

PHYTOCHEMICAL AND ISOLATION AND STANDARIZATION OF “SEMECARPUS ANACARDIUM LINN”

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ABSTRACT

Semecarpus anacardium Linn. (family-Anacardiaceae), commonly called as sanjivani or Bhalltak is well known for its anti-arthritis properties in ayurveda, Traditionally the fruits of this plant are used as carminative, tonic and aphrodisiac, and in the treatment of asthma; leucoderma and nervous debilities. The fruits of Semicarpus anacardium Linn have traditional uses to possess anti-cancer, anti-inflammatory, anti-arthritis and anthelmintic activities. Semicarpus anacardium Linn. is acrid, hot and anthelmintic. It is considered beneficial in ascites, tumours and warts, acute rheumatism, Asthma,

neuralgia, epilepsy and psoriasis. The juice of the pericarp and also of the tree trunk is powerful counter-irritant and vesicant. the extract material was successively extracted with various solvents such as petroleum ether ethanol and methanol. Thus the obtained extracts were tested for phytochemical analysis which revealed the presence of flavanoids, alkaloids, tannins carbohydrates glycosides and phenolic compounds. Petroleum ether extract showed the phytochemical test for steroids, alkaloids & flavonoids. Ethanolic extract showed the phytochemical test for alkaloids glycosides tannins. Pure toluene yielded two compounds and were labeled as C1 and C2. Petroleum ether: ethyl acetate (95:5) yielded three compounds and were labeled as C3 C4 and C5 respectively. They were characterized by ¹H NMR and IR. IR spectra of C1 and C2 compounds exhibited absorption at 349, 2927, 2815, 2723, 2356, 1596, 1353, 767 & 667cm⁻¹ and 3421, 2815, 2726, 2356, 1596, 1353, 767 and 655 cm⁻¹ respectively. NMR spectrum of C1 and C2 exhibited δ value at singlet-7.2, singlet-3.6,

triplet-2.3, singlet-2.1, quadrate-1.6, singlet-1.2 & triplet-0.89ppm. and singlet 7.2, triplet-2.3, singlet-2.1, singlet-2.1 & triplet-0.88ppm.

KEYWORD: Semecarpus anacardium linn, Phytochemical, Pharmacological, Characterization. Aanalysis.

INTRODUCTION

Semecarpus anacardium Linn. (family-Anacardiaceae), commonly called as sanjivani or Bhalltak is well known for its anti-arthritis properties in ayurveda, Traditionally the fruits of this plant are used as carminative, tonic and aphrodisiac, and in the treatment of asthma; leucoderma and nervous debilities. The fruits of *Semecarpus anacardium* Linn have traditional uses to possess anti-cancer, anti inflammatory, anti-arthritis and anthelmintic activities. *Semecarpus anacardium* Linn. is acrid, hot and anthelmintic. It is considered beneficial in ascites, tumours and warts, acute rheumatism, Asthma, neuralgia, epilepsy and psoriasis. The juice of the pericarp and also of the tree trunk is powerful counter-irritant and vesicant.

(Kirtikar & basu, Chopra et al, Hartwell, Lloydia, 1967, Siddiqui, 1942-43) *Semecarpus anacardium* Linn. It is a moderate-sized deciduous tree found in the Himalayas and hotter parts of India up to 3500 ft. height. The plant is found in abundance in Assam, Bihar, Bengal and Orissa, Chittagong, central India and western peninsula of East Archipelago, Northern Australia. A common tree of dry deciduous forests, easily recognized by large leaves and the red blaze exuding resin which blackens on exposure. It is frequently found in drier rather than damp localities. No specific soil affinity. It is a moderate shade bearer .The greenish yellow flowers appear with new leaves in May-June. The fruit ripens from December-March. An oblong drupe, 2.5 to 3.8 cms long, compressed, shining black when ripe, seated on an orange-coloured receptacle formed of the disk, the base of the calyx and the extremity of the peduncle.

Phytochemical studies with the extract revealed the presence of flavonoids (Ishartulla et al 1977). Phenolic compounds (prakasha Rao et al, 1973) and bharalawans (Gedam et al., 1974).An earlier report also revealed the presence of flavonoids, phenol and carbohydrates in the Siddha preparation of the nut milk extract. Several long chain alkenyl phenols, phenolic compounds (biflavone derivatives) have been isolated from the oil and pericarp of this nut. The nut shell of *Semecarpus anacardium* Linn. has been subjected to extensive investigations

and a number of compounds including anacardic acid, semicarpol, bhilawanol, monolefin I, dilefin II, bhilawanol-A, bhilawanol-B and biflavonoids such as biflavone A1, A2, B and C.

tetrahydroamentoflavone, tetrahydrobustafavone, jeediflavanone, semicarpufavone, and gullufavone have been isolated and characterized either from the nut shell or from the vesicant oil (Murthy, 1983ac). But the nut kernel has not been investigated thoroughly for the anticancer activity. The fruit nut contains the biflavones, semecarptin (m.p 164-165). Anacardufavone (m.p 134-135) Semecarpufavone, gallufavone, jeediflavanone, and dimeric flavonoid, nallaflavanone, the chloroform extract of nut significantly reduced acute carrageenan- induced paw oedema in rate; it was found active against the sec. lesions in adjuvant-induced arthritis delayed hypersensitivity induced in mice by by sheep red blood cells are as an antigen, is potentiate by the extract.

(Murthy, 1998, Murthy, 1992, Saraf et al, 1989, Murthy, 1986, Murthy, 1987,)

The karnel oil contain: oleic acid, 606; linoleic acid, 17.1; palmitic acid, 16; stearic acid, 3.8; and a rachidic acid, 1.4%. the oil is unsuitable for edible purpose because of it's a high acid value.

The fruits in cow milk, butter are used against ringworm. The fruits with salt and castor oil are given to febrile cattle as an antipyretic drug.

(Bhattarai, fitoterapia, 1992,)

Biological test have shown that extract of the fruits are effective against human epidermoid carcinoma of the naso-pharynx in tissue culture, experimental studies on the anticancer activity of the nut juice shows that oral administration to cancer patients, particularly those suffering from oesophageal and mouth cancer. The fruits shows hypoglycaemic activity when adm. Orally to experimental animals, they also effect blood pressure.

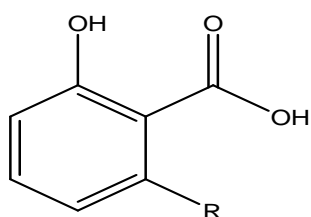
(Dhar et al, 1968, Tripathi et al, 1965, Khanna et al, 1969, 57, 237; Bose et al,1967,)

The present study was undertaken to perform a systematic phytochemical screening of *Semecarpus anacardium* Linn.

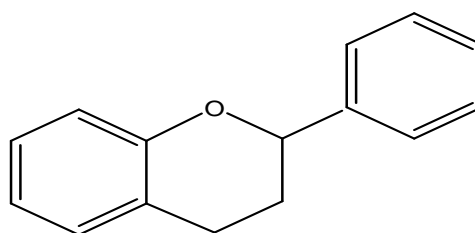
Chemical potential:- Flavonoids, Phenolic compound, Bhilawanol, Anacardic acid, semecarpol, bhilawanol, monolefin-1, dilefin-2, bhilawanol-A &B, and biflavonoids such as biflavone A1, A2, B and C, tetrahydromentoflavone, tetrehydrobustafavon, jeediflavanone,

semecarpuflavanone, and gulluflavanone. Oleic acid 60.6%, linoleic acid 17.1%, palmitic acid 16%, stearic acid 3.8% And arachidic acid 1.4%.

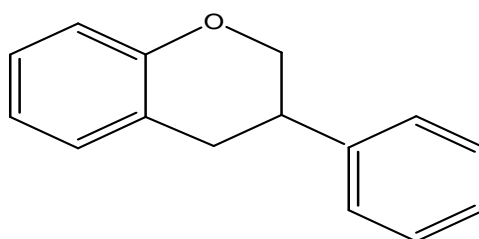
Therapeutic: Anticancer, antiarthritis, anti-inflammatory, anthelmintic, rheumatism, and lepra nodules, ascites, tumours, wart, acute rheumatism, asthma, neuralgia, epilepsy and psoriasis. Cytotoxic to human Leukemic cell lines. Immunomodulatory activity. Anticancer activity. Antioxidant, analgesic, antipyretic and ulcerogenic activity. Hepatocellular carcinoma Inhibit pro-inflammatory cytokine production in rheumatoid arthritis patients and maintain the glutathione redox status by restoring. Antifungal activity while nut shell were shown to prevent lipid preoxidation. Antitumour activity due to suppression of hypoxic and angiogenic factors. (Hypoxia inducible factor-1 α , vascular) endothelial growth factor activity. Anti-atherosclerotic Activity.



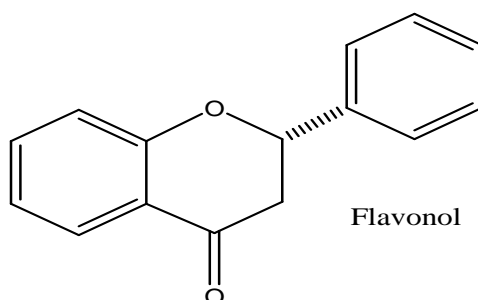
Anacardic acid



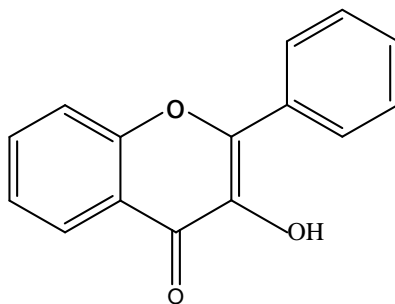
Flavon



Isoflavon



Flavonol



Flavanone

MATERIAL AND METHOD

Instrument used during experimental studies

Double beam UV/Visible Spectrophotometer 2202, FTIR Spectrophotometer(FTIR 4100), Heating Mantle, Column, Incubator, Autoclave, Laminar Air Flow Cabinet, Oven, Digital Balance, Digital Melting point app.

Chemical used during experimental studies

N-Hexane, Ninhydrin, Petroleum Ether, Pot. Dichromate, Pot. Iodide, Pyridine, Silica gel(60-120), Silica gel Gel, Sod. Chloride, Sod. Hydroxide, Sulphuric Acid, Zinc Chloride, Ethanol, Ethyl Acetate, Acetone, Benzene, Calcium Chloride fused, Chloroform, Copper Sulphate, Cyclohexane, from C.D.H Ltd. Delhi. Glacial Acetic acid, Ammonia Solution, dimethyl sulfoxide, Hydrochloric Acid. from Rankem Ltd, New Delhi, Dichloromethane, Iodine, Methanol. from Qualigens Ltd, Mumbai. All the chemicals used were of pure analytical grade.

METHOD

The drugs were collected from Sharma Ayurved Mandir Kashipur (Uttarranchal) & identification of the drugs was done with the help of qualified professor Mr. S.R. Gupta, Vipin Bihari Degree College (Botany Department) Bundelkhand University, Jhansi / asst. professor Mr. A.K. Gupta, Baidhanath Pvt. Ltd., Jhansi. Also authentication of drugs was carried out at Shri Baidyanath Ayurved Ltd. Jhansi. And a voucher specimen has been deposited in herbarium Dept. of Pharmacognosy, I.T.S Pharmacy college murad nagar Ghaziabad. (sp.no 502/10).

HOT CONTINUOUS EXTRACTION-SOXHLEATION

The use of commercially available soxhlet convenient way to prepare crude plant extracts. Typically, a soxhlet extraction is only required where the desired compound has a limited solubility in a solvent, and the impurity is insoluble in that solvent.

In this method the material to be extracted is placed in a thimble made from thick filter paper, which is loaded into the main chamber of the soxhlet extractor. The soxhlet extractor is placed on to a flask containing the extraction solvent. The soxhlet is then equipped with a condenser. The solvent is heated to reflux. The solvent vapour travels up a distillation arm and floods into the chamber housing the thimble of solid.

The chamber containing the solid material slowly fills with warm solvent. Some of the desired compound will then dissolve in the warm solvent. When the soxhlet chamber is almost full, the chamber is automatically emptied by a siphon side arm, with the Solvent running back down to the distillation flask. This cycle may be allowed to repeat many times, over hours or days. During each cycle, a portion of the non-volatile compound dissolves in the solvent.

After extraction the solvent is removed, typically by means of a rotary evaporator, yielding the extracted compound. The non-soluble portion of the extracted solid remains in the thimble, and is further extracted with high polarity solvent. (Joy P.P. et al 1998).

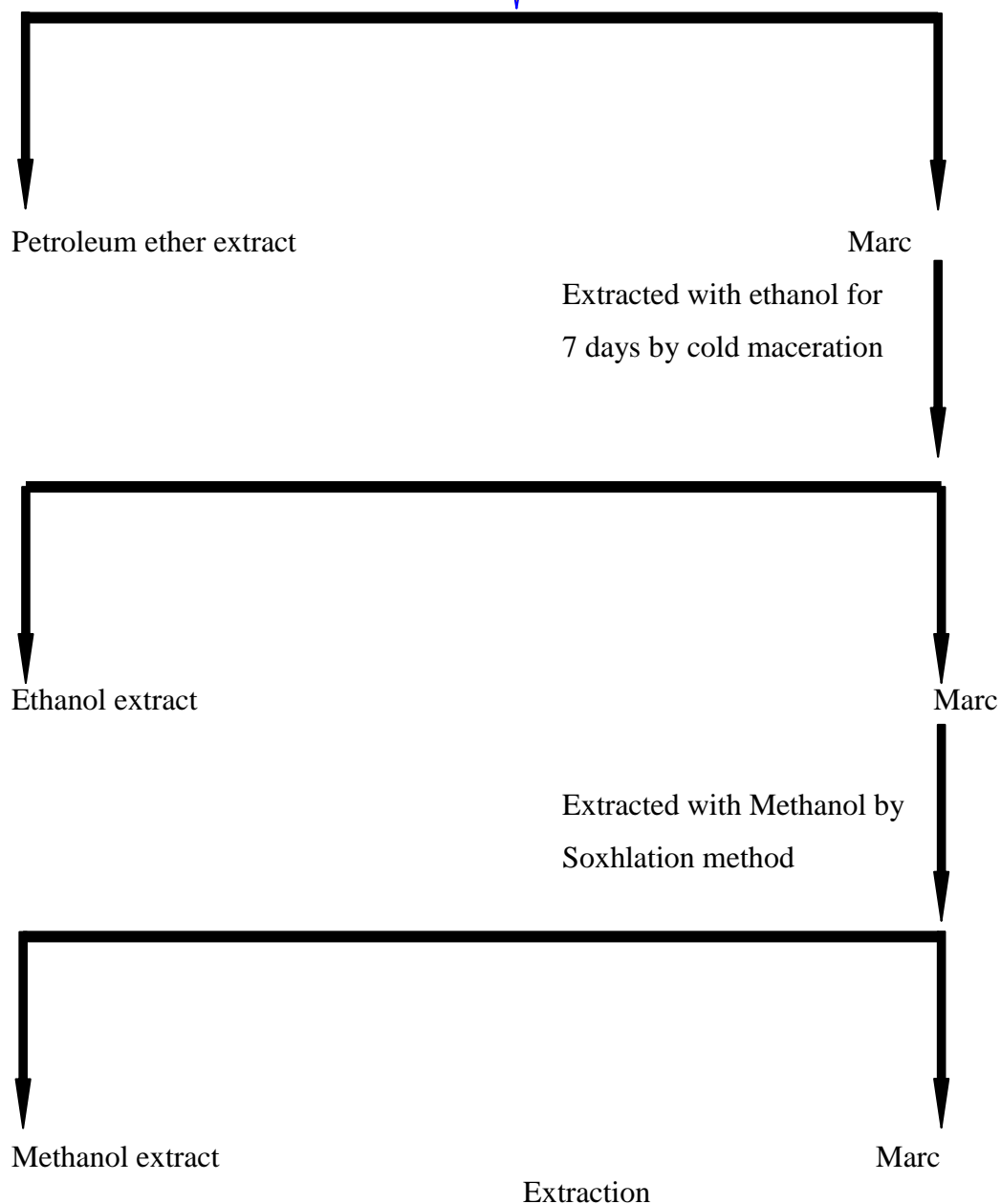
THIN LAYER CHROMATOGRAPHY (TLC)

50gm of silica gel G was weighed out and shaken to form a homogenous suspension with 100ml of dist. Water. This suspension was poured into TLC applicator which was adjusted to 0.25mm thickness. 20 TLC plates were laid together in a row and coated with silica gel G by drawing the applicator. The plates were allowed to dry at room temp. and then activated at 110°C for 30 min. in hot air oven.

EXTRACTION

Scheme: 1 *Extraction of Semecarpus Anacardium Linn.*

Crushed material of seeds (1 kg.) Extracted with petroleum ether
For 7 days by cold maceration



RESULT AND DISCUSSION

Semicarpus anacardium linn belong to family of anacardiacea the extract material was successively extracted with various solvents such as petroleum ether ethanol and methanol. Ethanolic extract showed the phytochemical test for alkaloids glycosides tannins. Pure toluene yielded two comounds and were labeled as C1 and C2. Petroleum ether: ethyl acetate

(95:5) yielded three compounds and were labeled as C3 and C4 respectively. They were characterized by ^1H NMR and IR.

IR spectra of C1 and C2 compounds exhibited absorption at 349, 2927, 2815, 2723, 2356, 1596, 1353, 767 & 667 cm^{-1} and 3421, 2815, 2726, 2356, 1596, 1353, 767 and 655 cm^{-1} respectively.

NMR spectrum of C1 and C2 exhibited δ value at singlet-7.2, singlet-3.6, triplet-2.3, singlet-2.1, quadrate-1.6, singlet-1.2 & triplet-0.89ppm. and singlet 7.2, triplet-2.3, singlet-2.1, singlet-2.1 & triplet-0.88ppm.

PETROLEUM ETHER EXTRACT

Fraction collected	Polarity	Compound
Fraction -30	Toluene 100%	C1
Fraction - 47	Toluene 100%	C2

ALCOHOLIC EXTRACT

Fraction collected	Polarity	Compound
Fraction-16	Petroleum ether: Ethyl acetate (95:5).	C3
Fraction -39	Petroleum ether: Ethyl acetate (95:5).	C4

TLC- Rf value

Fraction no.	Compound	Rf value
30	C1	0.40
47	C2	0.45
16	C3	0.42
39	C4	0.38

CONCLUSION

Semecarpus anacardium linn obtained extracts were tested for photochemical analysis which isolated the four compound C1, C2, C3, C4 and fraction 30, 47, 16, 39 respectively. The isolated compounds were pharmacological analyze and characterized by ^1H NMR and IR.

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