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REVIEW OF *SIDA ACUTA* - A POTENT DRUG

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ABSTRACT

Neurodegenerative disease's such as Alzheimer's disease occur due to loss of the structure and function of neurons. For the potential treatment of neurodegenerative diseases, ***Sida acuta*** can be used as it contains components like β-phenethylamines, quinazolines and Carboxylated tryptamines, in addition to choline and betaine, glutathione peroxidase antioxidants, as a neurotransmitter β-phenethylamine reportedly increases the dopamine level in the body which is responsible for communication and control movement, The ethanolic extract from the leaves and stems of ***Sida acuta***, causes effects on the central nervous system in experimental animals and reportedly glutathione can reduce oxidative stress and can bring balance in reactive oxygen Species. The said Plant have essential compounds which can improve cognitive functions on CNS and can be a novel drug for neurological improvements.

KEYWORDS: *Alzheimer's Disease, Central nervous system, Choline, glutathione, Reactive oxygen species*.

INTRODUCTION

Sida acuta is a malvaceous weed that often rules further developed fields, squander and upset places side of the road (Mann et al., 2003). The plant is local to Mexico and Focal America however has spread all through the jungles and subtropics (Holm et al., 1977). In conventional medication, the plant is frequently expected to treat illnesses like fever, migraine, skin sicknesses, looseness of the bowels, and diarrhea. Alluding to the conventional information, studies have been done to affirm the exercises the plant is accepted to apply in vivo. The depicted pharmacological properties of the plants include the ant plasmodial, antimicrobial, cell reinforcement, cytotoxic exercises and numerous different properties. A few examinations brought about the detachment of single mixtures while the others just showed the movement of the unrefined concentrates. The current audit is centred around the conventional utilizations of the plant, the in vitro research facility screening results and the pharmacological properties of certain mixtures separated from the plant.[1]

BOTONICAL DESCRIPTION

ORIGIN AND GEOGRAPHIC DISTRIBUTION

S. acuta is native to Central America but has spread throughout the tropics and sub-tropics in the Pacific, Asia and Africa, originating in central America, the small perennial shrub, *S. acuta* has effectively attacked the jungles around the world, generally as an impurity in field seed. Its resilience of a great many developing circumstances has empowered S. acuta to become laid out in these assorted living spaces. It can form dense monospecific stands in these regions and has had a pronounced economic impact in northern Australia, Papua New Guinea and many Pacific Islands.[2]

PLANT DESCRIPTION

S. acuta is a little, erect, lasting bush, stretching plentifully from the base. It typically goes from 30-150 cm in level, however develops to 3 m in positive circumstances in northern Australia (Lonsdale et al., 1995). The stems are sinewy to practically woody, with an extreme wiry bark. There is a profound, extreme taproot. The leaves are substitute, lanceolate, intense, tightening towards the two finishes, and on a short, bushy petiole 3-6 mm long. The leaves have toothed edges, are smooth or have meager stellate hairs and have unmistakable veins on the under surface.[3]

TAXONOMICAL CLASSIFICATION[21]

kingdom	Plantae
Phylum	Anthophyta
class	Dicotyledonae
Division	Tracheophyta
Order	Malvales
Family	Malvaceae
Genius	Sida
Species	***Sida acuta*** burm

VERNACULAR NAME[22]

Common name	Common wire weed
Sanskrit	Bala
Bengali	Kureta/berela
Hindi	Kareta/kharenti
Kannada	Vishakaddi/bhimana kadddi
Telugu	nelabenda

BOTANICAL RIVIEW OF *SIDA ACUTA*

STEM AND LEAVES

The slender, yet wiry or slightly woody, stems are branched and either upright (i.e., erect) or spreading (i.e., ascending) in nature. They are sparsely covered with fine, star-shaped (i.e., stellate), hairs.

The leaves are alternately arranged along the stems and borne on short, hairy (i.e., pubescent) stalks (i.e., petioles) 3-7 mm long. These yellowish-green coloured leaves (12-95 mm long and 3-40 mm wide) are usually elongated in shape (i.e., lanceolate) with toothed (i.e., crenate or serrate) margins and pointed tips (i.e., acute or acuminate apices). They are hairless (i.e., glabrous) or sparsely covered in simple or star-shaped (i.e., stellate) hairs.[4]

FLOWER AND SEED

The yellow (rarely whitish) flowers (1-2 cm across) are borne singly or in small clusters in the upper leaf forks (i.e., axils). They are borne on short and slender stalks (i.e., peduncles) 2-8 mm long, that elongate up to 15 mm in fruit. Each flower has five pale yellow, yellow, or pale orange petals (6-9 mm long) and five mostly hairless sepals (5-8 mm long). These pale green sepals are fused together at the base (i.e., into a calyx tube) and have pointed tips (i.e., acute calyx lobes). The flowers also have numerous (about 100) tiny stamens, with their bases fused to each other, and seed, the fruit is a hard structure (i.e., schizocarp) that turns from green to dark brown as it matures. These small fruits (2-6 mm across and 3-5 mm high) break up into 5-8 one-seeded segments (i.e., mericarps) when fully mature. These 'seeds' (i.e., mericarps) are wedge-shaped (1.5-2 mm long) and

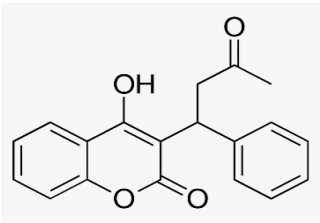
topped with two sharp awns (0.5-1.5 mm long). The true seeds are inside these mericarps, they are smaller (about 1.5 mm long) and reddish-brown to black in colour.[5]

CHEMICAL CONSTITUENT OF *SIDA ACUTA* PLANT[23]

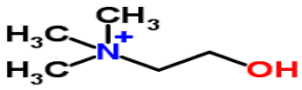
Phytochemical constituents	Solvents				
	Petroleum ether	Chloroform	Ethyl cetate	Ethanol	Water
Alkaloids	-	-	-	+	-
Steroids	+	+	-	+	-
Flavonoids	+	+	-	++	+
Tannins/phenols	+	++	+	++	-
Aminoacids and Proteins	+	++	+	-	-
Sugars	-	-	-	-	-
Glycosides	+	+++	++	++	++
Saponins	+	++	+	-	_
Terpenoids	+	-	-	-	-

'+'- Presence of secondary metabolites '-' Absence of secondary metabolites

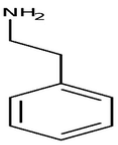
Much scientific research has been carried out in order to determine the chemical composition *of* ***Sida acuta***. Almost all parts of the plant are concerned by this research but leaves and root are the most studied. The phytochemical screening of ***Sida acuta*** species revealed the presence of alkaloids such as vasicine, ephedrine and cryptolepine, saponosides, coumarins, steroids, tannins, phenolic compounds, polyphenol, sesquiterpene and flavonoids and Phytochemical and micronutrient composition *of* ***Sida acuta*** using standard analytical methods Some of the general characteristics of flavonoid include potent water soluble super antioxidants and free radical scavenger; they prevent oxidative cell damage, β-phenethylamine and quindoline alkaloids from *S. acuta* are found.[6], 3-Phenethylamines were found to constitute the major bases in the aerial parts (stems and leaves[7] Thiamine is another vitamin present in ***Sida acuta***. Thiamine is especially important vitamin in animal nutrition because it cannot be produced sufficiently by ruminants, given ***Sida acuta*** to such ruminants will therefore improve the health status of the animal. Thiamine deficiency causes cerebrocortical necrosis and neurological signs[8] glutathione peroxidase are also found in sida acuta extract[9] and also Three types of alkaloidal constituents, viz., -phenethylamines, quinazolines and carboxylatedtryptamines, in addition to choline and betaine have been isolated from ***Sida acuta***.[10]



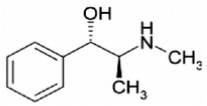
Glutathione peroxidase



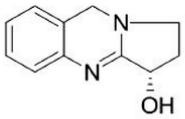
Choline



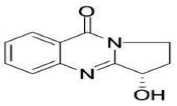
β -Phenethylamine



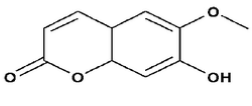
Ephedrine



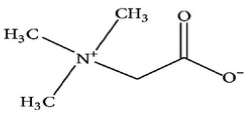
Vasicine



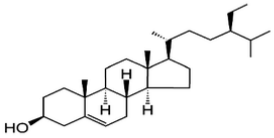
Vasicinone



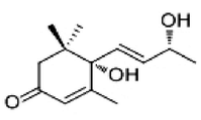
Scopoletin



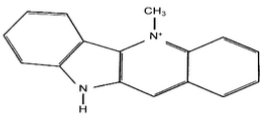
Betaine



β-Sitosterol



Vomifoliol



Cryptolepine

TRADITIONAL USAGES

S. acuta is broadly circulated in pantropical regions and is generally utilized as customary medication as a rule. The plant is likewise utilized for otherworldly practices. Table 1 shows the conventional utilizations of the plant in certain locales where it develops. Among sicknesses the plant is utilized to fix, fever is the most referred to. The organization might be by oral course for instance on account of fever or by outer utilization of the glue straightforwardly on the skin for skin illnesses or snake chomps (Kerharo and Adam, 1974). The plant might be utilized alone or in mix with different plants as per the sicknesses or to the healers.[1]

PHARMACOLOGICAL ACTIVITY OF *SIDA ACUTA*

SIDA ACUTA ON CENTRAL NERVOUS SYSTEM

Ethanolic extracts of *S. acuta* leaves have pain relieving action and energizer like properties tried in various creature models, demonstrating that the plant contains psychoactive substances.[11] In an experiment conducted by Dora et al, the ethanol extract from the leaves and stems of Sida acuta, caused significant effects on the central nervous system in experimental animals and support it traditional uses as sedative.[6]

Antioxidant activity

To decide the antioxidative capability of ***Sida acuta***, 24 grown-up wistar pale skinned person rodents were separated into four gatherings of 6 rodents each.[25] Group1 got feed and water (control) while bunch 2, 3 and 4 notwithstanding feed and water were treated with ethanol leaf concentrate of ***Sida acuta*** at 20, 40 and 60 mg/kg body weight, respectively. After one days of treatment, the rats were sacrificed, and plasma obtained for oxidative stress indices assay. The result showed a significant decrease ($P<0.05$) in mean values of plasma malondialdehyde concentration and a significant increase ($P <0.05$) in reduced glutathione concentration at 40 and 60mg/kg body weight compared to the control group. Plasma catalase and superoxide dismutase activity were significantly increased ($P<0.05$) only in animals treated with 60 mg/kg body weight compared to the control group. The result showed that ethanol leaf extract of ***Sida acuta*** possesses an antioxidant property which, in a dosedependent manner, reduces/ameliorates oxidative stress in rats.[12]

Anti-ulcer activity

Gastric ulcers were induced in the experimental animals by Pylorus ligation, and administration of Aspirin (300mg/kg) and Ethanol (1ml/kg) [40]. Then, at that point, Ethanolic concentrate of leaves of ***Sida acuta*** was administrated to those creatures and their impact contemplated. The antiulcer action was evaluated by deciding and contrasting the ulcer record in the test drug bunches with that of the benchmark group as well as that of Famotidine 20mg/kg (utilized as reference drug). This plant remove was laid out for its critical antiulcer movement against all the three-ulcer prompting trial models, by decreasing the ulcer file in those models with an improved outcome than famotidine bunch, at 200mg/kg of the concentrate against headache medicine (300mg/kg) in addition to pylorus ligation model. The antiulcer action of ethanol concentrate of entire plant of ***Sida acuta*** was additionally upheld by Malairajan et al. This plant extract was studied for its antiulcer activity against aspirin plus pylorous ligation gastric ulcer, HCl-ethanol induced ulcer and water immersion stress induced ulcer in rats. They found that ethanol extract markedly decreases the incidence of the ulcer in the first two models.[6]

Anxiolytic activity

Sida acuta extricate diminished the inertness time (T1) and expanded the dozing time (T2) initiated by pentobarbital, showing a soothing and mesmerizing impact of the plant's concentrate. The concentrate of ***Sida acuta*** shows an expansion in open arm investigation (anxiolytic movement). Results got in the rota-pole test showed that main the raised portion (750 mg/kg) of ***Sida acuta*** remove, intensely controlled, advances tremendous changes, at 60-and 120-min post-organization, in the hour of lastingness in the bar.[13]

Cardiovascular activity

Kannan et al screened cardioactive spices from Western Ghats of India. The heartbeat rate (HBR) and blood stream during systole and diastole were tried in Zebrafish undeveloped organisms [44]. The methanol concentrates of ***Sida acuta*** prompted decline in the HBR in Zebrafish undeveloped organisms, which was more prominent than that brought about by Nebivolol.[6]

Antibacterial activity

The antimicrobial impact of the ethanolic and watery concentrates of ***Sida acuta*** was examined. The test secludes from human skin contaminations were Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, Escherichia coli, Scopulariopsis candida, Aspergillus Niger and Aspergillus fumigatus. The zone of hindrance for the ethanolic extricate differed from 10 mm for P. aeruginosa to 43 mm for S. aureus and from 4 mm for P. aeruginosa to 29 mm for S. aureus in the watery concentrate. However, the zone of hindrance expanded with expansion in grouping of the concentrate, the most noteworthy convergence of the ethanolic extricate uncovered a higher critical ($P > 0.05$) restraint against S. aureus and B. subtilis contrasted with the hindrance impact on these organic entities by gentamicin utilized as control. The fluid concentrate affected the test living beings. The concentrates affected the growths detaches. This study has shown that the concentrate of S. acuta if appropriately harnessed medicinally will improve our medical services conveyance framework.[14]

Anti-inflammatory activity

The analgesic, anti-inflammatory and anti-ulcer was additionally concentrated on in mice and rodents utilizing the tail drenching, mouse ear oedema and

acetylsalicylic corrosive prompted ulceration models. The rough concentrates displayed huge (p< 0.001) pain relieving and calming exercises in mice as well as an undeniable security against acetylsalicylic corrosive prompted gastric mucosal ulceration in rodents (p< 0.001). This legitimized the utilization of ***Sida acuta*** against agony, irritation and ulcer in home grown clinical practice.[15]

Hepatoprotective activity

The hepatoprotective impact was additionally checked by histopathology of the liver. Pre-treatment with ***Sida acuta*** extricate essentially abbreviated the length of phenobarbitone-actuated narcosis in mice showing its hepatoprotective potential. Phytochemical concentrates on affirmed the presence of the phenolic compound, ferulic corrosive in the base of ***Sida acuta***, which represents the huge hepatoprotective impacts saw in the current review.[16]

Antimalarial activity

Karou et al investigated the antimalarial activity of five plants used in the traditional medicine of Burkina Faso to treat malaria, including ***Sida acuta***. These plants extracts were tested in vitro on fresh clinical isolates of Plasmodium falciparum. The result revealed Sida acuta to be the most active plant of the study (IC50 value of 4, 37µg/mL). In another work, Marimuthu studied the larvicidal and repellent activities of crude leaf extract of Sida acuta against three important mosquitoes. The result showed that crude extract of the plant had strong repellent action against the three species of mosquitoes investigated. The ethanolic extract and water decoction of the aerial part of Sida acuta from Ivory Coast was tested for their in vitro antiplasmodial activities on two strains of Plasmodium falciparum: Cameroon (chloroquine-resistant strain) and a Nigerian (chloroquine-sensitive strain). The ethanolic extract exhibited a better antiplasmodial activity than the decoction. The Pharma Innovation Journal All these studies have proved that Sida acuta has significant antiplasmodial activity.[6]

Wound healing property

Impacts of skin organization of methanolic concentrate of ***Sida acuta*** treatment was concentrated on separately on two sorts of twisted models in rodents, (I) the extraction and (ii) the cut injury model. The salve of the methanol concentrates of ***Sida acuta*** created huge reaction in both of the injury types tried. In the extraction model the concentrate treated injuries were found to epithelialize quicker and the pace of wound compression was higher, when contrasted with control wounds. The concentrate works with the recuperating system as proven by expansion in the rigidity in the entry point model.[17]

ANTIPYRETIC ACTIVITY

The extraction of leaves of ***Sida acuta*** (Wealth of India, Raw Materials), family Malvaceae was carried out using petroleum ether, acetone, ethanol and distilled water in succession. The extracts were evaluated for antipyretic activity. The acetone extract showed significant antipyretic activity.[18]

ANTIDIABETIC ACTIVITY

The antioxidant property of ***Sida acuta*** was as of late illustrated, in vitro. We suggested that this property could give some defensive advantage in alloxan model of diabetes mellitus in rodents and thought about the adequacy of the methanolic and ethanolic leaf concentrates of the plant in this review.[19]

ANTICANCER ACTIVITY

The anti-cancer effects of methanol and water extricates were tried on human bosom disease cells, MDA-MB-231, and the methanol remove showed the best enemy of malignant growth impact with an IC50 worth of 102.4 µg/mL. All in all, the trial information have exhibited promising pharmacological exercises of S. acuta removes got utilizing various solvents, subsequently giving a logical premise to the approval of the conventional restorative purposes of this plant.[20]

CONCLUSION

This reviw on ***Sida acuta*** a potent drug and used in treating various ailaments from ages highlights its various potencial properties on central nervous system, and in other disease, as it contains phytochemicals like terpenoids, β-phenethylamine, glutathione peroxidase, choline, vasicine, ephedrine and cryptolepine (the main alkaloid in the plant), saponosides, coumarins, steroids (ecdysterone, β-sistosterol, stigmaterol, ampesterol), tannins, phenolic compounds with various pharmacological action and also have lower cost and lesser toxicity. Therefore, based on the results it can be concluded that the aqueous extract of *S. acuta* may hold enormous resource of pharmaceutical properties and can be a novel drug.

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