



## Effects of hydroalcoholic extract of celery (apium graveolens) seed on blood & biochemical parameters of adult male rats

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### Abstract

Targeted research study the effect hydroalcoholic extract of celery (apium graveolens) seed on blood & biochemical parameters of adult male rats. Twenty-four adult male rats, were randomly divided into three equal groups. First group (control) daily drenched with 1 ml of distilled water along the experimental period (30 day), second & third groups (G1& G2) daily drenched with drinking water contain (50 & 100 mg/kg b.w) of hydroalcoholic extract of celery seed, respectively. At the end of experiment, blood samples were obtained from each rate for estimation of hemoglobin concentration, packed cell volume, WBC count and RBC count. TG, TC, LDL-c and HDL-c concentrations in blood serum were calculated. The result showed that significant increase ( $P<0.05$ ) in RBC counts, PCV & Hb concentration in the two treated groups as compared with control group, while the result of WBC count showed non-significant differences ( $P<0.05$ ) in two treated groups compared with control. The result of (TG, TC & LDL-c) concentrations showed a significant decrease ( $P<0.05$ ) in two treated groups compared with control group. At the same time, the result of HDL-c concentration showed a significant decrease ( $P<0.05$ ) in G2 compared with G1 and control groups.

### تأثير المستخلص المائي الكحولي لبذور الكرفس على الدم وبعض المعايير الكيموحيوية في ذكور الجرذان البالغة

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#### الخلاصة:

استهدف البحث دراسة تأثير المستخلص المائي الكحولي لبذور الكرفس (apium graveolens) على الدم وبعض المعايير الكيموحيوية في ذكور الجرذان البالغة. تم توزيع اربعة وعشرون جرذا ذكرا بالغاً على ثلاث مجموعات متساوية عوملت لمدة 30 يوماً على النحو الآتي: جرعت مجموعة السيطرة (C) 1مل من الماء المقطر على طول مدة التجربة (30 يوماً) ومجموعتي المعاملة الأولى والثانية (G1 & G2) تم تجريعها يومياً مع ماء الشرب بـ 50 و 100 ملغم/كغم من وزن الجسم من المستخلص الكحولي المائي لبذور الكرفس، على التوالي. وفي نهاية مدة التجربة، أخذت نماذج دم من كل جرذ لغرض قياس تركيز الهيموكلوبين، حجم خلايا الدم المرصوص و عدد خلايا الدم البيضاء و عدد خلايا الدم الحمراء و بعدها تم الحصول على مصل الدم وقياس مستوى TG و TC و LDL-C و HDL-C. أظنت النتائج وجود زيادة معنوية ( $p<0.05$ ) في تركيز الهيموكلوبين، حجم خلايا الدم المرصوص و عدد خلايا الدم الحمراء في مجموعتي المعاملة مقارنة بمجموعه السيطرة. بينما اشارت النتائج عدم وجود فروقات معنوية ( $p<0.05$ ) في

عدد كريات الدم البيضاء في مجموعتي المعاملة مقارنة مع السيطرة. كما اظهرت النتائج حدوث انخفاض معنوي ( $p < 0.05$ ) في تراكيز (TG و TC و LDL-C) في مجموعتي المعاملة مقارنة مع مجموعة السيطرة. من جانب اخر, اشارت النتائج الى انخفاض معنوي في تركيز HDL-C في مجموعة المعاملة الثانية مقارنة مع المعاملة الاولى ومجموعة السيطرة.

## Introduction

Medical herbs are an important part of the traditional medicine practiced all over the world due to their easy access and low cost. Celery (*Apium Graveolense*) is a medical herb used as a food and also in traditional medicine and aromatherapy due to its many health benefits [1,2]. Celery seed (*Apium graveolens*,) containing powerful healing factor and active component in response to investigations by researchers seeking to explain some of the medicinal used as antibacterial, anti-inflammatory, condiment, carminative, diuretic and for treatment of bronchitis, asthma, rheumatism, arthritis, urinary calculi, constipation as well as liver and spleen disorders [3, 4 and 5]. The healing properties of celery are due to its essential oil (*Delta limonene*, *B-Selinene*) and flavonoids (Apigenin, Sesquiterpene, Phthalide, 3-n-butylphthalide, Sedanoid, fatty acids as Linoleic acid, Oleic acid, Myristic, Palmitic, Petroselinic. as well as Volatile oils & Amino acids (tyrosine, glutamine) [6,7].

The isolated compound from seed flavonoids (Apigenin) have important role for preventing coagulation and aggregation of platelets in blood vessels [8]. A compound known as 3-n-butylphthalide (3nB) was discovered as the active component of celery have medical effects including lowering of Blood pressure & cholesterol by its ability to block B receptors in blood vessels causing vasodilatation [9].

The celery is one of plants have shown a free radical scavenging

activity in experimental animals. Celery fruit (seed) extracts are extensively used as flavoring ingredients in many food products, including meat products, soups, frozen dairy desserts, candies, baked goods, gelatins, puddings, condiments and relishes, snack foods, alcoholic and non-alcoholic beverages and others [10].

In the present study, aimed to investigate the effects hydroalcoholic extract of celery (*apium graveolens*) seed on blood & biochemical parameters of adult male rats .

## Materials and Methods

### Preparation of hydro-alcoholic extraction of celery

Celery (*A. graveolens*) seed was purchased from the local market and classified by State Board for Seed Testing and Classification, Agriculture Ministry, Iraq (SBSTC). these seed were grinded in an electrical blender into a fine powder. In order to prepare 50 g of hydro-alcoholic extract, the orally administrable celery were dissolved in 200 ml of 70% ethanol and the solution was kept at room temperature for three days. During these three days the solution was stirred several times to separate the extract, and after 72 hours, the mixture filtered with Whatman filter paper No.1. The extract solution was spread on a glass surface at room temperature to evaporate the solvent. The dried extract powder was obtained by scraping them from the glass surface, and then stored at 4°C until the use (11). The 50 and 100 mg/kg/B.W. concentrations were prepared from the

powder of celery seed extract, using distilled water as a solvent.

### **Experimental design**

Twenty four male rats were randomly assigned to 3 equal groups treated for thirteen day as follows:

- A- control (C): daily drenched with 1 ml of drinking
- B- (G1): daily drenched with drinking water contain( 50 mg/kg b.w) of hydroalcoholic extract of celery seed .
- C- (G2): daily drenched with drinking water contains (100 mg/kg b.w) of hydroalcoholic extract of celery seed.

### **Blood parameters**

blood were collected from each rate by intracardiac puncture, 5 ml of blood was divided into two parts, 1st part 1.5 ml put in EDTA tubes for hematological analysis including: Hb(cyanomet hemoglobin method by using Drabking's reagent[12], RBC(Hemocytometer and diluting fluid and special pipette [12], PCV[13] and WBC(Hemocytometer anf Thomas solution and special pipette)[14].

**Biochemical Analysis:** 2nd part 3.5 ml put in tubs without anticoagulant, separation of serum. Serum was analyzed for following biochemical parameter: triacylglycerol, total cholesterol, HDL-c and LDL-c were determined by the method of (Jacobs and Vander mark [15], Richmond [16], Burstein *et al.* [17], Wieland and Sidel [18].

### **Statistical Analysis**

Statistical analysis of data was performed on the basis of one-Way Analysis of Variance (ANOVA) using a significant level of (P<0.05). Specific group differences were determined using least significant differences (LSD) as described by [19].

### **Results and Discussion**

The statistical analysis showed a significant increase (P<0.05) in hemoglobin concentration ,packed cell volume and RBC count(Table 1) in G1 and G2 groups compared with control group. This increase may be attributed to the released erythropoietin hormone from the kidney which lead to stimulation of erythropoiesis[20] . Celery stimulates healthy and normal functioning of kidney [21] .Falzari and menarty showed that some components of *Apium graveolens* cause increase the level of erythropoietin which then lead to increase erythrocytes production and then increase hemoglobin concentration and packed cell volume[22] Also *Apium graveolens* continue high quantity of iron which consider essential element in erythropoiesis[23].

A. graveolens also contains a variety of various minerals and nutrients such as tryptophan, folate, nutritional fiber, molybdenum, manganese, phosphorus, potassium, calcium, magnesium and iron [24, 25]. Among vitamins, complex of vitamins B and C as well as  $\beta$ -carotene are worth mentioning [26]. These phytocon-stituents have antioxidant and anti-inflammatory activitie [24, 27].

Yet, these findings agree with Khuon [28] who observed that the oral administration of aqueous extract of A. graveolens has resulted in increasing of RBC and Hb levels significantly in female rats subjected to the hematotoxicity induced by CCl<sub>4</sub>. Also the result of this study was revealed that there are non-significant differences (p<0.05)in leucocytes number between control and treated group(Table1) which may be due to that reserving of extract don't cause stress to the rates while these cell increase due to stress infection [12].

The results of lipid profiles are shown in (Table2) G1 and G2 groups exhibit significant decrease ( $p < 0.05$ ) in TG, TC, LDL-c and increase in HDL-c compared to the control group.

Celery extract causes a significant reduction in serum levels of total cholesterol and low density lipoprotein (LDL), in individuals. It also increases the hepatic triglyceride by reducing the activity of hepatic triacylglycerol lipase [29]. The mechanisms suggested for lipid lowering action of *Apium graveolens* including inhibition of hepatic cholesterol biosynthesis, increasing faecal bile acid excretion and enhancing plasma lecithin: cholesterol acyltransferase activity and reduction of lipid absorption in the intestine. Some authors mentioned that blood lipids lowering effects was attributed to the compound 3n butylphthalide or (3nB) isolated from *Apium graveolens*, but, the active extract free from 3-n-butylphthalide has been reported to have lipid-lowering action. Instead, thin layer chromatography indicated that polar compounds with sugar or amino acid side chains(s) could be the hypocholesterolaemic constituents of celery extract.[30,31]. These results

agreed with Aqueous extract of celery caused significant reduction in serum total cholesterol level in hypercholesterolemic rats [32]. In a study, kooti et al[33] evaluated the effects of celery on serum lipids of mice fed a high-fat meals showed the plant causes a significant decrease in LDL and Cholesterol, However not on VLDL and HDL.

In a study, Tsi et al. examined the attributes of anti-hyperlipidemia of the celery in the rat. At the end of the experiment a significant reduction was observed in the concentration of serum total cholesterol, triglyceride levels and hepatic lipase triacyl glycerol in the treatment group[34]. Long-term consumption of aqua and butanol content celery extract primarily decreases total cholesterol levels by increasing the excretion of bile acids and, rather than by the modulating activity of Limiting enzyme in cholesterol biosynthesis.[35]

Conclusion: The result of the present study shows that in the administered dose, hydroalcoholic extract of celery seed have effect on haematological parameters and hypolipidemic effect in male rats.

**Table (1): Effect of treatment with hydro-alcoholic extract of celery (apium graveolens) seed on blood in control and treated rats.**

Parameter \ Groups	C(control)	hydro-alcoholic extraction	
		G1(50mg/kg)	G2(100mg/kg)
Hb g/dl	9.83± 0.54 c	11.02±0.34 b	12.1±0.27 a
PCV(%)	31.46±0.90 c	36.23±0.58 b	43.60±0.76 a
RBC count	9.16± 0.45 c	11.0± 0.77 b	13.6±0.90 a
WBC count	15.60±0.77 a	16.2±0.65 a	16.9±0.58 a

- Values are expressed as mean ± SE.

- Means having different letters at the same row are significantly ( $P < 0.05$ ) different.

**Table (2): Effect of treatment with hydro-alcoholic extract of celery (*apium graveolens*) seed on serum lipid profile concentration in control and treated rats.**

Parameter	C(control)	hydro-alcoholic extraction	
		G1(50mg/kg)	G2(100mg/kg)
Total Cholesterol(mg/dl)	2.57±0.11a	1.53±0.21 b	1.67±0.24 b
Triglyceride(mg/dl)	4.6±0.126 a	3.82±0.134 b	2.7±0.152 c
LDL-C(mg/dl)	1.9 ± 0.6 a	1.42±0.141 b	1.44±0.131 b
HDL-C (mg/dl)	2.5±0.131a	2.17±0.130 a	1.89±0.136 b

- Values are expressed as mean ± SE.

- Means having different letters at the same row are significantly ( $P < 0.05$ ) different.

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