

THE COMPARATIVE INVESTIGATION OF THE LEAF, FLOWER AND FRUIT EXTRACTS
OF *CRATAEGUS TANACETIFOLIA* AND THE MEDICINAL SPECIES *C. MONOGYNA* ON
THEIR EFFECTS ON THE CARDIOVASCULAR SYSTEM

CRATAEGUS TANACETIFOLIA YAPRAK, ÇİÇEK VE MEYVA EKSTRELERİNİN TIBBİ TÜR
C. MONOGYNA İLE KARŞILAŞTIRMALI OLARAK KARDİOVASKÜLER SİSTEM ÜZERİNE ETKİ-
LERİNİN ARAŞTIRILMASI

SULE TAMER¹, HÜSNIYE BİRMAN¹, GÜLAY MELİKOĞLU², ALİ H. MERİÇLİ²

¹Department of Physiology, Faculty of Medicine, University of Istanbul, Çapa, 34290 Istanbul-Turkey

²Department of Pharmacognosy, Faculty of Pharmacy, University of Istanbul, Beyazıt 34452 Istanbul-Turkey

The effects of *Crataegus* species, especially those of *C. monogyna*, which is accepted as the medicinal species, on the cardiovascular system, are well known. Herbal teas and preparations of the latter are widely used in pharmacies abroad.

The effects of the leaf, flower and fruit extracts of the endemic species *Crataegus tanacetifolia* on blood pressure, heart rate and ECG have been comparatively investigated with the medicinally accepted species *C. monogyna*. The results of the investigation indicated that while the leaf and flower extracts of both species decreased the heart rate and blood pressure, the fruit extracts had no such effect.

Crataegus türlerinin kardiovasküler sistem üzerine etkileri bilinmekte, özellikle tıbbi tür olarak kabul edilen *C. monogyna*'ya ait tıbbi çay ve preparatlar yurtdışı eczanelerinde bulunmaktadır.

Crataegus tanacetifolia endemik bir türdür ve bu türün yaprak, çiçek ve meyve ekstratlarının kan basıncı, kalp frekansı ve EKG üzerine olan etkileri, tıbbi tür olarak kabul edilen *C. monogyna* ile mukayeseli olarak incelenmiştir. İnceleme sonucu her iki türün de yaprak ve çiçek ekstratlarının kalp frekansını ve kan basıncını düşürdüğü, meyve ekstratlarının ise etkili olmadığı saptanmıştır.

Keywords : *Crataegus tanacetifolia*; *Crataegus monogyna*; Heart rate; Blood pressure

Anahtar kelimeler: *Crataegus tanacetifolia*; *Crataegus monogyna*; Kalp frekansı; Kan basıncı

Introduction

The herbal teas and preparations of the *Crataegus* species are broadly employed by especially elderly patients in foreign countries, owing to their cardiogenic effects. Experiments have shown that the *Crataegus* extracts have a positive inotropic effect, increase the activity of the cardiac muscle cells and ameliorate its nutrition, act as a coronary dilator, and regulate the flow of blood. It is also reported that these extracts regulate the blood pressure¹ and can normalize hypertension, due to their regulatory influence on the cardiac muscles. The

Crataegus extracts have anti-arrhythmic effects and have been found effective in the management of tachycardia. *Crataegus* is also effectual in fortifying the hearts of elderly people who suffer from myocardial weakness following an infectious disease. In addition to this, this extract finds use in arteriosclerosis and also as a mild cardiogenic in the initial stages of cardiac disorders. (1-3).

The activity of the *Crataegus* species is primarily due to the flavonoid compounds and procyanidines. Currently, the quality of the extracts is determined by their flavonoid contents via

hyperoside. The leaves, flowers and unripe fruits of the *Crataegus* species are used as drugs (4-5).

Crataegus tanacetifolia is an endemic species(6). A chemical research regarding the flavonoid compounds in the leaves, flowers and unripe fruits of the *C.tanacetifolia* implies that this species can be chemically considered as a medicinal plant(7).

The purpose of the present study was to make an investigative comparison between the drugs of *C.tanacetifolia*, the chemical research of which has been performed, and *C.monogyna*, which is considered as a medicinal species. The two species were compared with respect to their effects on blood pressure and heart rate.

Materials and Methods

Plant material

Crataegus tanacetifolia (Lam.) Pres. The flowers and leaves were collected in May 1989, and the unripe fruits 2 months later, from the Seben region, Bolu. The plant, identified by Prof.Dr.Kerim Alpınar, is registered with the number ISTE 61150 in the Herbarium of the Faculty of Pharmacy, University of Istanbul.

Crataegus monogyna (Jacq.) subsp. *monogyna*. The flowers and leaves were collected in May 1990, and the unripe fruits 2 months later, from the Bozüyük region, Bilecik. The plant, identified by Prof.Dr.Kerim Alpınar, is registered with the number ISTE 62476 in the Herbarium of the Faculty of Pharmacy, University of Istanbul.

Chemical Method

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

Physiological Method

60 adult, male, wistar, albino rats, weighing 200-600 grams were used. Each animal was anesthetized with 35 mg/kg IP sodium pentothal. A femoral artery and vein were both cannulated; the former to monitor the arterial blood pressure, and the latter to administer the extract. Conventional limb lead II was used to monitor the ECG, from which the heart rate was derived. The *Crataegus* was administered at doses of 2 mg/kg.

The cardiovascular parameters were determined by means of a Nihon Kohden RM 6000 polygraph. 8 test animals were used for each experiment.

The results of the experiments are shown in Table 1.

Table 1. The effect of leaf, flower and unripe fruit extracts of *C. tanacetifolia* and *C. monogyna* on blood pressure and heart rate.

Plant	Type of Extract	Blood pressure (mmHg)		Heart rate	
		Before administration of the extract	After administration of the extract	Before administration of the extract	After administration of the extract
<i>Crataegus tanacetifolia</i>	Leaf	100±5.4	70±3.1 *	326.8±41.5	265.4±42.2*
	Flower	155±10.3	110±7.8 *	330±42.4	270±7.0
	Fruit	168±3.1	168±3.4	360±38.1	363±56.4
<i>Crataegus monogyna</i>	Leaf	170±4.3	68±3.4 **	358.1±28.3	262.9±41.2**
	Flower	160±11.2	120±5.7 *	383.3±24	311.6±30.1*
	Fruit	150±8.7	140±5.8	345±40	315.6±16.5

* p<0.01

** p<0.001

The flavonoid contents of both species have been calculated in accordance with the German Pharmacopoeia DAB 10(8). The results were as shown in Table 2.

Table 2. The percentages of flavonoids in *C. tanacetifolia* and *C. monogyna* extracts according to DAB 10.

Plant	Material	The amount of flavonoids(%)
<i>Crataegus tanacetifolia</i>	Leaf	0,68
	Flower	0,58
	Fruit	0,24
<i>Crataegus monogyna</i>	Leaf	1,26
	Flower	0,83
	Fruit	0,31

Results and Discussion

It was observed that the results presented in Tables 1 and 2 are proportional to each other, and that the chemical results also show correlation, i.e. due to the fact that the flavonoid content of the fruits of both species is very poor. The fruit fails to show any activity on blood pressure and heart rate. On the other hand, since the leaves and flowers are rich in flavonoids, these were found to manifest evident activity. DAB 10 has determined the desired flavonoid amount in *Crataegus* drugs as 0.7%. The major flavonoid component of *Crataegus monogyna* which is accepted as the medicinal plant was hyperoside. Also special C-glycosides such as vitexin, vitexin 2''-rhamnoside are the typical components of this plant(9). It was shown that the percentage of the flavonoids in the flower leaves of the sample collected from Turkey was over the desired amount. The flavonoid amount of the leaves of *C.tanacetifolia* was close to the desired

amount. As the result of analyses the major flavonoid component of this plant was found as hyperoside. The C-glycosides, vitexin and vitexin-2''-rhamnoside were also found in this plant. *C. tanacetifolia* is similar to *C. monogyna* when compared chemically, but since the former has lower flavonoid content it differs only in flavanoid percentage. As can be concluded from the results, leaves and flowers of *C. tanacetifolia* contain flavonoid compounds – though not as much as those of *C. monogyna* – and the extracts of these parts were effective on heartbeat and blood pressure.

References

1. Kaul, R.: Der Weissdorn, Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart 1998
2. Weiss, R.F., Fintelmann, V.: Lehrbuch der Phytotherapie pp. 461, Hippokrates Verlag, Stuttgart 1997
3. Ammon, H.P.T., Kaul, R.: Dtsch. Apoth. Ztg. 134, 2433 (1994)
4. Wagner, H., Grevel, J.: Planta Med. 45, 98 (1982)
5. Ammon, H.P.T, Haendel, M.: Ibid. 43, 313 (1981)
6. Browicz, K. (In) Flora Of Turkey And The East Aegean Islands, Vol 4 (Davis, P.H.(Ed.)) pp. 133 University Press, Edingburgh 1972
7. Meriçli, A.H., Ergezen, K.: Sci. Pharm. 62, 277 (1994)
8. DAB 10, Band 3: Monographien (Weissdornblaetter mit Blüten) Deutscher Apotheker Verlag, Stuttgart 1997
9. Lamoison, J.L., Carnat, A.: Pharm. Acta Helv. 65, 315 (1990)

Accepted: 19.07.1999