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MORPHOLOGY, CHEMICAL COMPOSITION AND THERAPEUTIC POTENTIAL OF SOMLATA (*SARCOSTEMMA ACIDUM* WIGHT. & ARN.)

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ABSTRACT

Somlata or Moon plant (*Sarcostemma acidum* Wight. & Arn.) existing in warmer regions in European and Asian countries like India, China, Pakistan, Srilanka, Iran has various religious and pharmacological significances. The perennial, fleshy, glabrous branched, milky latex secreting shrub has been considered by majority of the researcher as an important candidate for divine "soma plant", mentioned in Vedic literatures. The plant with unique features has been given several names from one region to another. There are also alike species but are considered poisonous to human use. However certain species like *Ceropegia juncea* are similar to *S.acidum* on the basis of their use and property. The plant mainly contains alkaloids, phenols, triterpenes, tannins, flavonoids, carbohydrates, proteins, free amino acids, steroids, fixed oils, fats, mucilages, gums, wax etc. The stem also contains sucrose and phytosterol.The plant shows antiulcer, anti-inflammatory, hepatoprotective, antimicrobial gastroprotective, antioxidant, antifertility, insecticidal activities and thus hasa wide pharmaceutical application. The ethanol, acetone or methanol fraction of the plant extract both singly or in combination, exhibits strong therapeutic properties and can be used in preparing new formulations to cure various human ailments. This article is a comprehensive study of morphology, distribution, chemical composition and pharmaceutical uses of the plant. Moreover the study recommends more research on this plant to explore its various medicinal properties along with new approaches for its preservation.

KEYWORDS: *Sarcostemma acidum,* external features, chemical constituents, therapeutic uses.

INTRODUCTION

Somlata (*Sarcostemma acidum* Wight. & Arn.) a member of family *Asclepiadaceae* believe to be close to "Soma" a divine drink that confirms immortality, had ritual importance in Indian mythological system. The use of Soma by humans is mentioned in the Rig Veda, written more than 5000 year ago, which says that soma makes us immortal, lightened, and helps to find gods. Even the Iranian calls it "Hoama" as given in the sacred Avesta. The ancient Hindus and Zoroastrians uses soma in their age-old rituals, but the real identity of the plant from which Soma was obtained is still mysterious or lost with time[1].Susrutha Samhita, mentioned twenty four varieties of Soma plants based on their habitat, name and medicinal properties. The soma is generally used for restoration and is neither hallucinogenic nor intoxicating. According to

Rigveda, Susrutha Samhita and Ayurveda the plant contain 15 leaves which is beared per day during the waxing moon and shed off during waning moon [2].With the passage of time several species were identified and claimed as a suitable candidate for soma plant starting with *Ruta graveolens,* and *Sarcostemma brevistigma*, both claimed by [3, 4], *Ephedra sp.*,[5], *Sarcostemma sp.*[6], *Amanita muscaria*[7], *Ceropegia decaisneana* or *C. elegans* and *Sarcostemma brevistigma*[8], *Ceropegia juncea*[9,2]all showing close association with their feature and properties. However majority of the authors and their work on *Sarcostemma acidum*Wight. & Arn claims closer conformity of the plant with yester year's soma plant, hence preferred in this article.

Morphology and distribution

Somlata (*Sarcostemma acidum* Wight. & Arn.) is a perennial jointed trailing shrub with green, cylindrical, fleshy glabrous branches containing milk white latex, bearing opposite leaves which are reduced to scales (Fig. 1). The length of the stem is 2 to 4 meter and diameter 0.5 to1cm; the root is brownish in color with a depth of 5 to 8 inches containing 3 to 5 sub root branches, color-brownish; The plant flowers between July to February and bears light yellow, purple [10]or white or pale greenish actinomorphic flowers in umbels with 0.8 to 1cm diameter containing sepals, petals, stamens (5 each) 2 ovaries and androcium and gynocium are joined together with the help of 5 stigma and bears fruits follicles, with flatand ovate seeds [11, 12].The shrub is distributed wildly in India, Sri Lanka, Pakistan and European countries. In India it is distributed in dry rocky places in Coast of Coromandel , Konkan, Deccan, Karnataka, Andhra Pradesh, Tamil Nadu,Western Ghats (Sahya mountain ranges)Maharashtra, Madhya Pradesh, Kerala, Bihar and Bengal[10, 11].

Chemical Composition

The chemical constituent of the plant shows variation according to occurences and distribution. The plant occurring in warm places in India mainly contains sucrose Malic acid, Succinic acid, Alkaloids, Phytosterols, traces of tannin, Alpha and beta amyrins, Beta sitosterol, Lupeol and lupeol acetate[13,14]. Phytochemical studies of the powdered leaves contains alkaloids, phenolics, triterpenes, tannins, flavonoids, saponins, and carbohydrates [15].The plant extract contains carbohydrate and glycosides as evidenced by Molisch's test and Legal's and Borntr ager's test; alkaloids as evidenced by using HCl and various reagents; proteins and free amino acids; tannins and flavonoids confirmed by alkaline and Shinoda's test; steroids and triterpenoids as proved by Libermann-burchard and Salkowski test; fixed oils and fats; mucilages and gums and waxes[16]. The plant stem decoction shows presence of sucrose, terpines, phytosterol and saponins, ethanol

extract contains redusing and nonredusing sugar, triterpinoids and phytosterol, Chloroform extract contains steroids and triterpinoids[12].

The plant of Chinese origin shows presence of Sacidumlignan-A, Sacidumlignan-B, Sacidumlignan-C, Sacidumlignan-D, degraded derivatives of lignans such as Sacidumol-A and Sacidumol-B, Perforatic acid, (+)- Pinoresinol, 9 alpha hydroxyl pinoresinol , and Peucenin -7 O methyl ether[17]as chief chemical constituents. The 2D NMR spectroscopic techniques justifies that the aqueous fraction of ethanol extract of the plant contain sarcidumitol[18]and dried flowers contain a rare flavonol glycoside Quercetin 5a prenyl, 3-O-glucosyl, 7-O-(4c-p-coumaroyl) [19].Thin Layer Chromatography of Methanol solvents of plant shows presence of Flavonoids, Steroids, Alkanoids, Terpenoids, Fatty acids, Phenolic acids, Carrotinoids, Tannins, Saponins, Coumarins and Anthracene glycosides, whereas the hexane extract shows Alkaloids, Steroids, Saponins, Carrotinoids, Tanins, and Anthocyanins[10].

Fig. 1- *Sarcostemma acidum* plant

Therapeutic Uses

Sarcostemma acidum possess a significant therapeutic potential and shows bitter, cooling, emetic, narcotic, and rejuvenating effect. The plant is generally used in vitiated condition of pith, hydrophobia, psychopathy, dipsia, general debility, depression, pyschosis and fatigue[11].The plant is a natural source of membrane stabilizers and can be an alternative remedy for

inflammatory related disorders and diseases. *In-vitro* study of anti-inflammatory activity of Ethyl acetate extract of the plant using human red blood cell membrane stabilization method at 1, 2, 4 and 6 mg/ml shows 30, 42.8, 54 and 67.6% protection of HRBC when compared to standard Indomethacin drug with 69.6 % protection of HRBC in hypotonic solution[20]. A study on analyzing pole climbing response obtained through Condition Avoidance Response (CAR) and analyses of bar test generated through Cataleptic Scoring test reveals that the ethyl acetate extract of the whole plant inhibits the latency period of pole climbing and a higher degree of catalepsy in bar test due to obstacle in dopaminergic pathway proving anti Psychotic efficiency of the plant[21].

The affectivity of ethyl acetate plant extract on Central Nervous System on Wistar albino rats using actophotometer exhibited an increase in locomotors activity which indicates CNS inhibitory property of the plant [21].The Ethyl Acetate Extract of plant flower using CCl_4 induced hepatic damage agent causes elevation levels of serum bilirubin, serum marker enzymes and liver weight proving hepatoprotective activity of the plant [19]. This activity is further justified in other observations which shows elevation in biochemical parameters of liver cells using ethyl acetate extract of plant stem [22, 23, 24]. The synergetic action of plant flower Ethyl Acetate Extract and flavonol glycoside exhibited free radical scavenging thus showing lipid peroxidation inhibition activity[19]. The ethanolic extract of plant shows increase in level of antioxidant enzymes Catalase (CAT), superoxide dismutase (SOD),reduced glutathion (GSH)) and various membrane bound enzymes like Mg2+ ATpase, Ca2+ ATpase,Na2+ ATpase and decrease in lipid peroxidation in pylorus-ligation and malondialdehyde estimation method shows its antioxidant activity [15]. Ethyl Acetate Extract of *Sarcostemma acidum* plant also possess anxiolytic activity as evidenced by Elevated Plus maze showing an inclination in the number of entries in to the open arm and Hole Board Apparatus study which observed an increase in the number of head poking in HBA, resulting increase in exploratory behavior in rats[21]. The ethanolic extract of the plant using indomethacin induced ulcer model [25]and pylorus ligation rat model shows decrease in ulcer index, volume and total acidity, and increases the pH of the gastric fluid, exhibiting anti-ulcer activity which is mainly due to presence flavonoids and antioxidants [25, 15].

The 70% methanolic extract of *S.acidum* can be a good antimicrobial agent against two gram negative *Klebsiella pneumonia* and *Salmonella paratyphi* and gram positive bacteria *Streptococcus pneumonia* and *Bacillus cereus* exhibiting a zone of inhibition between13 – 22mm against these organisms, as justified through micro titter and tube dilution method[26].Similarly, several studies have also proved that the same concentration of methanolic extract of the plant

can act as a good antifertility agent by reducing sperm motility and density and 80% reduction fertility of male albino rats by decreasing the number of primary and secondary spermatocytes and spermatids without any major side-effect[27, 28, 29, 30, 31]. A study also suggest that b-amyrinan eco-friendly non-toxic plant steroid, isolated using NMR and the spectral data from methanol soluble fraction of the whole plant of *S. acidum* can act as an insect antifeedant and growth inhibition of the tobacco cutworm, *Spodoptera litura,* and thus a possible candidate to be tested at molecular and physiological levels[32].

CONCLUSION

These studies provide detail scientific information about phytochemical composition and pharmacognostic activities of *Sarcostmma acidum.* The study also details distribution, identification and morphological features of the plant that would be helpful in further scientific researches and studies. However, there is a need of elaborate research and implementation of modern scientific techniques to conserve this useful medicinal plant.

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