

Studying the Hypoglycemic Activity of Celery Herb Extract *Apium graveolens* in Blood Glucose Level of Laboratory Rats (Sprague Dawely)

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Abstract

The current study aimed to evaluate the effect of methanolic extract of celery herb *Apium graveolens* in blood glucose level of the laboratory rats. 300mg/kg of plant extract was detected. The blood glucose level was measured after 3, 6 hrs. for the extract and glibenclamide drug treatment. The result showed that both the extract and glibenclamide had hypoglycemic activity compared with control group. The result showed that there is significant hypoglycemic activity for celery extract and glibenclamide drug specially after 6hrs of the treatment.

Keyword: Diabetes, *Apium graveolens*, celery, hypoglycemic activity.

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INTRODUCTION

Diabetes is a chronic disease refers to the absolute lack of insulin. The clinical appearances are caused the glucose intolerance lead to hyperglycemia and changing in lipid and protein metabolism. Diabetes has two types of disorders. All types of diabetes mellitus can be referred to type 1 or type 2 diabetes. It seems that about 5% to 10% of the diagnosed people has type 1 diabetes, which usually caused by the destruction by the immunity of the pancreatic β -cells^{1,2}. Plants extract have usually been used as a source for drugs. The herbal drugs have been tested around the worlds to cure diabetes^{3,4}. However, the benefit of their use is lower adverse effects that are clearly seen during use the chemical medicines^{5,6}. Although the traditional hypoglycemic medicines that is reducing blood glucose may caused upsetting side effects. Discovery other anti-diabetes agents, especially those made from natural sources is preferred⁷. Celery originated as a wild plant growing in salt marshes in of the Mediterranean Sea^{8,9}. Wild celery *A. graveolens* is an aquatic perennial herb¹⁰. Previous studies revealed that the juice decrease blood pressure in many patients^{11,12}. This effect may be resulted from the chemical composition which contain about twenty compounds were obtained and recognized¹³⁻¹⁶. Accordingly the present study aimed to studying the hypoglycemic effect of alcoholic extract of celery herb.

MATERIALS AND METHODS

Methanol extract preparation of celery herb was performed According to¹⁷. Celery *A. graveolens* herb brought from the local market. The herb powdered in room temperature using grinder. Then 50 g of the preparing Powdered were dissolved in 500ml of methanol and extracted by soxhlet for 12hrs. The suspension was filtered and the remains was once more extracted in equivalent amount of methanol for 12hrs and again filtered. The filtrates was obtained, evaporated and dried by distillation with reducing pressure at 40 to 50°C in rotary evaporator¹⁸.

Laboratory animals

Twenty five male rats (Sprague Dawely) the weight ranging between 180 to 250 grams from the animal house of faculty of pharmacy university of Kufa .

Animal were housed at a controlling condition with approval of the animal ethical comity university of Kkufa. The rats were divided in to five groups. Five animals were assembled in each group

Diabetes mellitus induction

Induction of diabetes mellitus was made by intraperitoneal injection of alloxan monohydrate. It is a toxic glucose analogue. It is selectively destroys insulin-producing cells in the pancreas when the rodent are treated in this material as many other animal species. It causes an insulin dependent diabetes mellitus called alloxan diabetes¹⁹. After 7days and diabetes mellitus was measured using Glucometer device²⁰. The Animals with blood glucose level higher than 200 mg/dl were chosen for our research study. The animals were given 20% of glucose in drinking container of the animal along the days of experiment. Series of doses experiment were used to determine the therapeutic doses. Then animals were treated as the following:-

1. The Extract Group: Rats were treated orally with of 300 mg/kg of *A. graveolens* extract dissolved in 4ml of normal saline byusing stomach tube.
2. The glibenclamide group treated with of (0.8mg/kg) of glibenclamide as blind control.
3. The control group treated with (4ml) of normal saline orally. After the glucose level was measured during (3 and 6 hours) of treatment by collecting (1ml) of Blood directly from the heart for all groups.

Statistics

The differences between the treatments was calculated by applying one way ANOVA using SPSS version 25.000 (2018) program. The p value ≤ 0.05 was chosen to determine significant differences.

RESULT AND DISCUSSION

As it appear in Fig. 1 there was a significant $p \leq 0.05$ increasing in blood glucose level in the group treated with alloxan compared with control group. While Fig. 2 showed that there is no significant decreasing in blood glucose level in the diabetic group treated with plant extract compared with control group(normal saline) after 3hr of the treatment. The result in Fig. 3 showed no significant decreasing in blood glucose in the

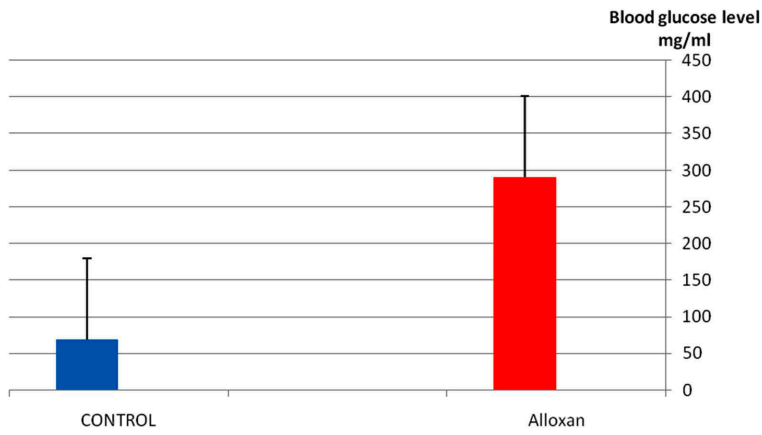


Fig. 1. Effect of alloxan in blood glucose level of laboratory rats n=5

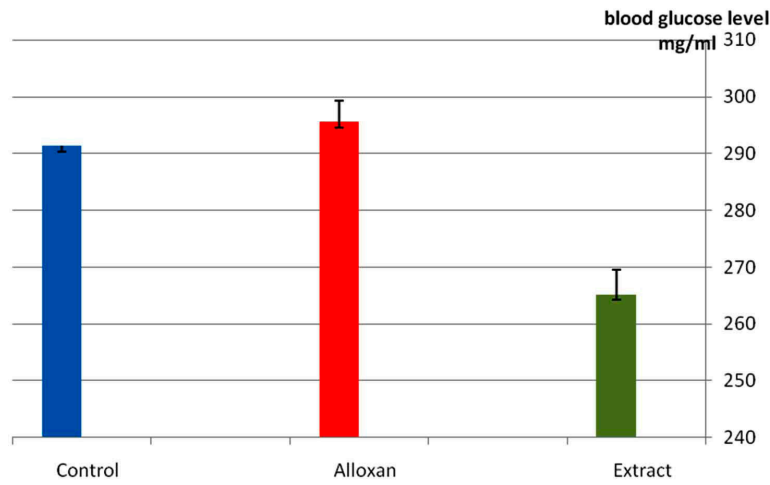


Fig. 2. Effect of the extract in blood glucose level of laboratory rats after 3hrs of treatment n=5

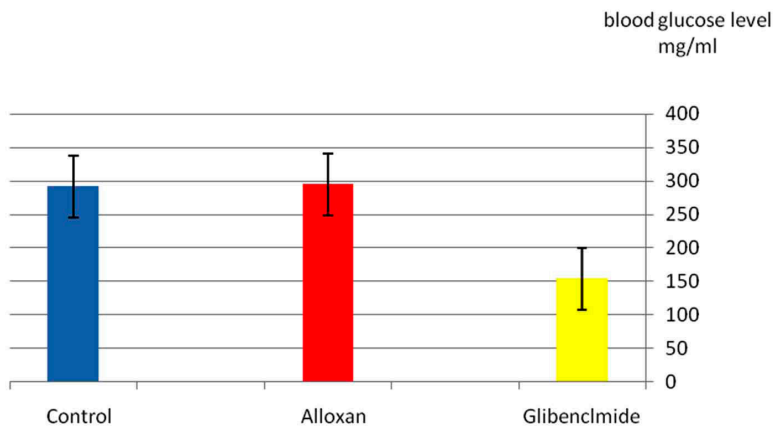


Fig. 3. Effect of glibenclamide drug in blood glucose level of laboratory rats after 3hrs of treatment n=5

diabetic group treated with glibenclamide drug compared with control group (normal saline) after 3hrs of the treatment. While Fig. 4 showed a significant decreasing $p \leq 0.05$ in blood glucose level in the group treated with the extract compared with control group. Fig. 5 indicates that there is considerable decreasing $p \leq 0.05$ in the blood glucose level in the group treated with glibenclamide drug compared with control group. Fig. 6 showed the comparison in the hypoglycemic activity between the group treated with extract and glibenclamide drug .Its indicates a significant decreasing $p \leq 0.05$ in blood glucose level in the group treated with glibenclamide drug compared with the group treated the extract. Alloxans compound used in medicinal research it is quick and convenient method for producing experimental diabetes in laboratory animal. As with other alkylting agents has cytotoxic effect causing DNA destruction or by other mechanisms which

may also lead to the DNA damage^{21, 22}. Thus the injection of alloxan may cause diabetes mellitus. Three phases are generally observed after the administration of alloxan, transitory periods of hyperglycemia and hypoglycemia followed by permanent hyperglycemia and other diabetic symptoms. Alloxan thought to act directly and specifically on the pancreatic insulin secreting β - cell, causing them to undergo degeneration and resorption This effect is obvious by the increasing level of blood glucose in animals treated with alloxan²³. The result in Fig. 2, 3 showed no significant hypoglycemic effect after 3hrs of treatment this may due to low metabolism of plant extract and it may take a long time to show its effect²⁴. The result in Fig. 4, 5 showed significant hypoglycemic activity in both plant extract and glibenclamid drug groups compared with control group after 6hrs of treatment. This activity may indicates a hypoglycemic effect in the plant extract

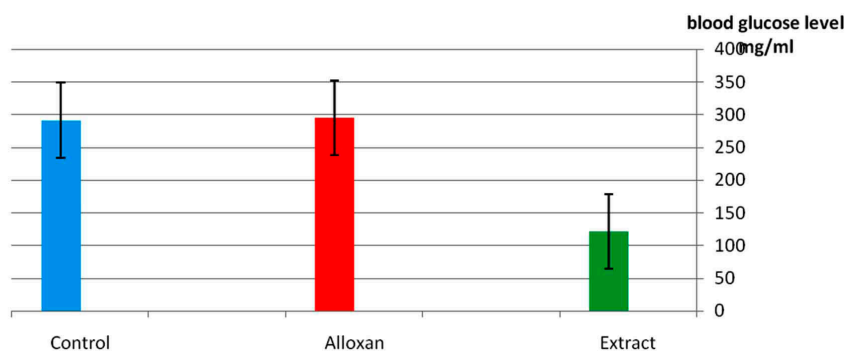


Fig. 4. Effect of the extract in blood glucose level of laboratory rats. After 6hrs of treatment n=5

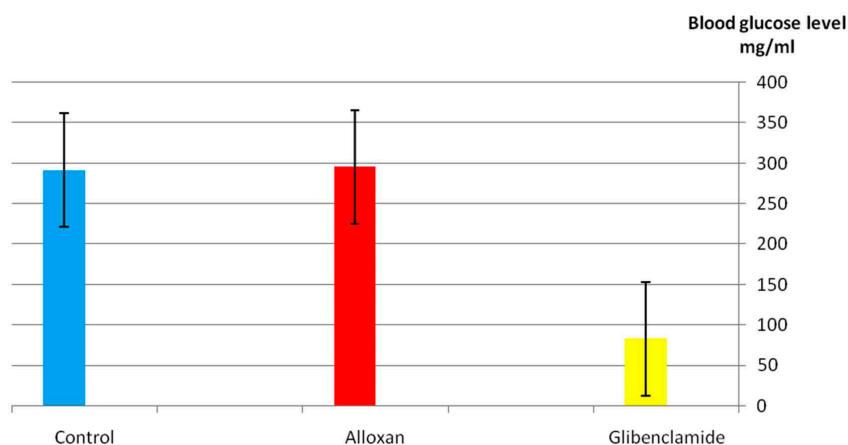


Fig. 5. Effect of the glibenclamide drug in blood glucose level of laboratory rats after 6hrs of treatment n=5

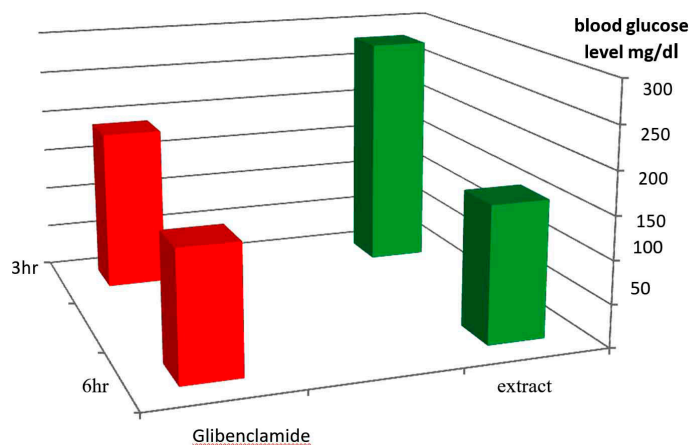


Fig. 6. comparison the effect of the extract and glibenclamide drug in blood glucose level after (3,6) hr in laboratory rats n=5

this activity may related of the ability of the celery extract to works at lowering blood glucose levels by affecting the absorption of glucose in the intestine, not by stimulating the production of insulin by the pancreas^{25,26}. Fig. 6 showed highly significant hypoglycemic activity of glibenclamide when it compared with plant extract. The low hypoglycemic activity of plant extract may due to the lower component of active ingredients in the crude plant extract. This agree with²⁷. Who suggest that Celery plant extracts have hypertensive and hypoglycemic effects? Or may be due to phthalide constituents (d- limonene, selinene, and related phthalides). The ability to reduce of blood glucose of the plant extract may due to the stimulation to the λ -cells to secrete insulin²⁸. The rising of repair or propagation of β -cells increased the effect of insulin and raising the oxidative capability which in turn, increases the utilization of glucose by the cells²⁹. Extra pancreatic mechanisms for example improved glucose transport into the cells and better formation of glycogen in the liver cell may be involved in induced the decrease in blood glucose level³⁰⁻³².

CONCLUSION

The plant *A. graveolens* may has hypoglycemic activity since its. A natural product and further studies need to evaluate its activity.

Recommendation

Further studies may be warranted to identify the possible mechanism of the plant by

including the parameters like insulin, C-peptide and also histopathology of pancreas.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

FUNDING

None.

AUTHOR'S CONTRIBUTION

RMAHW contributed by preparing the laboratory animal and the treatment of them and all the practical side of the research. YSAA analyzed the data and helped in preparation of figures, interpretation and drafted the manuscript. Both authors read and approved the manuscript for publication.

DATA AVAILABILITY

All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT

This paper was approved by the local ethical committee of kufa university which Dr. Rafid one of the researcher is amember in this committee according to report in number 16081 in 30/6/2019.

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