

Pharmacognostical studies of *Smilax aspera* Linn. – A herbal drug

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Abstract

Background: *Smilax aspera* L. (sarsaparilla or prickly ivy) is a perennial climber from the family Smilacaceae. Its root and rhizome are used as alterative, demulcent, depurative, diaphoretic, diuretic, stimulant and tonic. **Objective:** To perform standardization of root and rhizome of *S. aspera* for authentication and identification of raw drug by pharmacognostical, physicochemical, powder and finish product evaluation. **Materials and Methods:** Air-dried rhizome and roots were boiled, sectioned and stained for macroscopical and microscopical analysis. For physicochemical studies, rhizome and roots were coarsely powdered and subjected for determination of extractive values, ash values, chemical constituents, weight per millilitre, alcohol content, total solids and loss on drying. Finished product analyses (chromatographic studies, sediments, pH and total solid) were also undertaken. **Results:** The root was longitudinally wrinkled, about 3 mm in diameter with numerous branching, rootless, tough and flexible. Cortex consisted of 18–20 rows of parenchymatous cells; xylem and phloem were arranged in a radiate manner. Rhizome was wrinkled, hard and brown externally and white or light-yellow internally. The outer cortex consisted of polygonal parenchymatous cells. The findings of physicochemical determination of raw drugs including maximum extractive values in alcohol were 5.67% w/w, 0.1% w/w foreign matter, 8.90% w/w moisture content, 10.60% w/w total ash, etc., and finished product parameter showed pH near to 7, total solid 1.07% w/v and 50% v/v alcohol content. **Conclusion:** The data represented in this article may be used as distinctive diagnostic characters for proper identification, authentication of raw drug to ensure purity, quality and efficacy of drug *S. aspera*.

Keywords: Pharmacognosy, physicochemical, sarsaparilla, *Smilax aspera*, standardisation

INTRODUCTION

Smilacaceae or the Greenbrier family having 350 species in two genera (*Smilax* and *Heterosmilax*) is the second-largest family. The genus *Smilax* is widely distributed in tropical, temperate and subtropical zones and found all over Asia, Europe, Oceania and the USA.^[1] Out of 24 species found in India, 4 species, namely *Smilax aspera* Linn., *Smilax perfoliata* Lour., *Smilax wightii* A. DC. and *Smilax zeylanica* Linn., are available in southern India.^[2-4] These species are commonly known as sarsaparilla and mainly present as climbers, with long, thin thorny stem. The stem branches with the help of tendrils attached to other plants or objects to grow steadily upward. All the parts such as rhizome, roots, stems and leaves of sarsaparilla are used in traditional systems of medicine including Ayurveda; in Homoeopathy, mainly its root and rhizome are used.^[1,5,6]

S. aspera L., commonly known as sarsaparilla (common smilax, prickly ivy or rough bindweed) belonging to the family

Smilacaceae, was formerly included in the monocot family Liliaceae. *Smilax comes from ancient Greek language for bindweed*. It is an evergreen, perennial climber with a flexible and delicate stem with sharp thorns.^[7,8] Climber stems reach a height of 1–4 m in woodland or scrub habitats and are sheltered in sharp hooks which also lengthen along the base of the midribs of the leaves. Leaves are dark green, 8–10 cm long, petiolated, alternate, tough, leathery heart shaped and toothed. Yellowish or greenish flowers are very fragrant, small and in axillary racemes,^[9] and fruits are 1–3 seeded, red to blue-black coloured berries, 5–10 mm in diameter, rubbery in texture and spherical in

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shape.^[10] The seeds are round and bird dispersed. This species is broadly dispersed across the Mediterranean, Central Africa and Southern Europe through Asia into China, Pakistan, India, Sri Lanka, Nepal and Myanmar.^[9,11]

Principal chemical constituents present in *S. aspera* fruit are anthocyanins, pelargonidins and cyanidins. The active constituent is pelargonidin 3-O-rutinoside.^[12] Root and rhizome mainly contain steroidal saponins, flavonoids and anthocyanins.^[10,12,13] Primary steroidal saponins are (25S)-5b-spirostane-3b-ol-3-O-a-L-rhamnopyranosyl-(1-2)-b-D-glucopyranosyl-(1-2)-b-D-glucopyranoside, curillin G, asparagoside E, asparoside A, asparoside B, (25S)-5b-furostan-1b, 2b, 3b, 5b, 22a, 26-hexaol-26-O-b-D-glucopyranoside and 26-O-b-D-glucopyranosyl-(25S)-5b-furostan-1b, 3b, 22a, 26-tetraol-1-O-b-D-glucopyranoside.^[9,14,15] Seed mainly contains different fatty acids.^[10] *S. aspera* has been used in the treatment of syphilis, rheumatism, stomach pain, bloating, leprosy, psoriasis and diabetes and as an antioxidant to diminish the problems of menopause.^[1,9,10,16,17] The root and rhizome of plant are used as alterative, demulcent, depurative, diaphoretic, diuretic, stimulant and tonic^[18,19] and are also used in the treatment of inflammatory disease, rheumatic arthritis, joint pain and oedema.^[20,21]

The present study was, therefore, undertaken to produce standard information for correct identification/authentication of this plant. Even though present modern analytical techniques, for example DNA barcoding, high-performance thin-layer chromatography, high-performance liquid chromatography (HPLC) and infrared, can provide high-quality data for authentication and quality control and quality assurance, here we seek to explore the employment of low-cost yet robust analytical techniques to ensure the quality control and quality assurance of the drug. This information presented in this study may also be considered as the standards ensuring the purity and quality of the drug *S. aspera* L.

MATERIALS AND METHODS

The rhizome and roots were obtained from Centre of Medicinal Plants Research in Homoeopathy (CMPRH), Emerald, Ooty (Tamil Nadu), India. Voucher herbarium sample (Herbarium no. 6511) was prepared and preserved at CMPRH, Emerald, Ooty (Tamil Nadu), India. The pharmacognostic and physicochemical parameters were performed as per the protocols mentioned in Homoeopathic Pharmacopoeia of India (HPI).^[22] For physicochemical studies, the rhizome and roots were dried in shade. The dried material was powdered coarsely for the preparation of mother tincture.

The chemicals used in the study were double-distilled water, 37% hydrochloric acid (dilution to 10% was done in-house), strong alcohol, chloroform and methanol. All the chemicals used in this study were of analytical grade.

Macroscopy study

Macroscopic characteristics of root and rhizome were noted on

the basis of visual observation of raw drug materials as per the prescribed methods.^[23,24] It included observation of condition, branching, shape, length, diameter, colour, odour, taste, surface texture and fractures.

Microscopy study

The microscopic study was undertaken by taking appropriate section of the plant parts. Rhizome and roots were boiled separately, cut into small pieces and processed for paraffin method of microtomy as per the method described by Johansen and Wallis.^[25,26] Slides of microtome sections cut at 12–15 µm were made, and these slides were further stained with safranin and light green or crystal violet and basic fusion combinations and mounted in Canada balsam and subjected for microscopic observations. Photograph of transverse section of rhizome and roots was taken using Olympus BX53 Research Trinocular Microscope.^[27]

Organoleptic characters

Organoleptic characters of powder were evaluated by taking a minute quantity of powder and spread on a white background and visually examined for general appearance, namely nature, colour, odour, taste and texture.

Physicochemical studies

The dried plant material was coarsely powdered and subjected to physicochemical studies which include loss on drying, ash values and extractive values. Mother tincture was prepared following the method described in HPI^[22] and subjected for its specific gravity measurement, pH metry, chromatographic profile and ultraviolet (UV) spectroscopy studies.

Thin-layer chromatography

Around 25 mL of mother tincture was heated on a water bath to remove the alcohol. The organics from the aqueous part were extracted using three 25 mL portions of chloroform. The chloroform extract was evaporated to around 2 mL, and thin-layer chromatography was performed using the concentrated chloroform extract using silica gel and chloroform: methanol (90:10) as mobile phase. The spots were detected using UV light of wavelength 365 nm and 254 nm.

OBSERVATIONS AND RESULTS

Pharmacognostic studies

Macroscopy

Macroscopic studies revealed that root was longitudinally wrinkled, about 3 mm in diameter, dark reddish-brown colour and with numerous branching rootless, tough, flexible and not breaking easily even when bent double. Rhizome was also wrinkled, hard, externally brown coloured, internally white or light yellow coloured and gave rise to several roots at different points, fracture short, odourless and taste slightly bitter [Figure 1].

Microscopic studies

Root

Transection of root was circular in outline. Outermost layer epidermis was single layered; epidermal cells were compactly

arranged, polygonal or spherical in shape. Some epidermal cells were modified into root hairs. Epidermis was followed by 2–4-layered hypodermis. Hypodermal cells were polygonal in shape, tightly packed cells with no intercellular spaces. Hypodermis was followed by multilayered cortex. Cortex consisted of 18–20 rows of parenchymatous cells. These cells were small to large spherical in shape with intercellular space. Endodermis was uniseriate with uniformly thickened walls. Endodermis was followed by a biseriate pericycle layer. Cells of pericycle were smaller in size as compared to endodermis cells. Vascular bundles were radial and polyarch. Xylem and phloem were arranged in radiate manner. Xylem consisted of lignified vessels, with spiral or reticulate thickening and bordered pitted tracheids, fibres lignified, with narrow ends, pitted thickening. Phloem consisted of phloem parenchyma, sieve tubes and companion cells. Large pith was present in the centre composing parenchymatous cells with intercellular space [Figure 2].

Rhizome

Transection of rhizome showed a somewhat circular outline. The outermost layer was single-layered epidermis. Epidermal cells were closely arranged, rectangular in shape. Epidermis was followed by hypodermal ground tissue. Hypodermal cells were lignified. Hypodermis was followed by the cortical region which is composed of the outer and inner cortex. The outer cortex consisted of polygonal shape parenchymatous cells; cells contain starch grains, tightly arranged without intercellular space. Inner cortical cells were spherical or oval in shape, loosely arranged without intercellular space; bundles of acicular crystals of calcium oxalate were present. Vascular bundle was collateral, conjoint, closed and scattered. A group of sclerenchymatous fibres was present in inner cortex which also partially covered the vascular bundles. Xylem fibres were of different size, lignified, septate, with pits and large lumen. Xylem vessels were present in small and large size, with scalariform thickening and bordered pitted [Figure 3].

Powder studies

The powder microscopy study showed the presence of pieces of epidermal cells and modified root hairs, polygonal hypodermal cell, pieces of cork with groups of tangentially elongated cells; isolated vessels or tracheids either whole or broken and acicular crystals of calcium oxalate.

Organoleptic characters

- Colour: Whitish brown
- Touch: Rough
- Odour: Characteristic
- Taste: Slightly bitter.

Physicochemical studies

The results of the physicochemical study of the raw drug are described in Table 1. The results of physicochemical studies of raw drugs showed 0.1% w/w foreign matter, 8.90% w/w moisture content, 10.60% w/w total ash, etc., and finished product parameters showed pH near to 7, total solid 1.07%



Figure 1: Raw drug of *Smilax aspera*

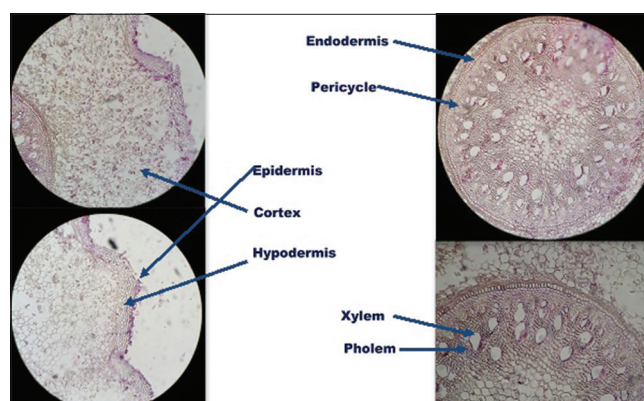


Figure 2: Transverse section of *Smilax aspera* root

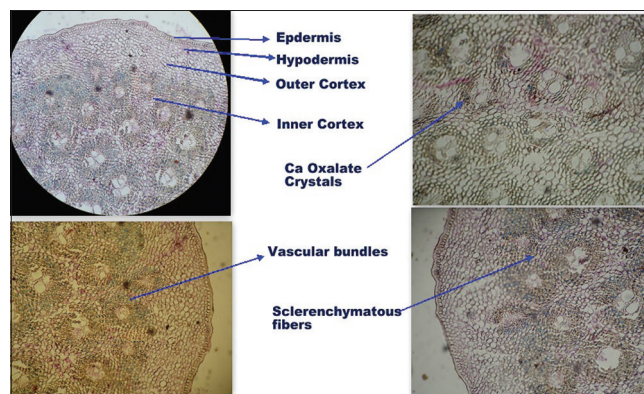


Figure 3: Transverse section of *Smilax aspera* rhizome

w/v and 50% v/v alcohol content. The loss of drying (LOD) was found to be 8.90%.

In Table 2, the physicochemical data of the mother tincture have been provided. The pH is close to 7. Furthermore, the total solid is 1.07% w/v. This shows that the solvent system is an excellent solvent system for phytochemical extraction.

Preparation of mother tincture

The mother tincture prepared as per Table 3.

Table 1: Raw drug parameters

Parameter	Value
Foreign matter	0.1% w/w
Moisture content (L.O.D. at 105°C)	8.90% w/w
Total ash	10.60% w/w
Acid-insoluble ash	4.28% w/w
Water-soluble ash	1.07% w/w
Extractive values	
Alcohol	5.67% w/w
Distilled water	14.11% w/w

DISCUSSION AND CONCLUSION

S. aspera is widely used in different medicinal systems for a variety of disorders. The present study demonstrates detailed macroscopic, microscopic, powder studies and physicochemical standards of crude drug and mother tincture of *S. aspera*. The root is longitudinally wrinkled, about 3 mm in diameter with numerous branching rootlets, tough and flexible. Rhizome is also wrinkled, hard and externally brown colour, internally white or light yellow colour. Microscopic studies show the unique arrangements of epidermal, hypodermal, cortex and vascular tissue in root and rhizome of *S. aspera*. In physicochemical parameters, LOD percentage provides the information regarding the amount of raw wet drug required for the mother tincture preparation. The total ash was found to be around 10%. This value suggests that the metallic component in the raw drug is quite low. The acid-insoluble ash is <5%. This indicates that the amount of silicates in the raw drug is moderate. This is quite expected from the fact that the part for the drug used is exclusively sourced from the underground part of the plant. The pH of the mother tincture is close to 7, indicating that the mother tincture is safe for oral administration. Here, we have shown that even without using high-end instruments this study has been carried out, and we hope, this will pave the path for simple yet robust drug standardisation research. However, considering the new age instrumentation advances in analysis, for example HPLC-mass spectrometry (MS), gas chromatography-MS and nuclear magnetic resonance, we will also seek to explore the use of these modern analytical instruments in the future. This will provide a comparison of our present study with future studies employing modern analytical instruments. We are hopeful that these data may also be considered as pharmacopoeial standards for the drug *S. aspera*.

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Nil.

Table 2: Finished product parameters

Parameter and Observations	
Organoleptic profile	
Appearance	Clear, non-viscous
Colour	Sunset yellow
Odour	Woody
Sediments	Absent
Weight per millilitre	Not >0.95 g
Total solids	Not <1.07 % w/v
Alcohol content	50 % v/v
pH	6.33
λ-max	232, 278 nm
TLC	Mobile phase: Chloroform:methanol (9:1 v/v)
254 nm (detecting light)	0.92 (Violet) 0.90 (-do-) 0.72 (-do-) 0.58 (-do-) 0.54 (-do-) 0.40 (-do-) 0.32 (-do-) 0.24 (-do-) 0.18 (-do-) 0.09 (-do-)
366 nm (detecting light)	0.90 (Yellow) 0.80 (-do-) 0.58 (-do-) 0.40 (-do-) 0.32 (-do-) 0.27 (-do-) 0.18 (blue)



Table 3: Preparation of Mother tincture

Parameter	Value
Mother tincture (φ)	
Drug strength	1/10
Sarsaparilla in coarse powder	100 g
Purified water	500 mL
Strong alcohol	537 mL
To make 1000 mL of the mother tincture	
Potencies: 2× to contain one part mother tincture, four parts purified water, five parts strong alcohol; 3× and higher potencies to be prepared with dispensing alcohol	

Conflicts of interest

None declared.

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स्माइलैक्स ऐस्पेरा लिन्-एक जड़ी बूटी वाली औषधि का फार्माकोग्नोस्टिकल अध्ययन

पृष्ठभूमि: स्माइलैक्स ऐस्पेरा एल. (सारसापारिल्ला या प्रिकली आइवी) स्माइलाकेसी परिवार से आने वाली एक बारहमासी लता है। इसके जड़ और प्रकंद का उपयोग परिवर्तनशील, शांतिप्रदायिनी, विशोधक, स्वेदजनक, मूत्रवर्धक, उत्तेजक और टॉनिक के रूप में किया जाता है। **उद्देश्य:** एस. फार्माकोग्नोस्टिकल, फिजियोकेमिकल, पाउडर एवं तैयार उत्पाद के मूल्यांकन द्वारा कच्चे औषधि के प्रमाणीकरण और पहचान के लिए ऐस्पेरा के जड़ और प्रकंद का मानकीकरण करना। **पदार्थ और पद्धति:** मैक्रोस्कोपिकल और माइक्रोस्कोपिकल विश्लेषण के लिए हवा में सुखाए गये प्रकंद और जड़ों को उबाला गया, विभक्त किया गया और रंजित किया गया। फिजियोकेमिकल अध्ययनों के लिए, प्रकंद और जड़ों को दरदरा पीसा गया और सारत्व मूल्यों, भस्म के मूल्यों, रसायनिक घटकों, वजन प्रति मिलीलीटर, एल्कोहॉल की मात्रा, कुल ठोस पदार्थ और सूखने पर होने वाली क्षति के निर्धारण के अधीन किया गया। परिष्कृत उत्पाद का विश्लेषण (क्रोमैटोग्राफिक अध्ययन, तलछट, पीएच और कुल ठोस पदार्थ) भी किया गया। **परिणाम:** इसका जड़ लम्बवत रूप से झुर्रीदार, असंख्य शाखाओं के साथ लगभग 3 मिमी के व्यास वाला, जड़विहीन, कठोर और लचीला था। इसकी छाल में पैरेंकाइमेटस कोशिकाओं की 18–20 कतारें सम्मिलित थी; जाइलेम और फ्लोएम को एक विकीर्ण रूप में व्यवस्थित किया गया था। प्रकंद (राइजोम) झुर्रीदार, सख्त, बाहर से भूरा एवं अंदर से श्वेत या हल्का पीला था। बाहरी छाल पॉलीगोनल पैरेंकाइमेटस कोशिकाओं से निर्मित थी। एल्कोहल में अधिकतम सारत्व मूल्य सहित, प्राकृतिक औषधियों के भौतिकी-रसायनिक निर्धारण का निष्कर्ष था, 5.67 प्रतिशत डब्लू/डब्लू 0.1 प्रतिशत विदेशी पदार्थ, 8.90 प्रतिशत डब्लू/डब्लू नमी की मात्रा, 10.60 प्रतिशत डब्लू/डब्लू कुल राख आदि और अंतिम उत्पाद के मापदण्ड ने पीएच: 7 के आसपास, कुल ठोस पदार्थ: 1.07 प्रतिशत डब्लू/वी और 50 प्रतिशत एल्कोहल की मात्रा को प्रदर्शित किया। **निष्कर्ष:** यहाँ पर प्रदर्शित किये गये आँकड़ों का उपयोग एस. अस्पेरा औषधि की शुद्धता, गुणवत्ता और प्रभावकारिता को सुनिश्चित करने के लिए कच्ची औषधि की उचित पहचान, प्रमाणीकरण के लिए विशिष्ट नैदानिक विशेषताओं के रूप में किया जा सकता है।

Études pharmacognostiques de *Smilax aspera* Linn - Un médicament à base de plantes

Contexte: *Smilax aspera* L. (Salsepareille ou lierre de Barbarie) est une plante grimpante vivace de la famille des Smilacaceae. Sa racine et son rhizome sont utilisés comme altérant, adoucissant, dépuratif, diaphorétique, diurétique, stimulant et tonique. **Objectif:** Standardiser la racine et le rhizome de *S. aspera* pour l'authentification et l'identification du médicament brut par évaluation pharmacognostique, physiochimique, en poudre et du produit fini. **Matériel et méthodes:** Le rhizome et les racines séchés à l'air ont été bouillis, coupés et colorés pour une analyse macroscopique et microscopique. Pour les études physico-chimiques, le rhizome et les racines ont été grossièrement pulvérisés et soumis à la détermination des valeurs d'extraction, des valeurs de cendres, des constituants chimiques, du poids par millilitre, de la teneur en alcool, des solides totaux et de la perte au séchage. Des analyses de produits finis (études chromatographiques, sédiments, pH et solide total) ont également été entreprises. **Résultats:** La racine était plissée longitudinalement, d'environ 3 mm de diamètre avec de nombreuses ramifications, sans racines, résistantes et flexibles. Le cortex se composait de 18 à 20 rangées de cellules parenchymateuses; le xylème et le phloème ont été disposés de manière rayonnée. Le rhizome était ridé, dur, brun à l'extérieur et blanc ou jaune clair à l'intérieur. Le cortex externe était constitué de cellules parenchymateuses polygonales. Les résultats de la détermination physico-chimique des drogues brutes, y compris les valeurs d'extraction maximales dans l'alcool, étaient de 5,67% p / p, 0,1% p / p de matières étrangères, 8,90% p / p de teneur en humidité, 10,60% p / p de cendres totales, etc., et fini le paramètre du produit a montré un pH proche de 7, un solide total de 1,07% p / v et une teneur en alcool de 50% v / v. **Conclusion:** Les données représentées ici peuvent être utilisées comme caractères de diagnostic distinctifs pour une identification correcte, l'authentification du médicament brut pour assurer la pureté, la qualité et l'efficacité du médicament *S. aspera*.

Estudios farmacognosticos de *Smilax aspera* Linn- Un medicamento herbario

Antecedentes: *Smilax aspera* L. (Sarsaparilla o hiedra espinosa) es un escalador perenne de la familia Smilacaceae. Su raíz y rizoma se utilizan como alterativo, demulcente, depurativo, diaforético, diurético, estimulante y tónico. **Objetivo:** Realizar la estandarización de la raíz y el rizoma de *S. aspera* para la autenticación e identificación de fármacos crudos mediante evaluación farmacognostica, fisicoquímica, en polvo y producto terminado. **Materiales y métodos:** El rizoma y las raíces secas al aire fueron hervidos, seccionados y teñidos para análisis macroscópico y microscópico. Para estudios fisicoquímicos, el rizoma y las raíces fueron en polvo grueso y sometidos para la determinación de valores extractivos, valores de ceniza, componentes químicos, peso por mililitro, contenido de alcohol, sólidos totales y pérdida en el secado. También se realizaron análisis de productos terminados (estudios cromatográficos, sedimentos, pH y sólido total). **Resultados:** La raíz estaba arrugada longitudinalmente, de unos 3 mm de diámetro con numerosas ramificaciones, sin raíces, resistentes y flexibles. La corteza consistía en 18–20 filas de células parenquimatosas; xylem y phloem se organizaron de una manera radiante. El rizoma estaba arrugado, duro, marrón externamente y blanco o amarillo claro internamente. La corteza externa consistía en células parenquimatosas poligonales. Los resultados de la determinación fisicoquímica de medicamentos crudos, incluidos los valores máximos de extracción en alcohol, fueron del 5,67% p/p, 0,1% p/p materia extraña, 8,90% p/w con contenido de humedad, 10,60% con ceniza total, etc., y el parámetro del producto terminado mostró pH cercano a 7, sólido total 1,07% p/v y 50% v/v contenido de alcohol. **Conclusión:** Los datos aquí representados pueden ser utilizados como caracteres diagnósticos distintivos para la identificación adecuada, la autenticación de la droga cruda para asegurar la pureza, calidad y eficacia de la droga *S. aspera*.

Pharmacognostical Studien von *Smilax aspera* Linn - Eine pflanzliche Droge

Hintergrund: *Smilax aspera* L. (Sarsaparilla oder stacheligen Efeu) ist eine mehrjährige Kletterer aus der Familie der Smilacaceae. Seine Wurzel und rhizome werden verwendet, als Alternative ist, wie beruhigende Mittel, reinigende, Schweißtreibend, harntreibend, Stimulans und Tonikum. **Ziel:** Um die Standardisierung von Wurzel und Rhizom von *S. aspera* für die Authentifizierung und Identifizierung von roh-Drogen, von pharmacognostical, physiko-chemischen, Pulver und fertige Produkt-evaluation. **Materialien und Methoden:** Luft getrocknete Rhizom und die Wurzeln wurden gekocht, geschnitten und gefärbt, für die makroskopischen und mikroskopischen Analyse. Für physikalisch-Chemische Untersuchungen, Rhizom und Wurzeln wurden grob pulverisiert und ausgesetzt für die Bestimmung von extraktiv-Werte, Asche-Werte, Chemische Bestandteile, Gewicht pro Milliliter, Alkohol-Gehalt, Gesamt-Feststoffe und Verlust auf dem trocknen. Fertigen Produkt-Analysen(chromatographische Untersuchungen, Sediment, pH-Wert und total solid) wurden ebenfalls vorgenommen. **Ergebnisse:** Die Wurzel war längs faltig, etwa 3 mm im Durchmesser, mit zahlreichen Verzweigungen, wurzellos, zäh und flexibel. Cortex Bestand von 18-20 Zeilen von parenchymatösen Zellen; xylem und phloem angeordnet, die in einem strahle Art und Weise. Rhizom war faltig, hart, Braun und außen und weiß oder hell - gelb intern. Die äußere Rinde Bestand aus polygonalen parenchymatösen Zellen. Die Ergebnisse der physikalisch-chemischen Bestimmung von roh-Drogen, einschließlich maximale mineralgewinnenden Werte in Alkohol wurden 5.67% w/w 0,1% w/w Fremdkörper, 8.90% w/w den Wassergehalt 10.60% w/w Gesamt-Asche, usw., und fertigen Produkt-parameter zeigten pH-Wert in der Nähe von 7, insgesamt solide 1.07% w/v und 50% v/v Alkohol. **Fazit:** Die Daten dargestellt, die hier verwendet werden können, wird als eindeutiges diagnostisches Zeichen für die korrekte Identifizierung, Authentifizierung von roh-Drogen, um sicherzustellen, Reinheit, Qualität und Wirksamkeit von drug - *S. aspera*.

斯米拉克斯阿斯佩拉林的药理学研究- 一种草药

背景: 斯米拉克斯阿斯佩拉 L. (萨萨帕里拉或刺常春藤) 是一个常年登山者从家庭斯米拉卡塞。其根和根用于替代, 去尿, 净化, 抗药性, 利尿, 兴奋剂和补品。目的: 通过药理学、物理化学、粉末和成品评价, 对原药进行根部和根部标准化, 对原药进行鉴定和鉴定。材料和方法: 风干根部和根被煮沸、分段和染色, 用于宏观和微观分析。在物理化学研究中, 根部和根部经过粗粉处理, 用于测定萃取值、灰值、化学成分、每毫升重量、酒精含量、总固体和干燥损失。还进行了成品分析(色谱研究、沉积物、pH值和总固体)。结果: 根部纵向起皱, 直径约3毫米, 有许多分支, 无根, 坚韧和灵活。皮层包括18-20行的实质细胞; 木质部和韧皮部被安排在辐射的方式。根茎起皱, 硬, 外部为棕色, 内部为白色或淡黄色。外层皮层由多边形实质细胞组成。原药物物理化学测定结果(包括酒精中最大采掘值)为5.67%w/w, 0.1%w/w异物, 8.90%w/w水分含量, 10.60%w/w总灰等, 成品参数显示pH值接近7, 总固体1.07%w/v和50%v/v酒精含量。结论: 此处显示的数据可用作正确识别、鉴定原药的独特诊断特征, 以确保药物 *S. aspera* 的纯度、质量和疗效。