İstanbul Ecz. Fak. Mec.
35-36 (2) (2002-2003)

J. Fac. Pharm. Istanbul
35-36 (2) (2002-2003)

CHEMISTRY AND PHARMACOLOGY OF *UNCARIA TOMENTOSA* (CAT'S CLAW)

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SUMMARY

Uncaria tomentosa is an important plant because of its use for diseases like cancer, asthma and gastric ulcer for 2000 years. In this review, the general information is given and chemical constituents and the usage of *Uncaria tomentosa* is summarized.

ÖZET

Uncaria tomentosa 2000 yıldan beri kanser, astım ve gastrik ülser gibi rahatsızlıklarda kullanıldığı için çok önemli bir bitkidir. Bu derlemede *Uncaria tomentosa* hakkında genel bilgi verilmiş ve kimyasal içeriği ve kullanılışı özetlenmiştir.

Key words: Uncaria tomentosa, Cat's claw, Uña de Gato

INTRODUCTION

Uncaria tomentosa (Willd.) D.C. (Rubiaceae), commonly known as Cat's claw or Uña de Gato in Spanish , is a tropical large woody vines that can reach over 100 meters high into the canapy with claw like torns. It grows in the Amazon rainforest especially in Peru and South America. It is also known as Paraguayo, Garabato, Garbato casha, Samento, Toroñ, Tambor huasca, Aun huasca, Uña de gavilan, Hawk's claw in some other languages. The name of the plant is derived from the hook like torns that

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grow along the vine resembling a claw of a cat. The plant needs 20 years for maturing cause it grows very slowly.

There are 26 plants known as Cat's claw. But two closely related species (*Uncaria tomentosa* and *Uncaria guianensis*) are used almost interchangeably in the rainforests for treatment. Especially *Uncaria tomentosa* is used widely.

Cat's claw bark contains a series of secondary metabolites such as oxindole alkaloids, polyphenols (flavonoids, proanthocyanidins, tannins) and small concentration of other metabolites such as quinovic acid glycosides, polyhyroxylated triterpens and saponins.

Uncaria species are used by the people of the rainforest in very similar ways for at least 2000 years. The Ashaninka Indian tribe in central Peru has been the most closely associated rainforest tribe with Cat's claw. The Ashaninka healers used the plant to treat asthma, inflammations of the urinary tract, to recover from childbirth, as a kidney cleanser, to cure deep wounds, for arthritis, rheumatism and bone pain, to control inflammation, gastric ulcers and for cancer (1, 28). The Indians believe that the plant can cure every diseases and it's a holy medicine. Dr. Brent Davis refers to Cat's claw as the "Opener of the way" because of its ability to cleanse the entire intestinal tract and its effectiveness in treating stomach.

There is an ancient Ashaninka legend about Cat's claw. "One night in the Peruvian jungle, under a full moon and under the watchful eye of the 'Kashiri' god, supreme being of the Ashaninkas, a hunter went out in search of food for his family. After long hours of frustrated hunting, his strength already exhausted, the hunter saw a fierce jaguar clawing a vine and drinking the water coming from it. After drinking the water, the jaguar pounced on a monkey that happened to be passing by. Surprised by what he'd seen, the hunter approached the plant and drank the water from the vine. Instantly his body was filled with vitality. He decided to continue his journey, taking part of the plant with him. He noticed that the plant looked a lot like the claws of the jaguar. The next morning the hunter woke after a deep sleep, still full of strength. He continued his journey and was successful in his hunt to find food for his family."

For the Ashaninkas, the strength and fierceness of the jaguar was not a coincidence. They believe it was the result of the magic revitalizing and curative power of the Cat's claw or samento, as it is called by the tribe. From the time this legend came into being, the Ashaninkas tribe has used the vine for many medicines. Furthermore, they respect the jaguar because the Kashiri god chose it to introduce cat's claw to the tribe. They fear the jaguar but never hunt it, because the god would be upset and bring death from hunger and disease upon them.

With so many usage it's no suprise that the western researchers and scientists gave attention to the plant. First written about the plant was in the mid 1960's by an European teacher, Arturo Brell, and US. University professor Eugene Whitworth. Then in the early 1970's came Klaus Keplinger, a journalist self-taught enthnologist from Innsbruck, Austria who was responsible for organizing the first definitive studies on Cat's claw.

CHEMICAL CONSTITUENTS

The research groups had investigated so many polyphenols, triterpenes, quinovic acid glycosides, saponins, alkaloids and sterols. But the immune system stimulant effect of this plant came from the oxindole alkaloids which was included majorly (2, 3, 4, 5, 6, 7, 8, 14, 23, 24, 25, 26, 27, 29).

In the first report on its constituents, the leaves and stems of *U. tomentosa* were found to contain rhynchophylline and isorhynchophylline as the major alkaloids, mitraphylline, isomitraphylline, dihydrocornyntheine, hirsutine and hirsuteine were found as minor alkaloids in one herbarium sample (2).

Italian research group reported that they isolated steroisomeric alkaloids which were named pteropodine, isopteropodine, speciophylline, uncarine F and isomitraphylline from the bark of the plant (3).

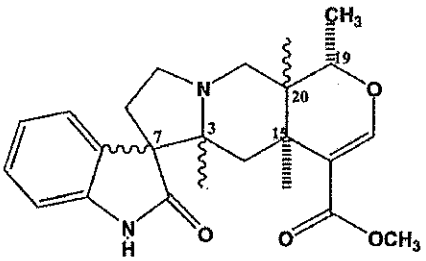
There was also a comprehensive report on the alkaloid distribution in various part of 16 individual *U. tomentosa* plant and seasonal variation of the alkaloid contents in the leaves of the species (4). Major alkaloids for this plant were shown on Table 1.

Oxindole alkaloids: Pteropodine, Isopteropodine, Speciophlline, Uncarine F, Mitraphylline, İsomitraphylline, Rhynchophylline, Isorhynchophylline, Corynoxeine, Isocorynoxeine

Indole alkaloids: Akuammigine, Tetrahydroalstonine, Isoajmalicine, Hirsutine, Dihydrocorynantheine, Hirsuteine, Corynantheine

Table 1 : The alkaloids of *Uncaria tomentosa*

		Young leaves	Mature leaves	Roots
Pteropodine	**1**	+	+	+
Isopteropodine	**2**	+	+	+
Speciophlline	**3**	+	+	+
Uncarine F	**4**	+	+	+
Mitraphylline	**5**	+	+	+
Isomitraphylline	**6**	+	+	+
Rhynchophylline	**7**	+	+	+
Isorhynchophylline	**8**	+	+	+
Corynoxeine	**9**	+	+	+
Isocorynoxeine	**10**	+	+	+
Akuammigine	**11**	+	+	+
Tetrahydroalstonine	**12**	+	-	-
Isoajmalicine	**13**	+	+	-
Hirsutine	**14**	+	+	+
Dihydrocorynantheine	**15**	+	+	+
Hirsuteine	**16**	+	+	+
Corynantheine	**17**	+	-	-



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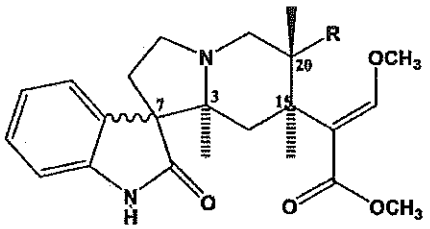
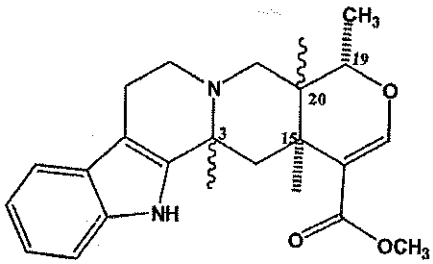
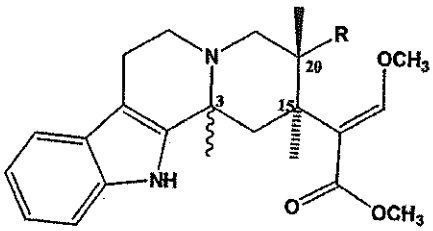


7-10

1	**3S, 7R, 15S, 19S, 20S**	**7**	**3S, 7R, 15S, 20R R= ethyl**
2	**3S, 7S, 15S, 19S, 20S**	**8**	**3S, 7S, 15S, 20R R= ethyl**
3	**3R, 7S, 15S, 19S, 20S**	**9**	**3S, 7R, 15S, 20R R= vinyl**
4	**3R, 7R, 15S, 19S, 20S**	**10**	**3S, 7S, 15S, 20R R= vinyl**
5	**3S, 7R, 15S, 19S, 20R**		
6	**3S, 7S, 15S, 19S, 20R**		



11-13



14-17

11	**3R,15S, 19S, 20S**	**14**	**3R, 15S, 20R R= ethyl**
12	**3S,15S, 19S, 20S**	**15**	**3S, 15S, 20R R= ethyl**
13	**3R,15S, 19S, 20R**	**16**	**3R, 15S, 20R R= vinyl**
		17	**3S, 15S, 20R R= vinyl**

Polyhydroxylated triterpenes; triterpenoidic saponins which have demonstrated anti-tumor effects in vitro against Ehrlich carcinoma cells had been isolated from the plant (7, 8, 9, 10, 15).

Three sterols; sitosterol, stigmasterol, and campesterol had been identified and been looked for their anti-inflammatory effect.

Tannins, phenolic compounds, proanthrocyanidins and flavonoids had been found and researched for their antioxidant effects (30).

A lot of quinovic acid glycosides which have anti-inflammatory effect have been isolated from the plant (9, 10, 11, 12, 13).

USAGE AND PHARMACOLOGY

Cat's claw has been reportedly used by indigenous people in the Andes to treat inflammations, rheumatism, gastric ulcers, tumors, dysentery and for child birth control. Cat's claw is popular in South American folk medicine for intestinal complaints, gastric ulcers, arthritis, and to promote wound healing (13).

A research group had assed in vivo the anti-inflammatory activity of two Cat's claw bark extract by comparing a spray dried hydroalcoholic extract against an aqueous freeze dried extract, to determine which extract was more effective. They used the carrageenan- induced paw endema model in mice. The results show that the anti-inflammatory activity was significantly higher using the hydroalcoholic extract compared with the aqueous extract (16).

In Canada the two extracts of different collections of the traditional medicine Uña de Gato from Peru were characterized by HPLC as containing 6 mg/g total oxindole content prior to studies with alveolar macrophages. The results suggested a strong immunostimulant action of this plant (17).

Six oxindole alkaloids have been isolated and identified from the roots of the plant. The alkaloid were researched for their effect on phagocytosis. They showed a pronounced enhancement effect on phagocytosis except mitraphylline and ryncophylline (18).

The main oxindole alkaloids were tested for their antileukemic effect on the cell lines HL60 and U-937. All tested oxindole alkaloids dosedependently inhibited the growth of HL60 and U-937 cells except mitraphylline. The selectivity between leukemic and normal stem cells indicates that Uncarine F may be considered as a possible drug for the treatment of patients with acute leukemia (19).

In a case series of 14 HIV-positive patients given standardized Cat's claw root extract, five patients remained symptom-free over six years follow-up; nine symptomatic patients had reduced symptoms in the first year of the treatment and T helper cell counts increased during the first two years.

Triterpenoidic saponins from Cat's claw have demonstrated anti-tumor effect against Ehrlich carcinoma cells. Metholic extracts of both root and bark had antioxidant

effect in vitro. The plant sterols and Cat's claw glycosides had anti-inflammatory effects in Italian studies (10, 15, 20).

Nowadays Cat's claw is used as an immune stimulant and cancer remedy; it's also used to treat inflammatory conditions, arthritis and atopic disorders, gastritis and other intestinal disorder, viral infections including HIV; chemical and environmental sensitivities; chronic fatigue; fibromyalgia; and prostate problems.

It can be used as;

Tea: Cat's claw tea is prepared from 1 gram of root bark by adding 250 ml of water and boiling for 10 or 15 minutes. After cooling and straining, one cup is drunk 3 times per day (21).

Tincture: 1 to 2 ml of tincture can be taken up to 2 times per day.

Capsule : Dried bark 350-500 mg per day. 20 to 60 mg of a standardized dry extract can be taken per day.

Patients have combined Cat's claw with AZT as treatment for HIV disease. Also patients used Cat's claw with *Echinacea* for immune stimulant effect.

No serious adverse effects have yet been reported. But Cat's claw may be contraindicated in autoimmune illness, multiple sclerosis, tuberculosis. Herbalists recommend that Cat's claw should not be used during pregnancy, lactation or for children in less than three years old, patients undergoing grafts and organ transplants, hemophiliacs and patients receiving hormonal drugs, insulin, sera, immune globulin, thymus extracts or vaccines (21).

The aqueous extracts of *U. tomentosa* which were analyzed for the presence of toxic compounds did not show any toxicity in vitro (22).

RESULTS AND DISCUSSION

At the beginning Cat's claw was a popular plant only in South America. Nowadays it is one of the most polular plant in the world because of its amazing usage in most diseases especially in AIDS and cancer therapy. But it is not merchandised and known widely in Turkey today. Our hope is to see its preparates in our pharmacies soon, like other countries which already have.

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