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Exploring Uncaria tomentosa: A Review of Its Pharmacognostic Attributes and Pharmacological Significance

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ABSTRACT
Medicinal particularly Amazon rainforest. Belonging to the Rubiaceae family, conditions, including viral illnesses, asthma, fevers, abscesses, wounds, and infections of the urinary tract. Over time, scientific studies have supported many of these traditional uses by demonstrating its antioxidant immune-supporting properties. Contains a diverse array of phytochemicals, including triterpenes, proanthocyanidins, organic acids, glycosides, sterols, and both indole and oxindole alkaloids. These bioactive compounds contribute to its wide spectrum of therapeutic effects. Research has explored the activity of U. tomentosa against various harmful microorganisms, including bacteria, viruses, and parasites such as Plasmodium, Babesia, and Theileria. In recent years, numerous uncaria tomentosa based products such as teas, tinctures, extracts, decoctions, and capsules have become commercially available. Pharmacokinetic profile, its chemical composition, the biological activities attributed to its extracts, and the toxicological information currently known.

KEYWORD: Drug-absorption profile, therapeutic actions, plant-based chemical constituents, uncaria tomentosa (herbal vine), and the genus Uncaria.

I. INTRODUCTION

They have also been a significant source of new drug.[1] In many regions of Asia and Africa, traditional plant-based remedies remain the primary source of healthcare for much of the population due to their affordability and ease of access.[2]Herbal preparations typically contain a diverse mixture of phytochemical constituents, and these natural compounds often act synergistically. Many these substances have provided lead molecules for developing modern drugs.[3]

Uncaria tomentosa, scientifically known as cat's claw is a climbing medicinal vine native to the Amazon Basin and several parts of Central and South America. Belonging to the Rubiaceae family, it derives its common name from its small, hook-like thorns that resemble a Uncaria tomentosa.[4]Uncaria species, are the two native to South America, traditionally used to manage conditions such as abscesses, fevers, urinary tract infections, minor wounds, and various viral illnesses. [5]The plant is widely recognized for its antioxidant, antibacterial, anti-inflammatory, and immune-modulating effects, making it a popular complementary therapy. It has also been used traditionally to address parasitic infections.[6] Research on Uncaria tomentosa indicates that its extracts are rich in bioactive compounds Historically humans have relied heavily on natural resources especially plants to treat ailments. Archaeological discoveries suggest that medicinal plant use dates back at least 60,000 years, and for most of human history, nearly 90% of therapeutic agents were derived from botanical sources.[7]

Plants of the Uncaria genus have played an important role in traditional medicine for centuries. The species are woody vines equipped with claw-like thorns that help them climb. More than 36 species belong to this genus, and Uncaria tomentosa used by Indigenous peoples such as the Asháninka of Peru has been part of traditional healing practices for an estimated 2,000 years.[8] Phytochemical investigations show bark, plant contain numerous active compounds, including phenolics, sterols, glycosides, triterpenes, and notably, indole and oxindole alkaloids. Other compounds such as quinovic, ursolic, and oleanolic acids, along with flavan-3-ol-related proanthocyanidins, have also been identified.[9] Although other studies suggest that other phytochemicals contribute to its biological activities.[10] The pentacyclic and tetracyclic oxindole alkaloids are currently employed as chemical markers in quality control of raw materials and derivatives from uncaria tomentosa.[11] For example, certain alkaloids from

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aqueous root extracts have been shown to enhance phagocytic activity in vitro, while other potent constituents may support immune function by triggering apoptosis.[12] The pharmacological importance of Uncaria tomentosa is well supported, especially regarding its anti-inflammatory properties, which have contributed to its global use as a natural therapeutic agent.[13] The plant has also demonstrated unique contraceptive-like effects, possibly due to interactions between its aqueous bark extracts and estrogen receptor binding sites, as well as 5-hydroxytryptamine 2 receptors.[14] Additional findings suggest that it may help protect the skin from sun-induced damage by promoting natural repair mechanisms.[15] Toxicological studies indicate that aqueous extracts of the root bark exhibit low acute and subacute oral toxicity, supporting their relative safety when used appropriately.[16]

PLANT PROFILE

Fig No. 1: Uncaria tomentosa

Synonyms: Cs Claw y una de gato.

Common and alternative names

The claw of a cat
Vilcacora (name in Indian)
Kanta Ulat (Hindi)

Chemical Constituents of Uncaria tomentosa

Pentacyclic oxindole alkaloids (e.g., pteropodine, speciophylline, isopteropodine, uncarine A-F).
Tetracyclic oxindole alkaloids (e.g., rhynchophylline, isorhynchophylline, corynoxeine).
Indole alkaloids (e.g., mitraphylline, akuammigine, harman).
Triterpenes (e.g., quinovic acid derivatives).
Glycosides (e.g., loganic acid, lyaloside, quinovic acid glycosides)
Sterols (e.g., β-sitosterol, campesterol, stigmasterol)
Organic acids (e.g., chlorogenic acid, vaccenic acid).[17]

UNCARIA TOMENTOSA: BOTANICAL & FUNCTIONAL MONOGRAPH

Botanical Description

Morphology

Growth habit: Woody climbing vine capable of reaching over 30 m in length.
Thorns: Distinctive hook-like to sickle-shaped, sharp, used for climbing; responsible for the common name "uncariatomantosa".

Leaves

Shape: Elliptic
Arrangement: Opposite (paired)
Margin: Smooth (entire).[18]

Fig No. 2: leaves

Flower

Color: White with a yellowish tint
Inflorescence: Occur in clusters
Blooming season: June–August.

Fig No. 3: Flower

Ecology & Distribution

Native range: Central and South American tropical rainforests, from Peru to Belize.
Habitat: Low-mountain tropical forests, thriving in warm, humid environments.[19]

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Requirements Growth
Light
Prefers full sun to partial shade
Indoors: Provide bright, filtered, indirect light.

Temperature & Humidity
Ideal temperature: 18–29°C (approx. 85°F)
Humidity: 50–60%; may require misting or a humidifier indoors.
Thrives in environments with consistent warmth and moisture.[20]

Soil & Watering
Soil: Rich, loamy, well-draining soil with high organic matter.
Water: Maintain consistent moisture in the soil, but avoid oversaturation. Let the upper layer dry a bit before watering again.
Reduce watering in winter, but avoid letting soil get completely dry.[21]

BIOACTIVE PROPERTIES AND THEIR CONSTITUENTS

Bark and roots of Uncaria tomentosa have been traditionally relied upon to manage a broad range of ailments. Communities have used the plant to address arthritis, stomach ulcers, cancers, various inflammatory conditions, and infectious diseases. It has also been incorporated into practices aimed at cleansing the blood, supporting kidney function, easing asthma symptoms, and regulating menstrual irregularities and abnormal bleeding. Following childbirth, preparations made from the plant were applied to cleanse wounds, promote skin repair, reduce fever, and help restore overall physical balance.[22] The plant was further employed in the treatment of rheumatism, general debility, abscesses, urinary tract infections, and as a traditional contraceptive. Its use even extended to addressing emotional and mental disturbances, including anxiety. Among certain Native American groups, the liquid obtained from the plant's stem was consumed both as a therapeutic drink and as a remedy to relieve thirst.[23]

PHARMACOLOGICAL ACTIVITIES

Fig No. 4:A diagrammatic illustration showing the various pharmacological activities of Uncaria tomentosa.

Antioxidant Activity

Strong antioxidant capacity of Uncaria tomentosa is linked to its abundance of polyphenolic compounds, specific alkaloids, and flavan-3-ol units. Experimental research suggests that uncaria tomantosa may help. The shield the stomach lining from inflammation, offering protection in models of both short-term and long-term gastritis triggered by high-dose exposure. and protect against various oxidative stressors, including peroxynitrite, which is associated with chronic inflammatory conditions such as arthritis.[24]

In vitro experiments have demonstrated the high antioxidant capacity of Uncaria tomentosa bark through assessments such as superoxide drastic scavenging, reactive radical diphenyl picryl hydrazyl activity. Furthermore, the bark was shown to protect membrane lipids from iron/ascorbate induced oxidation, as evidenced by reduced formation of thio barbituric acid-reactive substances.[25]

The plant also exhibits cytoprotective effects by modulating key molecular pathways. In vitro studies reveal the can inhibit gene, which is normally activated by lipopolysaccharides and is associated with nitrite production, peroxyl radical formation. These properties suggest that Uncariatomentosa may help regulate oxidative stress–induced cellular damage. [26]

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Anti-Neoplastic Activity

The oxindole alkaloids present in Uncaria tomentosa (cat's claw) are recognized for their potential antitumor activity as well as their ability to stimulate the immune system.SW620 colon adenocarcinoma cells Moreover, multiple investigations have reported that suppresses the derived from breast, osteosarcoma, and cervical cancers. Notably, hot water inhibit tumor cell growth without affecting the production or signaling of interleukin-2 Thereby contributing to its anticancer and anti-inflammatory effects. [27]

Cheng and co-researchers found that Uncariatomantosa extracts can inhibit the growth of numerous cancer cell types, including glioma, promyelocytic leukemia, breast cancer, acute lymphoblastic leukemia, and neuroblastoma, demonstrating broad-spectrum antiproliferative activity.[28]

Anti-Inflammatory Activity

Shown that extracts from Uncaria tomentosa can stimulate the immune system by promoting the production of interleukin-6 and interleukin-1.[29] in rat alveolar cells and lipopolysaccharide-stimulated macrophages in vitro, with these effects being dose-dependent. The plant's anticancer properties appear to be linked to the induction of apoptosis in tumor cells. [30] quercetin helps protect heart tissue by reducing platelet activity and lowering the risk of reperfusion-induced arrhythmias in rats. Although the paper focuses on cardiovascular effects, these findings support quercetin.[31] Demonstrated that rhynchophylline inhibits platelet aggregation in rabbits and rats, and isorhynchophylline exhibits similar activity in rats and dogs. Standardized aqueous.[32]

The immunomodulatory, anticancer, and antioxidant activities alkaloids extensively study in recent years.[33] Reported that extracts can increase serum colony-stimulating factors promoting the proliferation of myeloid precursor cells. Animal studies have shown that aqueous extracts of Uncaria tomentosa can significantly decrease leukocyte counts in both normal subjects and in models of doxorubicin-induced neutropenia.[34] Observed that treatment with Uncaria tomentosa bark extract led to a notable reduction in pulmonary inflammation.[35] Research has shown that mice administered with Uncariatomentosa bark extract experienced a marked reduction in lung inflammation. Additionally, Dreifuss and colleagues. Demonstrated that quinovic acid glycosides obtained from aqueous Uncaria tomantosa extracts possess significant anti-inflammatory activity in living models.[36]

Antimicrobial, Antiprotozoal and Antiviral Activities

Extracts from bark of Uncariatomentosa have demonstrated notable antimicrobial activity well as against various morphological forms of Borrelia burgdorferi. The plant has also shown strong antifungal effects, effectively inhibiting terbinafine- and anidulafungin-resistant strains, as well as several fluconazole-resistant non-albicans species.[37]

Recent studies attribute its antiprotozoal activity to its ability to disrupt harmful microorganisms, showing effectiveness against parasites such as Babesia and Theileria. This suggests that Uncaria tomentosa could serve as a complementary herb alongside conventional antiprotozoal therapies.[38]

In vitro research has also demonstrated that quinovic acid glycosides isolated from the plant possess antiviral properties, acting against RNA viruses including rhinovirus 1B, negative-strand RNA viruses, and vesicular stomatitis virus. [39]

Additionally, hydroethanolic extracts of Uncariatomentosa have shown antiherpetic activity, including the capacity to prevent herpes simplex virus infections and inhibit UV-induced DNA damage, highlighting the protective effects of both quinovic acid glycosides and oxindole alkaloids.[40]

Immunomodulatory Activity

Uncariatomentosa they have shown enhance cellular immune responses, but the POA inhibited the immune stimulating effect of this POA in vitro. Additional in vitro studies have investigated the influence of Study have examined how different Uncariatomentosa extracts and their alkaloid components influence immune signaling pathways triggered by interferon-gamma.[41] Interestingly in vivo research has demonstrated that Uncariatomentosa promoting release biologically active cytokine which subsequently leads to an expansion of myeloid progenitor cells within the bone marrow. Furthermore, research using the human THP-1 acute monocytic leukemia cell line has shown that these extracts can modulate cytokine production and suppress the mitogen activated protein kinase signaling pathway emphasizing their potential role as immunomodulatory agents.[42]

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Cardiovascular activity

Indole alkaloid hirsutine an from Uncaria rhynchophylla extract, has been shown reduce Cellular calcium levels.In addition to this effect, hirsutine exhibits antiarrhythmic properties, a negative chronotropic effect, and promotes vasodilation. Other alkaloids, including corynoxeine, isocorynoxeine, rhynchophylline, and isorhynchophylline, also specifically inhibit Ca^{2+} channels, leading to lowered blood pressure and potential modulation of central nervous system activity.[43]

Activity Against Alzheimer's Disease

The plant is thought to possess bioactive compounds capable of reducing amyloid-beta plaques in the brain. Recent studies attribute this effect to specific polyphenolic constituents, particularly certain proanthocyanidins, which exhibit both plaque-reducing and anti-tangle properties. Among these, proanthocyanidin B2 a key polyphenol identified in uncariatomentosa was shown to significantly lower brain plaque levels and improve short-term memory in both young aged transgenic mice expressing Aβ precursor protein Furthermore, proanthocyanidin B2 demonstrated strong anti-inflammatory effects.[44]

TRADITIONAL USES

Latex

Diabetes, diarrhoea, hemorrhoids, toothaches, boils, traumatic pain and swelling, and inflammatory enlargements.

Leave

Chronic wounds, hemoptysis, cervical adenitis, abscesses, and glandular swelling linked to dysentery and diarrhea.

Bark

Bleeding, skin problems, gonorrhea, leucorrhea, menorrhagia, and an upcoming abortion.

Roots

Hydrophobia, mumps, diabetes, diarrhea, pectoral issues, and other inflammatory glandular enlargements.

Harvests

Leucorrhea, styptic, tonic, kidney and spleen disorders, astringent bowel, stomachic, refrigerant dry cough, voice loss.

Sap root

Hematuria, menorrhagia, smallpox, diabetes, mumps, and inflammatory diseases.[45]

APPLICATIONS IN MEDICINE

Anti-inflammatory and pain reliever: Used to treat aches in the muscles and joints brought on by inflammatory diseases like arthritis.

Immune support: May enhance immune function due to its immune modulatory and immune stimulant qualities.[46]

Fig No. 5: Medicine

HEALTH BENEFITS

The state of arthritis
Enchants DNA repair
Because of its antiviral properties
Energy and stamina
Preventing strokes
Reduced Inflammation.[47]

LESS COMMON USES

Preventing diarrhea
The anti-cancer
Anti-anemia
Keeping diabetes at bay
Anti-inflammatory
Anti-cancer
Activities of antioxidants
Anti-inflammatory
Effects of anti-diabetes
Stimulation of the immune system
Antimicrobial properties
Anticancer actions
Anti-hypertensive
The central nervous system

This plant is used for various benefits, including reducing inflammation, boosting immunity, and supporting digestive health.
It also provides antioxidant protection and promotes overall wellness.[48]

SAFETY EVALUATION

In Vitro

At tested concentrations, aqueous extracts show no cytotoxic effects on bacterial or mammalian cells.

In Vivo

Oral administration in rats showed:
High LD_{50}: > 8 g/kg
Maximum tolerated dose (MTD): > 8 g/kg
No observed acute or chronic toxicity within tested ranges.[49]

APPLICATION OF COSMATICS

Suncare: It is a promising ingredient for sunscreens and after-sun products because of its capacity to improve DNA repair after UV exposure.
Preserve the integrity of the skin barrier and lessen the obvious symptoms of aging.
Anti-redness and calming creams: Because of its anti-inflammatory properties, it can be used with products that are intended for sensitive, irritated, or inflamed skin.
Anti-acne and healing products: It can be included in products that treat acne and help repair damaged skin because it is an antimicrobial agent.[50]

MARKETED PREPARATIONS

Extract Powder

Common commercial form; e.g., yellow-brown solvent-extracted powder sold by suppliers such as Indian biotech firms.

Liquid Extracts & Tinctures

Hydro alcoholic extracts from bark and root appear in patent filings and pharmaceutical-use formulations.

Capsules

Powdered or liquid extracts encapsulated for convenient oral use.[51]

COSMETIC VALUE & DERMATOLOGICAL BENEFITS

Antioxidant Properties

Neutralizes free radicals produced by pollution and UV radiation.
Protects collagen, helping reduce:
Fine lines, dark spots

Anti-Inflammatory Effects

Reduces redness, itching, and other signs of irritation.
Potentially helpful for:
Psoriasis
Atopic dermatitis (eczema)
Hand eczema
Post-procedure skin recovery (e.g., chemical peels, laser therapies).[52]

II. CONCLUSION

Uncaria tomentosa is a versatile medicinal plant native to Central and South American tropical forests, long valued in traditional medicine for its wide-ranging therapeutic properties. Scientific research has confirmed its antioxidant, anti-inflammatory, antimicrobial, and immunomodulatory activities, which contribute to its potential in cosmetic, dermatological, and pharmaceutical applications. Commercially, it is available in multiple forms, including powders, tinctures, liquid extracts, and capsules, allowing standardized and convenient usage. Its safety profile is generally favorable, with low toxicity observed in in vitro and in vivo studies.

This review explores the diverse phytochemical compounds isolated from Uncaria tomentosa and their potential therapeutic applications. Commonly Uncaria tomentosa employed in and modern management a wide spectrum of conditions, including cancer, immune system disorders, neurodegenerative diseases, Crohn’s disease, chronic fatigue syndrome, kidney detoxification, inflammatory disorders, microbial and parasitic infections, irritable and leaky bowel syndromes, and various digestive issues. effects of multiple bioactive phytochemicals, which occur in varying concentrations throughout the plant.

REFERENCE

[1]. Batiha, G. E. S., et al.,“The Effects of Trans-Chalcone and Chalcone 4 Hydrate on the Growth of Babesia and Theileria.” PLoS Neglected Tropical Diseases, 2019,vol(13)74-80.
[2]. Adeyemi, O. S., et al., “In Vitro Screening to Identify Anti-Toxoplasma Compounds and In Silico Modeling for Bioactivities and Toxicity.” Yale Journal of Biology and Medicine, 2019 ,vol(92) 369.
[3]. Batiha, G. E. S., et al. ,“Evaluation of the Inhibitory Effect of Ivermectin on the Growth of Babesia and Theileria Parasites

In Vitro and In Vivo." Tropical Medicine and Health, 2019,vol(47)42.
[4]. Heitzman, M. E., et al.,"Ethnobotany, Phytochemistry and Pharmacology of Uncaria (Rubiaceae)." Phytochemistry, 2005,vol(66)5–29.
[5]. Marques, Olinda, et al.,"Uncaria tomentosa as a Promising Natural Source of Molecules with Multiple Activities: Review of Its Ethnomedicinal Uses, Phytochemistry and Pharmacology." International Journal of Molecular Sciences,2025, vol(26) 6758.
[6]. Santos, K. F., et al., "Uncaria tomentosa Extract Alters the Catabolism of Adenine Nucleotides…" Journal of Ethnopharmacology, 2016,vol(194) 108–16.
[7]. Cunha, A. P., et al., Plantas e Produtos Vegetais Em Fitoterapia. Fundação Calouste Gulbenkian, 2012,vol(17)88-90.
[8]. Pilarski, R., et al., "Antioxidant Activity of Ethanolic and Aqueous Extracts of Uncaria tomentosa." Journal of Ethnopharmacology,2006, vol(104) 18–23.
[9]. Ganzera, M., et al.,"Improved Method for the Determination of Oxindole Alkaloids in Uncaria tomentosa." Planta Medica, 2001,vol(67) 447–50.
[10]. Abdel-Fattah, M. A-F., et al.,"Effects of Uncaria tomentosa Total Alkaloid…" Journal of Pharmacy and Pharmacology, 2000,vol(52)1553–61.
[11]. Ganzera, Markus, et al., "Improved Method for the Determination of Oxindole Alkaloids in Uncaria tomentosa by High Performance Liquid Chromatography." Planta Medica, 2001,vol(67) 447–50.
[12]. Sheng, Y., et al., "Induction of Apoptosis and Inhibition of Proliferation in Human Tumor Cells Treated with Extracts of Uncaria tomentosa." Anticancer Research,1998, vol(18) 3363–68.
[13]. Herrera, D. R., et al., "In Vitro Antimicrobial Activity of Uncaria tomentosa." Journal of Oral Science, 2010,vol(52)473–76.
[14]. Salazar, E. L., and V. Jayme. "Depletion of Specific Binding Sites for Estrogen Receptor by Uncaria tomentosa." Proceedings of the Western Pharmacology Society,1998, vol. (41)123–24.
[15]. Mammone, T., et al.,"A Water-Soluble Extract from Uncaria tomentosa Is a Potent Enhancer of DNA Repair…" Phytotherapy Research, 2006,vol(20)178–83.
[16]. Valerio, L. G., and G. F. Gonzales. "Toxicological Aspects of the South American Herbs Cat's Claw and Maca." Toxicology Reviews,2005, vol(24) 11–35.
[17]. Navarro Hoyos, M., et al.,"Phenolic Assessment of Uncaria tomentosa…" Molecules,2015, vol(20)22703–17.
[18]. Marques, O., et al. ,"Uncaria tomentosa as a Promising Natural Source…" International Journal of Molecular Sciences, 2025,vol(26)6758.
[19]. Sandoval, M., et al., "Antioxidant Properties of Proanthocyanidins of Uncaria tomentosa." Free Radical Biology and Medicine, 2005,vol(39)590–99.
[20]. Heitzman, M. E., et al.,"Ethnobotany, Phytochemistry and Pharmacology of Uncaria (Rubiaceae)." Phytochemistry,2005, vol(66) 5–29.
[21]. Rojas, P., et al.,"Polyphenolic Composition and Antioxidant Activity…" Antioxidants, 2018,vol(7)65.
[22]. Allen-Hall, L., et al. ,"Uncaria tomentosa Acts as a Potent TNF-α Inhibitor…" Journal of Ethnopharmacology, 2010,vol(127)685–93.
[23]. Laus, G. "Advances in Chemistry and Bioactivity of the Genus Uncaria." Phytotherapy Research,2004, vol(18) 259–74.
[24]. Azevedo, B. C., et al.,"Aqueous Extracts from Uncaria tomentosa Reduce Bronchial Hyperresponsiveness…" Journal of Ethnopharmacology,2018, vol(218) 76–89.
[25]. Sandoval, M., et al., "Cat's Claw Inhibits TNF-α Production…" Free Radical Biology and Medicine, 2000,vol(29)71–78.
[26]. Navarro, M., et al.,"Polyphenolic Composition and Antioxidant Activity…" Antioxidants, 2019,vol(8) 339.
[27]. Akesson, C., et al.,"An Extract of Uncaria tomentosa Inhibiting Cell Division…" International Immunopharmacology, 2003,vol(3) 1889–900.
[28]. Cheng, A. C., et al., "Induction of Apoptosis by Uncaria tomentosa in Human Leukemia Cells." Food and Chemical Toxicology,2007, vol(45)2206–18.

[29]. Erowele, G. I., and A. O. Kalejaiye. "Pharmacology and Therapeutic Uses of Cat's Claw." American Journal of Health-System Pharmacy, 2009,vol(66)992–95.

[30]. Rinner, B., et al.,"Antiproliferative and Pro-apoptotic Effects of Uncaria tomentosa…" Anticancer Research, 2009,vol(29)4519–28.

[31]. Xiao, D., et al. ,"Effects of Quercetin on Platelet and Reperfusion-Induced Arrhythmias in Rats." Zhongguo Yaoli Xuebao, 1993,vol(14)505–08.

[32]. Paniagua-Pérez, R., et al.,"Antigenotoxic, Antioxidant and Lymphocyte Induction Effects Produced by Pteropodine." Basic and Clinical Pharmacology and Toxicology, 2009,vol(104) 222–27.

[33]. Sheng, Y., R. W. Pero, and H. Wagner. "Treatment of Chemotherapy-Induced Leukopenia…" Phytomedicine,2000, vol(7) 137–43.

[34]. Cisneros, F. J., et al.,"An Uncaria tomentosa Extract Protects Mice…" Journal of Ethnopharmacology, 2005,vol(96)355–64.

[35]. Dreifuss, A. A., et al.,"Uncaria tomentosa Exerts Extensive Antineoplastic Effects…" PLoS ONE, 2013,vol(8)618.

[36]. Moraes, R. C., et al., "Antifungal Activity of Uncaria tomentosa…" Industrial Crops and Products,2015, vol(69) 7–14.

[37]. Bors, M., et al.,"Protective Activity of Uncaria tomentosa Extracts…" Food and Chemical Toxicology, 2011,vol(49)2202–21.

[38]. Caon, T., et al., "Antimutagenic and Antiherpetic Activities…" Food and Chemical Toxicology,2014, vol(66)30–35.

[39]. Košmider, A., et al., "Uncaria tomentosa Leaves Decoction Modulates ROS…" Molecules, 2017,vol(22)620.

[40]. Allen-Hall, L., et al., "Treatment of THP-1 Cells with Uncaria tomentosa Extracts…" Journal of Ethnopharmacology, 2007,vol(2)312–17.

[41]. Leenen, F. H., et al.,"Central Sympathoinhibitory Effects of Calcium Channel Blockers." Current Hypertension Reports, 2001,vol(3) 314–21.

[42]. Snow, A. D., et al.,"Uncaria tomentosa Constituents Are Potent Inhibitors of Brain Plaques…" Scientific Reports,2019, vol(9)561.

[43]. Yang, R.-Y., et al.,"Pharmacological actions of Uncaria alkaloids, rhynchophylline and isorhynchophylline." Acta Pharmacologica Sinica,2003, 323–331.

[44]. Keplinger, K., et al. ,"Uncaria tomentosa Ethnomedicinal Use and New Pharmacological Results." Journal of Ethnopharmacology, 1999,vol(64) 23–34.

[45]. De Feo, V. "Medicinal and Magical Plants in the Northern Peruvian Andes." Fitoterapia, 1992,vol(63)417–40.

[46]. Shukla, A., et al., "Asiaticoside-Induced Elevation of Antioxidant Levels in Healing Wounds." Phytotherapy Research, 2004,vol.(11) 291–93.

[47]. Bent, S. "Herbal Medicine in the United States: Review of Efficacy and Safety." JAMA, 2008,vol.(9)2115–26.

[48]. Fabbrocini, G., et al. ,"Skin Rejuvenation with Cosmetic Products." Journal of Cosmetic Dermatology, 2014,vol(13)178–85.

[49]. Reis, C. L., et al., "Chemotherapeutical Effects of the Herbal Medicine Uncaria tomentosa (Willd.) DC." Genetics and Molecular Research, 2017,vol(16)7398.

[50]. Gontero, Marília V., et al. ,"A water‑soluble extract from Uncaria tomentosa (Cat's Claw) is a potent enhancer of DNA repair in primary organ cultures of human skin." Journal of Ethnopharmacology, 2000,vol(4)33–39.

[51]. Navarro, M., Arnaez, E., Moreira, I., Hurtado, A., Monge, D., and Monagas, M. "Polyphenolic Composition and Antioxidant Activity of Uncaria tomentosa Commercial Bark Products." Antioxidants,2019, vol(8) 339.

[52]. Mammone, T., Silver, C., Gan, D., Giampapa, V., and Pero, R. W. "A Water-Soluble Extract from Uncaria tomentosa (Cat's Claw) Is a Potent Enhancer of DNA Repair in Primary Organ Cultures of Human Skin." Phytotherapy Research, 2016,vol(20)178