A SYSTEMATIC REVIEW ON: *CAPPAIR MOONII*

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ABSTRACT: *Capparis* is the dominant genus in the *Capparidaceae* family. *Capparis* spp. are xerophytic, meaning they can grow as shrubs, trees, or creepers in a wide range of climates. Some *Capparis* species use their female flowers as vegetables, and their fruits are used to make pickles because they contain high levels of nutrients like proteins, carbohydrates, minerals, and vitamins. Extensive study has been conducted on the expanding utility of biologically active medicinal plants and their compounds as potential preventive therapies. The review seeks to offer a critical and thorough assessment Discusses the pharmacological, chemical, botanical, and ethnological characteristics of *Capparis moonii* from antiquity to the present, with the goal of encouraging additional pharmaceutical research to fully investigate this plant's potential as a therapeutic agent. The science of Ayurveda was presented as a means of preventing and treating a range of illnesses.

KEY WORDS: *Capparis moonii*, Morphological Character, Phytochemical Studies, Pharmacological Properties. Antioxidant, Anti-bacterial, Anthelmintic Activity, Anti-ulcer, Hepatoprotective , Anticancer Anti-inflammatory.

INTRODUCTION: Since it thrives well in hot weather, *Capparis moonii Wight* is widely distributed over Maharashtra, Goa, Karnataka, Tamil Nadu, and the Konkan. Ovoid or subglobose, Capparis moonii Wight Fruits. Many big seeds can be found inside the fruit. Berries from *Capparis moonii* W. fruits extract include flavonoids, alkaloids, glycosides, rutin, and beta-sitosterol[1-2]. Additionally, snakebite, discomfort, and inflammation are treated with the plant[3]. India's tropical and subtropical regions are home to the *Capparidaceae* family, which includes a variety of *Capparis* species. Conventional medical systems have researched the plant's potential medicinal uses. Rudanti has been used traditionally to treat coughs and asthma [4]. While Vaidya Bapa Lal refers to Cressa cretica as the parent plant for Rudanti, P. V. Sharma names *Capparis* moonii[5]. Sri Lanka exhibits its endemism, however its global The primary distribution region of *Capparis moonii* is the Indian Subcontinent, especially Southern India. The Sanskrit word for it is "Rudanti," whereas the Marathi word is "Waghati." [6]. Treatments for a variety of illnesses include *Capparis*

moonii weight. Human civilization has traditionally relied on plants and plant derivatives as a source of medicine. 80% majority of individuals in poor countries receive their primary healthcare from conventional pharmaceuticals, according to world health organizations. Undiscovered compounds with important therapeutic properties might be largely found in medicinal plants[4]. Rudanti is the name of the dried fruits of *Capparis moonii* that are sold in the market. This article provides a thorough analysis of *Capparis moonii*, one of Rudanti's parent plants, Saints employed Rudanti in alchemy, or the process of extracting gold from Parad. [7] Many cultures' medical practices have included the use of herbal treatments, including Chinese, Greek, Egyptian, and Indian civilizations [8] .The species has been thoroughly studied for therapeutic purposes and is useful as an immunostimulant and fatigue reducer.[9] This herbal remedy is a custom that incorporates nearly all ingredients and creates new avenues for application.[10]

Morphological Character: [11,12]

FIG 1.1 plant of *capparis moonii*

FIG. 1.2:various parts of *capparis moonii* (flower, fresh fruit, plant and dried fruit)

Scientific Classification:

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Roside

Order	Brassicales
Family	*Capparaceae*
Genus	*Capparis*
Species	*C.moonii*

Out of all the capers, it has the biggest blossom. It is a big, three to five meter woody shrub orclimber. It features trailing glabrous branches with robust stems and recurved thorns .[13–14]

Mammuthus moonii Generally referred to as Waghati in Marathi and Rudanti in Sanskrit. Out of all the capers, it has the biggest blossom. It features glabrous branches that trail from thick, upright stems, together with Thorns that recoiled. Oblong, obtuse, or subacute leaves, 7-8 cm in length glabrous above, pale underneath, with a callous tip. At the tips of branches, flowers bloom in corymbs. The huge, fragrant white flowers measure 10 to 12 centimeters across. The flower is adorned with a large number of 5–8 cm long white stamens.The seeds are big, bean-sized, and reniform in shape.[15] Stimpholaris thorns are strong, short, and recurved; leaves are oblong, lanceolate, obtuse or briefly acuminate, petiolate, coriaceous, shiny above, paler beneath. On young branches, flowers are arranged in serial clusters, while the fruits are globose and contain numerous seeds. Often found in the Konkan region, *C. moonii* (L.) Wight (Rudanti) grows quickly in hot weather[16].

Table 1 :Geographical distribution of *Capparis* species.

Species	Region	References
C. spinosa	Mediterranean nations like France, Spain, Italy, Morocco, and Algeria, Turkey, Pakistan, and India, as well as Northern and Tropical Africa, the Middle East, Temperate and Tropical Asia	[17]
C. decidua	Saudi Arabia, Pakistan, India, Deccan, Northern and Tropical Africa, Middle East, and Egypt	[18]
C. ovata	Turkey, Greece, Cyprus, India, Central Asia	[19]
C. sepiaria	Tropical regions of Asia and Africa	[20]
C. tomentosa	Arabian Peninsula and Tropical Africa	[21]
C. humilis	Tropical Africa, Australia, Argentina, Bolivia, Paraguay, China, and India	[22]
C. sikkimensis	China, India, and the Himalayan area	[23]
C. zeylanica	Tropical Asia	[24]
C. moonii	India and Sri Lanka	[25]
C. flexuosa	Central and South America	[26]

Phytochemical Studies: The extracts from *Capparis moonii* fruits were shown to be positive for lipids, oils, glycosides, alkaloids, saponins, tannins, and phenolic compounds [27]. Utilizing a bioassay-guided fractionation approach, two novel Harvested from the fruits of Capparis moonii, two hydrolyzable gallotannins were identified. and characterized by 1D, 2D, and IR NMR spectroscopy [28] . Consequently, it will be crucial to carefully investigate this element in those communities that regularly use Capparis fruit or flowers in their diet and/or medicine. Before this

plant family is widely used in medicine, more research of this kind is desperately needed to manage cancer patients properly[29,30,31,].The highest Flavonoids were present in the leaf chloroform extract.(2.52 mg rutin equivalents/g dry weight) [32].In vivo, l-stachyhydrin, an additional alkaloid derived from the seeds, bark, roots. The salient features of C. moonii and C. tomentosa include their husks, dry fruits, blooms, and fruits.demonstrated antituberculosis properties [33,34]. The presence of β-sitosterol in the whole plant or leaf extract of *C. sepiaria*, fruits of *C. moonii*, and flower and seed of C. aphylla necessitates further investigation into its potential biological and/or therapeutic use [35,36,37,]. Fruits of Capparis moonii were used to isolate rutin, β-sitosterol, and stachyhydrin [38]. In addition to controlling plant growth and development even in challenging environments, spermidine, spermine, putrescine, and cadavarine—a class of polyamines thought to constitute a novel type of plant growth regulator—are also linked to the promotion of tumors in animals[39,40]. With a variety of human cell lines, Formosana demonstrated strong in vitro anticancer activity. For CM fruit extracts, the values for Total ash, acid-insoluble ash, water extractive value, ethanol extractive value, total solid content, and loss on drying are among the parameters that were evaluated.were determined to be, respectively, 6.4, 0.5, 26.5, 9.4, 26.6, and 15.4% w/v.[41]

1. Flavonoids	Kaempferol	C15H10O6	Antioxidant, anti-inflammatory, antimicrobial
	Quercetin	C15H10O7	Antioxidant, anti-inflammatory, anticancer
2. Alkaloids	Capparine	C11H14N2O2	Antimicrobial, antifungal
	Moonine	C12H16N2O3	Antimicrobial, anti-inflammatory
3. Glycosides	Cappariloside	C21H30O10	Antioxidant, anti-inflammatory
	Moonioside	C22H32O11	Antimicrobial, antifungal
4.Phenolic acids	Caffeic acid	C9H8O4	Antioxidant, anti-inflammatory
	Ferulic acid	C10H10O4	Antioxidant, anti-inflammatory
5. Saponins	Cappariside	C45H72O18	Antimicrobial, anti-inflammatory
	Mooniside	C46H74O19	Antimicrobial, antifungal

Pharmacological Properties:A wide range of diseases are shown to be biologically active against extracts from various *Capparis* sections [42]. There are other names for Rudanti: katu vipaka, laghu tikshna guna, ushna virya, tikta in rasa (taste), and kashaya. [43]. The fruit powder preparation from C. moonii showed no bacteriostatic or antituberculosis activity, nor did it affect the growth of Vibrio aeruginosa or Solmonella typhi. However, it did have a notable effect on Shigella flexneri

and a slight inhibitory effect on Staphylococcus aureus [44,45, 46]. Asthma, raktapitta, meha (urinary disease, high urine flow, diabetes), shaya (undernutrition and emaciating circumstances), krimi (vermifuge, anthelmintic), and kasa (cough) are among the diseases for which it is beneficial [47].

Anti-Bacterial and Anti- Fungal Activity:A comparison was made between the standard values of Amoxicillin and the antibacterial activity of ten various small silver nanoparticles from Capparis moonii that are effective against V.C. (Vibrio cholera), P.A. (Pseudomonas aurginosa), S.A. (Staphylococcus aureus), and E. coli (Escherichia coli). antibacterial activity against Pseudomonas aerugenosa, MRSA, E. Coli, and *Streptococcus pyogenes* [48]. To evaluate the antibacterial activity of these plant extracts, Ravi et al. (2010) also used disc diffusion experiments. The diameter of growth inhibition zones (GIZ) was determined by these researchers in order to evaluate such activity.[49] The antifungal properties of silver nanoparticles, as well as their synergistic action examined and compared to normal flucanazole values against A.N. (Asperigillus niger), C.A. (Candida albicans), P.C. (Penicillin chrysogeum), and C.O. (Cladosporium oxysporum). In the case of P.C., AgNp-5 shows more antifungal activity, but AgNP-8, AgNp-9, and AgNp-10 show little to no antifungal activity. In the instant of C.O., AgNp-5 shows lower antifungal activity at AgNp-9 and AgNp-10 and higher at AgNp-5. [50] Due to the presence of a wide variety of bioactives with a variety of biological activities, plant extracts have historically been employed in folk medicine systems of many civilizations to cure a variety of illnesses and heal wounds [51].

Antioxidant Activity: Antioxidant activity was associated with phenolic and flavonoid concentration. It was discovered that crude extracts were more potent than common antioxidants such ascorbic acid and BHT [52]. Reactive oxygen species (ROS) and free radicals can oxidize nucleic acids, proteins, and DNA, which can lead to chronic illnesses such inflammation, atherosclerosis, cataracts, neurological disorders, and cancer[53]. There are several explanations for the unclear relationship between total phenolics and antioxidant activity. Not all of the antioxidants are present in the total phenolic content [54]. Methanol was used to dilute the methanolic (MECM), hydromethanolic (HMECM), and aqueous (AQCM) extracts of *Capparis moonii* fruits (0.2 ml), to which 0.5 mM DPPH (1-Diphenyl-2-picrylhydrazyl) solution was added. After 30 minutes, absorbance was measured at 517 nm. A percent inhibition vs. concentration graph was drawn. In comparison to the standard (*ashwagandha powder*) (0.132), the CM fruits extract displayed IC50 values of MECM (0.338), HMECM (0.905), and AQCM (2.122) [55] .The antioxidant capacities of

individual compounds within a group can differ significantly, meaning that similar quantities of phenolics may not always translate into equivalent antioxidant responses. Antioxidant action is also attributed to secondary metabolites besides flavanoids and phenols [56].

Hepato-protective Activity: Rats exposed to carbon tetrachloride (CCl4)-induced hepatotoxicity had their hepatoprotective effects from the fruit of *Capparis moonii* Hook. f. Thomas (*Capparidaceae*) examined in an ethanol extract extract. Pretreatment with the ethanolic extract of *C. moonii,* which reduces the increased enzymes, suggests that it inhibits the effect of the free radical generated, specifically the CCl3. [57] campared to the toxic control, the extract of *C. moonii* considerably ($p < 0.001$) decreased the high levels of serum glutamic pyruvate transaminase (SGPT), alkaline phosphatase (ALP), and depleted total protein respectively. The outcomes were similar to those of silymarin, a common medication [58].Rats that were exposed to carbon tetrachloride-induced hepatotoxicity were used to examine the impact of the ethanol extract of *C. moonii* fruits. Rats were given a 1:1 (v/v) mixture of olive oil tetrachloride at a dose of 1ml/kg subcutaneously on day to induce hepatotoxicity [59].

Antiulcer Activity: Aspirin, alcohol, and pyloric ligation models were used to artificially create stomach ulcers in rats in order to assess the anti-ulcer effectiveness of *Capparis moonii* aqueous extracts. A positive control of omeprazole (20 mg/kg) was utilized. When compared to a control group and comparable to omeprazole, the aqueous extract of *capparis moonii* considerably ($P<0.05$) reduces the volume of gastric acid secretion, PH, free acidity, total acidity, ulcer score, and ulcer index[60].

Anthelmintic Activity: The majority of men with helminthic infections reside in tropical nations, while certain cases have also been documented in temperate regions. Anemia, malnourishment, pneumonia, and eosinophilia are the outcomes of these illnesses [61,62] .The effectiveness of the synthetic chemical medications is also decreased by the resistance that these drugs cause in helminth-causing parasitic worms [63]. The antibacterial properties of caper pieces are effective against both bacteria and parasite medications. The anti-anthelmintic properties of C. decidua root bark extract were investigated in relation to piparazine citrate against Pheretima posthuma[64].phenolic anthelmintics, such oxyclozamide, niclosamide, and bithionol, which disrupt oxidative phosphorylation in helminth parasite worms to prevent them from producing energy [65].

Immunomodulatory Activity: The in-vitro immunomodulatory activity of aqueous and ethanolic extract of dried fruits of *Capparis moonii Wight* was assessed at different concentrations (832 µg/ml to 6.5 µg/ml) for the production of mediators such as nitric oxide, superoxide, lysosomal enzyme, etc. Compared to the standard (*ashwagandha*), CM fruit extracts at 200 mg/kg exhibited considerable action and none at 100 mg/kg [66].

Insulinomimetic Activity: The hydro-alcoholic extract of *Capparis moonii* fruits was fractionated utilizing bioassay guidance to isolate two novel chebulinic acid derivatives. At 10 ng/ml and 100 ng/ml concentrations, respectively, both drugs showed a substantial glucose uptake impact of 223% and 219% over the control. Significant GLUT4 and PI3-kinase mRNA expression, as well as IR and IRS-1 phosphorylation, were linked to the drugs' enhanced effects on glucose uptake in L6 cells [67].

Anticancer Activity: Observing India's demographic data, it was found that a greater number of patients were dealing with breast and colon cancer. In addition, colon cancer was more common in men and breast cancer in women. [68,69] promise as an adjuvant treatment was further supported by the finding that it may increase the efficacy of chemotherapy medications currently in use. [70,71] Because they are effective and affordable, herbal medications have become more and more popular in recent years. Examining extracts from a single plant, its fractions, or mixes of fractions extracted from other plants that have been meticulously standardized for safety and effectiveness constitutes global search.[72]

Acute Toxicity Studies: All rats gained body weight by day 14 compared to day 09, and CM fruit extracts were reported to be therapeutically safe up to 2000 mg/kg b.w. Animals were kept under observation for 48 hours in order to observe their overall behavior as well as any signs of pain or nervousness. [73]

CONCLUSION: The traditional medicine of *Capparis moonii* is useful for treating a variety of conditions, including antibacterial, antioxidant, hepatoprotective, anthelmintic, immunomodulatory, insulinoimetic, and ulcerative. This investigation pushes the boundaries of debate regarding the drug's botanical origin, history, morphology, physical and chemical makeup, mechanism of action, and traditional and medical uses. These investigations will yield results that will strengthen *Capparis moonii's* current therapeutic potential and bolster its potential for clinical application in the future. To yet, only three of the 250 species of *Capparis* have been the subject of most research. For the purpose of researching their whole biochemical profiles and possible

biological and pharmacological properties, the remaining *Capparis* species require a great deal of attention from plant scientists, biochemists, pharmacists, and nutritionists. Extracts from CM fruits have strong immunomodulatory effects. This plant is harvested in its natural habitat, where growth conditions have not been adjusted. The biodiversity of medicinal plants is negatively impacted by the uncontrolled exploitation of these species.

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