as Mean ± SE, (n = 6).
- Different letters indicated a significant difference at (P<0.01).

Also, table (2) showed the effects of extract on the triglyceride and cholesterol levels. There is non-significant increase in triglyceride of the second and third groups compared with the first group. Also, the results showed non-significant decrease of triglyceride level in the second group compared with third group. The same table showed decreased significantly of cholesterol level in the second and fourth groups compared with the first and third groups. Also, there was a significant increase at level of cholesterol in the third group compared with the first group.

Table (2) Influence of *Citrullus colocynthis* pulp extract on the Triglyceride, Cholesterol levels of female rats

| Animal groups | Triglyceride (mmol/L) | Cholesterol (mmol/L) |
|---------------|-----------------------|----------------------|
| First group   | 0.72±0.3a             | 3.08±0.3a            |
| Second group  | 0.89±0.2a             | 1.93±0.2a            |
| Third group   | 1.48±0.15a            | 4.28±0.12a           |
| Fourth group  | 0.72±0.14a            | 2.7±0.15b            |

-The values are expressed as Mean ± SE, (n = 6).
- Different letters indicated a significant difference at (P<0.01).
- Same letters were indicated non-significant difference at (P<0.01).

Table (3) showed that AST and ALT levels in the second, third and fourth groups decreased significantly compared with the first group at (P<0.01). Also, AST level of the third and fourth groups increased significantly compared with the second group. AST level decreased significantly in the fourth group compared with the third group. There was non-significant difference in ALT level between the groups second, third and fourth at (P<0.01).

Table (3) Influence of *Citrullus colocynthis* pulp extract on the GOT, GPT levels of female rats

| Animal groups | AST (U/L)          | ALT (U/L)          |
|---------------|--------------------|--------------------|
| First group   | 41.33±0.33a        | 6.1±0.13a          |
| Second group  | 10.33±0.33d        | 4.6±0.24b          |
| Third group   | 18±1.00b           | 3.3±0.33b          |
| Fourth group  | 13±1.52c           | 3.6±0.33b          |

-The values are expressed as Mean ± SE, (n = 6).
- Different letters indicated a significantly difference at (P<0.01).
- Same letters were indicated non-significant difference at (P<0.01).

Recently, various plant extracts have been claimed to be useful for the treatment of diabetes. According to earlier studies, plant extracts cause antihyperglycemic effect by promoting beta cells regeneration or by protecting the pancreas from destruction, by restricting glucose load as well as by promoting unrestricted endogenous insulin action or its effect beta cells to release insulin and activate the insulin receptors to absorb the blood sugar [19].
The current investigation reveals that ethanol that extracted of *Citrullus colocynthis* has shown significantly pharmacological activity towards lowering blood glucose in diabetes rats treated with extract compared with the first and third group (diabetic group). These raised of blood glucose levels in fourth group (diabetic rats) were declined sharply after oral administration of extract. [20,21,22] showed that "the pulp extract of *C. colocynthis* exerted antihyperglycemic releasing effects in alloxan-induced diabetic rats. [23] showed 'that saponosides may be active constituents of *C. Colocynthis*, which regulated the blood glucose efficiently in diabetic rats. They may exert their effect by potentializing the insulin-secretion of residual insulin cells or increase the ability of cells to keep glucose [24,25,26].

Obvious increase in levels of serum cholesterol and triglyceride in third group (diabetic rats), while the administration of extract decreased the serum cholesterol and triglyceride in diabetic rats treated with extract and second group, [27] showed levels of cholesterol, triglycerides in serum and liver homogenate, were significant increase in diabetic control rats whereas decrease after administration of *C. colocynthis* pulp extract of diabetic rats. [28] showed the cholesterol, triglyceride levels that a significantly decrease.

The activity of ALT and AST of diabetic rats that treated with extract nearness was decrease whereas increase in third group, [28] noted the rise in serum level of AST, ALT and other enzyme have been attributed to the damaged structural integrity of the liver. Hence, the extracts were subjected to liver function tests which mediated reduction in level of AST and ALT towards normal values that may indicate the plasma membrane stabilization as well as the hepatic tissue damage may repair. [22,28] showed that oral administration of *Citrullus colocynthis* for 50 days lead to decrease of the activities of many enzyme of diabetic rats.

4. Conclusion

From our study it is concluded that ethanolic extract of *Citrullus colocynthis* exhibited hypoglycemic in diabetic rats that induced by alloxan. This extract also showed amelioration in some parameters like Cholesterol, Triglyceride, GPT and GOT levels.

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