

Effect of Aqueous Extract of Leek on Insulin and Biochemical Parameters in Female Rats

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ABSTRACT

Aim : study the change in level of insulin, cholesterol ,urea, creatinine and the weight of rats, when uptake orally of Aqueous Extract of (leek) for Female albino Rats. Methodology: Between march 2015 and January 2016, 20 female white rats They were randomized into two groups one of it is a control group and others treated with the aqueous extract warm of *Allium porrum* (leek) plants for concentration (800) mg/kg and taken for 1 month. This study was conducted in laboratories of physiology and chemistry at the faculty of pharmacology Medicine /University of Kufa. Results: It shows significantly increase ($p<0.05$) in the insulin hormone of white female rats for concentration 800 mg/kg comparing with control group, It also shown decrease ($p<0.05$) in the cholesterol level in plasma female rats for concentration 800 mg/kg which equaled with control group, and shown decrease ($p<0.05$) the weight of the rats. While the urea shows significantly decrease ($p<0.05$) the white female rats for concentration 800 mg/kg compared with control group. Conclusion: the creatinine shows significantly decrease ($p<0.05$) the white female rats for concentration 800 mg/kg compared with control group . In short comparing with control group. The aqueous of leek extract acts as increase insulin in white female rats while negative effect of aqueous extract of leek on Cholesterol, Urea and Creatinine and weight of the rats.

Keywords: *Allium porrum*, Insulin, Cholesterol, Urea and Creatinine.

INTRODUCTION

The leek contain many nutrition compounds. Important its flavonoid, is polyphenolic compounds and have a biological and pharmacological activities like kaempferol and quercetin Also contain saponin. Leeks are an excellent source several vitamins such as vitamin A, K, B6, B9 C and E¹.

The "flavonoid kaempferol" are polyphenols, that substantial amount of sulfur which originate in the leeks vegetables, may be performance an essential part in sustenance of humane body which construction of connective tissue in body and may acts as antioxidant also as detox organizations^{2,3,4}

kaempferol is a decrease danger of many diseases for instance cardiovascular syndromes as well as cancer disease. some glycosides of kaempferol (such as kaempferitrin and astragalol) have a varied run of pharmacological accomplishments, counting "antiosteoporotic, anti-inflammatory, antioxidant, antimicrobial, neuroprotective, antidiabetic"⁵.

Quercetin is flavonoid biosynthesis, it has many important effects: antioxidant, decrease blood pressure, inflammation antihistamine (help inhibithistamine release)^{6, 7}

Insulin is a polypeptide have 51 amino acids. Secreted by B-cells in the islets of langerhans of pancreas. It is composed of two amino acid chain. Insulin synthesis

primarily in rough endoplasmic reticulum to form proinsulin, cleaved in the Golgi apparatus to form insulin. The half-life of insulin in blood circulates about 6 minutes after this degraded by the enzyme insulinase in liver to a lesser extent in kidneys and muscle⁸.

Cholesterol importance within the cells which concenter the establish to formed "vitamin D, bile acids, and steroid hormones". Cholesterol is formed by lipogenesis, when converted acetyl co-A to fatty acids. Which occurs in cytoplasm are organized by multienzyme complex called fatty acid synthetase. The pyruvate converted to acetyl-coA by enzyme pyruvate dehydrogenase (PDH). Acetyl-coA carboxylase (ACC), converts acetyl-coA into malonyl co-A, which provides the two-carbon that are building blocks of larger fatty acids. Insulin stimulate this processes. When activated of pyruvate dehydrogenase phosphatase, which remove the phosphate from pyruvate dehydrogenase lead to converted to acetyl co-A. Also insulin stimulate the ACC by dephosphorylation the ACC increase the rate of acetyl co-A conversion to malonyl co-A, that lead to increase production of fatty acid through biosynthesis. In last the insulin stimulate lipogenesis by activating PDH and ACC^{4,8}.

MATERIALS AND METHODS

Perpetration of Laboratory Animals

Three month adult female white *Rattus rattus* rats, included twenty female weighted (200_ 270) gram were used for the study and randomly assigned into two study group of each ten, housed in a clean with stenderized condition with 12 hours light/dark cycle : room temperature 25 c and Normal rats feed and tap water were provided *ad libitums*. All procedures were approved in pharmacology university of kufa after 30 days the animals were killed and draw the blood for horonological analysis.

Preparation of plant extract

According the method of the scientists Nasem⁵. Preparing the aqueous extract warm for leek plants, use 100 grams of the powder of the leafs of the leek was addition 1000 ml of DW. By means of Sox let extract. The aqueous extract of the leek is gradually vaporize for gain a full produce. And then put the extract of the leek in incubator until become crystalline. Finally, weighed prevue of the extract by balance storage it at 4°C.

EXPERIMENTAL DESIGN

The white rats which randomly a selection of and allocated into two clusters of 10 rats in every cage. One of it conceders as control group and taken orally DW. at 1ml /100 g body weight (b.wt.). And other group were given aqueous extract of *Allium porrum* orally at 800 mg/kg b. wt.

Analysis

Draw 5 ml from blood of rats and isolated plasma by centrifugation (10000 rpm for 20 minute) for determination of plasma levels of cholesterol progesterone and insulin. And take the weight of rats before experiment and killed.

Statistical Analysis

Use experiments for the aqueous warm extract analyzed for concentration 800 mg/kg for duration 30 days after the replications ten, using design completely randomization factorial experiments with completely randomized design, this design has been used least significant deference (L.S.D.).

RESULTS

In this study shows in the table significant increase ($p \leq 0.05$) in level of insulin hormone after treatment with the aqueous extract of the leeks plant for concentration 800 mg/kg, amounting to (4.96 ± 0.82) UL/ m compared with the control group reaching (3.44 ± 0.25) UL/ m level of insulin hormone.

The table refers to the presence of significant ($p \leq 0.05$) decrease in the cholesterol concentration afterward taken orally the aqueous extract of the leeks plant for concentration 800 mg/kg, amounting to (55.3 ± 5.00) mg/ dl compared with the control group reaching (85.66 ± 2.18) mg/ dl cholesterol level.

In same table showed the results and having significant ($p \leq 0.05$) decrease in the urea concentration afterward treatment with the aqueous extract of the leeks plant for concentration 800 mg/kg, amounting to (45.20 ± 5.21) mg/ dl compared with the control group reaching (68.2 ± 2.86) mg/ dl in the urea level.

while showed the same table and having significant ($p \leq 0.05$) decrease in the creatinine concentration afterward treatment with the aqueous extract of the leeks plant for concentration 800 mg/kg, amounting to (0.35 ± 0.05) mg/ dl compared with the control group reaching (1.94 ± 0.14) mg/ dl.

DISCUSSION

In this study shows significant increase ($p \leq 0.05$) in the insulin hormone level in plasma female white rats after treatment with the aqueous extract of the leeks plant. The the aqueous extract warm of *Allium porrum* (leek) plants contains two kinds of flavonoids, one of it is quercetin. The quercetin work to increase insulin secretion from B-cell in pancrease because the quercetin enhanced intracellular concentration of L-type Ca^{++} influx through Ca^{++} canal in B-cell in pancrease^{9,10}.

In this study shows significant increase in insulin hormone but significant decrease in cholesterol levels of plasma female rats after treatment with the aqueous extract warm of *Allium porrum* (leek) plants. Expected when increase insulin hormone level in plasma take action to stimulate pathway of cholesterol production return the reason to the quercetin acts to blocks the insulin receptors tyrocine kinase from phosphorylating substrate. Insulin activation enzyme pyruvate dehydrogenase phosphate PDH for converted pyruvate acetylco-A. Also quercetin blocks insulin receptor for activation acetylco-A carboxylase ACC for converted acetylco-A into malonyl co-A. This pathway essentially to forming fatty acid finally lead to forming cholesterol¹¹. The form of cholesterol that absorbed by the intestinal enterocyte in the upper intestine is called micelles, its combination between the cholesterol from food with bile salts from the bile, on one occasion of absorption of cholesterol by enterocytes form chylomicron particles, then secreted into the lymphatic vessels in villi and dispersed to the liver. Quercetin inhibit cholesterol levels in blood by inhibit intestinal cholesterol absorption, Through decrease the cholesterol pleased in "chylomicrons and chylomicron remnants" lead to block the interest of micellar cholesterol, and then reduce amount of cholesterol reach to the liver.^[12] May be the quercetin cooperate to expressed ezetimibe-sensitive cholesterol absorption pathway at the apical membrane of enterocytes. This pathway is a multistep process that determined cholesterol absorption from intestinal lumen^{13,14}.

Some scientists are using the flvonoid that extract from deferens plants they found some flavonoid such as quercetin and kampherol that acts to inhibit preadipocytes differentiation to adipocytes when induced mitotic clonal expansion of postconfluent in the 3T3-L1preadipocyte cell line²². While other researcher believed the Quercetin block the signals that stimulate adipogenesis¹⁵.

The researchers² in 2013 when addition of quercetin to the hepatocytes shows the fatty acid synthesis was inhibited after 30 minute when addition quercetin that bring about decrease formation of cholesterol in blood and decrease the weight of the female white rats.

Table 1: Effect of the leek extracts on Insulin UL/ m, Cholesterol mg/ dl, Urea mg/ dl, Creatinine mg/ dl in female rats.

	<i>Allium porrum</i> Mean \pm SD	Distal Water Mean \pm SD
Insulin UL/ m	4.96 \pm 0.82*	3.44 \pm 0.25
Cholesterol mg/ dl	55.3 \pm 5.00*	85.66 \pm 2.18
Urea mg/ dl	45.20 \pm 5.21*	68.2 \pm 2.86
Creatinine mg/ dl	0.35 \pm 0.05*	1.94 \pm 0.14

Results are presented as Mean \pm SD; * $p \leq 0.05$, significant as compared with control.

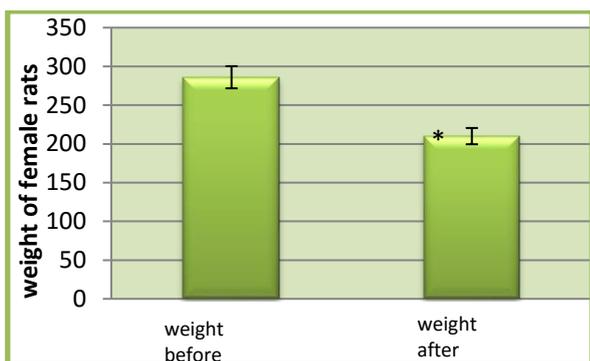


Figure 1: effect of the interference between the weight of the female white rats before and after treatment of aqueous extract of the leeks plant. Represents a different significant ($p \leq 0.05$) between between the weight of the female white rats before and after treatment.

Work the researcher de boer and his group in 2006 take quercetin orally to the rats for 41 weeks they shown the fatty acid was catabolism pathways and free fatty acid level was decreased. this agree with my study when catabolism of fatty acid pathways Finally lead to decrease the cholesterol level in blood and decrease the weight of the female white rats. And others agree with my study¹⁶. Saponin contain glycoside portion are free called saponin, these saponin binding with cholesterol in lumen of intestine composed insoluble complex compound resultant cannot absorbed by enterocyte epithelial tissue of the wall small intestine make possible to diminish cholesterol in blood. A number of researcher use saponin free from alfalfa plant that taken orally. the saponin induced liver cholesterol excretion in bile acid finally excretion in to jejunum causes hypocholesterolemic effects of saponin¹⁷.

The results of current study shows significantly ($p \leq 0.05$) decrease in level of blood urea nitrogen and serum creatinine in female white rats after treatment with the aqueous extract of the leeks plant belongs to antioxidant activities of the quercetin flavonoid and vitamin E that have ability to lowering blood urea nitrogen and serum creatinine. The researcher^[18] in 2007 found when take quercetin and vitamin E orally to rats lead to decrease blood urea nitrogen and serum creatinine and shows more effective of quercetin than vitamin E on urea and creatinine level.

The actions of anti-oxidative of quercetin, to inhibit the creatine kinase (CK) through the interface with "horseradish peroxidase and hydrogen peroxide (HRP-H₂O₂)". These action lead to lessen formation level creatinine in plasma¹⁹. The quercetin have antioxidant properties, its play important role to improve renal function causes increase clearance of blood urea and creatinine²⁰. Other researcher the quercetin serves to protect the kidney from oxidative stress and decreasing DNA oxidative damage, finally improvement kidney function lead to less level of blood urea and creatinine²¹.

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