

THE EFFECTS OF *CRATAEGUS TANACETIFOLIA* LEAVES EXTRACT ON BLOOD BIOCHEMISTRY

CRATAEGUS TANACETIFOLIA YAPRAK EKSTRESİNİN KAN BİYOKİMYASINA ETKİLERİ

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Experiments have shown that the *Crataegus* extracts have a positive inotropic effect and increase the activity of the cardiac muscle cells.

Crataegus tanacetifolia grows endemically in Bolu-Seben.

In the present investigation an attempt has been made to study the effect of this plant extract on toxicity, blood glucose, serum AST, ALT, LDH, ALP, total bilirubin and creatinine levels in normal rats.

The administration of the *C.tanacetifolia* leaves extract (50 mg/kg) to Wistar albino rats for 30 days resulted in a significant reduction both, in cholesterol and triglyceride levels.

It showed no effect on blood glucose and had no toxic effect on kidney or liver function as assessed by blood chemistry.

The data indicated that the use of *C.tanacetifolia* may be effective in preventing or at least retarding the development of cardiovascular complications.

Araştırmalar *Crataegus* (alıç) ekstraktlarının kalp hücrelerinin aktivitesini artırarak pozitif inotrop bir etkiye sahip olduğunu göstermiştir.

Crataegus tanacetifolia endemik olarak Bolu-Seben bölgesinde yetişir. Buradaki çalışmada normal ratlar da *Crataegus* sulu yaprak ekstresinin uzun süreli kullanımının toksisite, kan glukoz seviyesi, serum ALT, AST, ALP LDH, total bilirubin ve kreatinin seviyelerine etkisi tayin edildi.

Wistar albino ratlara *C.tanacetifolia* yapraklarının ekstresinin (50 mg/kg) 30 gün boyunca verilmesi, kolesterol ve trigliserid düzeylerinin ikisinde de anlamlı bir azalma ile sonuçlanmıştır.

Böbrek ve karaciğer için toksik bir etkisi gözlenmedi ve kan glukozu değişmedi. Elde edilen bulgular *C.tanacetifolia* yaprak ekstresinin kardiyovasküler komplikasyonları önlemede veya en azından geciktirmede etkili olabileceğini düşündürmektedir.

Keywords: *Crataegus tanacetifolia*; Biological parameter; Blood chemistry

Anahtar Kelimeler: *Crataegus tanacetifolia* (alıç); Biyokimyasal parametreler; Kan biyokimyası

Introduction

It is known that *crataegus* (hawthorn) extracts have been used for a long time for the traditional treatment of diseases such as jaundice and gut (1).

Experiments have shown that *crataegus* extracts have cardiovascular effects. Hawthorn is widely used in phytotherapy

due to its improvement of the heart function (2-4).

The action of alcoholic and aqueous *crataegus* preparations on contractility of isolated perfused guinea pig hearts and anaesthetized cat and dogs in vivo has been studied.

In all cases, contraction amplitude and cardiac output were increased. Furthermore, the extracts of *crataegus* have a hypotensive and potential antiarrhythmic action on ischaemic myocardium (5,6,9). In addition, some investigations reported that extracts of *C.monogyna* elicited vasorelaxant and antioxidant activity (7,8).

Generally, the oligomeric procyanidines and flavonoids were considered to be active components responsible for the biological action of Hawthorn preparations (10,11).

The purpose of the present study was to investigate the changes of biochemical parameters, during long-term using of *Crataegus tanacetifolia* extract. For this purpose, we determined plasma cholesterol and triglyceride levels and other biochemical changes in normolipidemic rats.

Materials and Methods

Plant material

Crataegus tanacetifolia (Lam.) Pers. The leaves were collected in May 1990 and from the Seben region, Bolu. The plant identified by Prof. Dr. Kerim ALPINAR, is registered with the number ISTE 61150 in the Herbarium of the Faculty of Pharmacy, Universty of Istanbul.

Chemical method

50 grams of the material was macerated with 500 ml. of water at room temperature for 24 hours. The mixture was filtered and the filtrate was concentrated in vacuum, to obtain a dry extract. The extract was then diluted with water so as to obtain a concentration of 50 mg/ml.

Physiological method

The experiments were carried on groups of 20 Wistar albino adult male rats, weighting 270 ± 40 g. The control group consisted of 5 male rats.

All the rats were fed with standard breed and tap water in private rat cages. *C.tanacetifolia*

leaves extract was administered by gavage at doses of 50 mg/kg. for 30 days.

The control group received only physiological saline.

On the 30th day of *C.tanacetifolia* administration the rats were anaesthetized intraperitoneally by pentothal sodium (35 mg/kg) and their chests were opened and 4-4.5 cc. of blood was taken from the left ventricle into the plain red vacotioners and the serum was seperated by centrifugation for the biochemical tests.

The levels of serum glucose, blood urea nitrogen (BUN), creatinine were analyzed using Bayer Technicon DAX-72 otomation system colorimetric method. Alkalen phosphatase (ALP), aspartate amino-transferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH), cholesterol and triglyceride levels were also measured on the same system by the enzymatic methods.

Results

Table 1 shows the levels of blood glucose, cholesterol, triglyceride, HDL, LDL, VLDL total protein levels in the experimental and control group.

Table 2 shows liver enzyme levels, BUN, creatine levels experimental and control group.

The results were evaluated by the students-t-test.

As shown in Table 1 the chronic application of Hawthorn plants leaf extract for 30 days decreases the level of serum cholesterol and triglyceride significantly when compared with the control group ($p < 0.001$).

Also the level of LDL and VLDL decreases significantly ($p < 0.01$).

Significant changes had not been observed in the level of serum protein and glucose between control and experiment groups.

The level of liver enzymes and the level of BUN and creatinine for kidney functions have been determined to

observe toxicity of this extract. The liver enzymes, which are ALP, AST, ALT, LDH, level have been found higher in experimental group animals than the control group. But this increase is not significant statistically.

Table 1. Biochemical parameters observed in rats applied with *C.tanacetifolia* extract for 30 days.

Parameter	Experimental n=20	Control n=5
Cholesterol mg/dL	52.4 ± 15.4*	118 ± 20
Triglyceride mg/dL	72.2 ± 16.3**	149.5 ± 34
HDL mg/dL	20.4 ± 5.1	35.2 ± 8.9
LDL mg/dL	29.5 ± 7.8*	82.1 ± 3.7
VLDL mg/dL	13.8 ± 3.2*	27.2 ± 7.1
Total protein gr/dL	6.7 ± 0.2	7.3 ± 0.4
Glucose mg/dL	117 ± 3.8	125 ± 6.1

* P<0.01, **P<0.001

The increase in liver enzyme levels seen in extract applied animals may probably be result of the flavonoid, procyanidin and cardiotoxic amin compounds found highly in the plant leaf extract.

When we examine the functions of kidney there isn't significant difference between the experiment and control group animals by the BUN and creatinine levels. This result shows that the extract doesn't have negative effect on glomerular filtration (Table 2).

Table 2. Liver enzym levels, BUN and Creatinine levels in rats applied with *C.tanacetifolia* extract for 30 days.

Parameter	Experimental n=20	Control n=5
AST (SGOT) U/L	317.1 ± 5.2	235 ± 6.2
ALT (SGPT) U/L	91.2 ± 2.3	104.1 ± 3.4
LDH U/L	1754 ± 7.2	1728 ± 6.8
ALP U/L	249 ± 2.7	203 ± 5.6
BUN mg/dL	23.2 ± 3.4	22 ± 4.1
Creatinine mg/dL	1.29 ± 0.32	1.08 ± 0.51

Discussion

The changes in blood chemistry formed in chronic treatment of Hawthorn leaf extract to the rats by gavage is very attractive.

The most important change in experimental group rats is reduction of the level of serum cholesterol and triglycerid significantly.

As known, the most important level in lipid metabolism is cholesterol metabolism. The relationship between high blood cholesterol and coronary heart disease is known for a long period of time. In the experiment, it is shown that arterosclerotic plaques forms in arterosclerosis are loaded with cholesterol (12,13,14).

The collection of cholesterol on the veins and becoming thick, lost of elasticity, hardening and narrow internal diameter of arter are the cause of arteriosclerosis (15,16).

Some of the experiments examine the relationship between serum lipoproteins and coronary arterial diseases determined angiografically had shown that, there is a positive correlation between serum total cholesterol or LDL cholesterol and coronary arterial diseases prognosis (16-18).

Some of experiments had shown that Myocardial Infarction and triglycerid concentration is an independent risk factor in female gender.

In our previous experiments, had shown that *Crataegus* leaf extract decreases the blood pressure (9).

Long term treatment of *Crataegus* extract biochemically, effects lipid metabolism and decrease the cholesterol triglycerid LDL cholesterol levels. Reduction of lipid levels as a primary factor decreases the arterosclerosis risk and has an positive effect to prevent hypertension.

The results of our studies indicate that the cholesterol-lowering effects of Hawthorn extract, may induce inhibition of hepatic cholesterol synthesis by flavonoid compounds. As the result of analyses the major flavonoid component of this plant was found as hiperoside (19).

Some others suggested that flavonoid has hypolipidemic activity on experimental hypercholesterolemia in rat (10,11).

Liver enzyme in the animals administered this extract is increased however this increase is not significant. In experiments it is shown that, *crataegus* extract has not any toxic effect (20). There is more investigation about *Crataegus* at the literature, but the most part of these experiments are about the cardiovascular activity of *Crataegus* species.

Our experiment is original because of the indication of the changes in the blood biochemistry for long-term using this extract. There is any toxic effect for renal and liver function furthermore, it has, positive effect on cardiovascular system because of the reduction of blood cholesterol and triglycerid levels.

We suggested that long-term usage of *Crataegus tanacetifolia* leaf extract may be effective in preventing or at least retarding the development of cardiovascular complications.

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