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A Precise Review on the Pharmacognostical and Pharmacological Imputes of Bermuda Grass: *Cynodon Dactylon* Linn

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ABSTRACT

The World Health Organization estimates that about 80% of the world's population uses herbs to meet their basic healthcare needs. *Cynodon Dactylon* (Doob grass), is a sacred grass belongs to the Poaceae family. It is a weed and has been found to possess various potential medicinal with diverse pharmacological activity spectrum. It is a perennial herb found in all tropics and sub tropics regions. The plant can reach upto a feet height. The plant possess number of medicinal properties, such as antiviral, antimicrobial, anti-inflammatory, immunomodulatory etc.,. Bermuda grass is rich in proteins, carbohydrates, minerals, and other substances like terpenoids, vitamin C, palmitic acid, and alkaloids. The present study focusses on the updates of pharmacognostical and pharmacological properties of the Cynodon dactylon Linn.

1. INTRODUCTION

An estimate from the World Health Organization states that about 80% of people worldwide use herbs to meet their basic medical needs. Durva, or taxonomically the Cynodon dactylon, is one of the many plant species found in India that is important to traditional medical knowledge systems and ethnomedical practices (Ayurveda, Unani, Nepalese, and Chinese) **(Ninad V Shendye *et al.*, 2014)**. The sacred grass next to tulsi, or Ocimum sanctum, is Cynodon Dactylon, or "doob grass," since it is fed to cows, which are revered in India. **(Das Mukesh Chandra *et al.*,2013).** Perennial grass Cynodon dactylon L. is a multipurpose medicinal plant. All over the tropics and subtropics, it is grown. The entire plant and its root stalk are used medicinally **(R. Kowsalya *et al.*, 2015).**

Known as "Njem" in Tunisia, Cynodon dactylon L. (Gramineae, Poaceae) is a plant with a variety of medicinal properties, including antiviral, antimicrobial, anti-inflammatory, and immunomodulatory activity. It is widely used to treat dysentery, dropsy, hypolipidemia, and acts as a hypoglycemic agent.

2. PLANT PROFILE

Scientific name: Cynodon Dactylon Linn
Family:Poaceae

3. TAXONOMICAL CLASSIFCATION

Kingdom-Plantae
Division-Magneliophyta
Class-Liliopsida
Order-Cyperales
Family-Poaceae
Genus-Cynodon
Species-Cynodon dactylon

4. VERNACULAR NAMES IN INDIA

Sanskrit	Bhargavi, doorway, granthi, sveta
Hindi	Doorva, doob
Tamil	Arugu, arugampull
Bengali	Durba
Kannada	Ambate-hullu, garikae
Malayalam	Karuka-pulli
Marathi	Doorva, haryali
Punjabi	Dub, kabbar, talla
Telugu	Garka, gerike, haryali
Pushtu	Kabal
Urdu	Ghass

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5. HABITAT

Perennial Cynodon dactylon is a common weed along roadsides, in lawns, and in areas where there is a lot of nitrogen. C. dactylon is frequently grown in warm areas with annual rainfall between 625 and 1,750 mm (24.6 and 68.9 in) (or less, if irrigation is available) that are located between roughly 30° S and 30° N latitude. **(Rawal Jatin R *et al.*, 2016).**

6. MORPHOLOGICAL CHARACTERISTICS

The edges are uncomfortable and sharp. It is short and has a dark green tint. The upright stems have a height range of 1 to 30 centimeters. Most of the nearly straightened stems have a hint of purple coloring. At the top of the stalk, seed heads appear in a cluster of two to six spikes, each measuring 2.5 to 5 centimeters in length. The root system is deep and can grow to a depth of more than 2 meters (6.6 feet) in conditions of a dry spell and porous soil. **(Shweta Das *et al.*, 2013).**

7. TRADITIONAL USES

The herb was traditionally used to cure wounds, hemorrhages, diarrhea, dysentery, and hyperdypsia. The fresh plant juice was used as an astringent and demulcent, and it was used to treat dysentery, chronic diarrhea, anasarca, dropsy, and catarrhal opthalmia. Blood purifying, diuretic, antiemetic, anti-inflammatory, and antidiabetic properties are all associated with the rhizome's aqueous extract. **(Azade Eskandary *et al.*, 2017**). The freshly extracted grass juice was used to treat hemuturesis, vomiting, and catarrhal opthalmia. It can also be administered topically to wounds and cuts, as well as to treat chronic diarrhea and dysentery. Root decoctions were used to treat vesical calculus, secondary syphilis, pile bleeding, and urinary tract discomfort. **(Ali Esmail Al-Snafi., 2016).**

7.1. Leaf

The leaf's lamina is distinguished by an almost square to oval epidermal with an uneven outer wall. The dorsal side of the cell is composed of a collection of bulliform cells that are thin-walled and devoid of chlorophyll, extending deep into the mesophyll. These cells are situated at the bottom of a distinct groove that separates the veins. Crude alkaloids, carbohydrates, tannins, flavonoids, saponins, and cardiac glycoside are all present in the leaf. **(Kartikey Pandey *et al.*, 2016).**

7.2. Root

It has been widely utilized to control soil erosion because this grass has a strong, fibrous root structure in shallow soil. **(Viroon Kamchoom *et al.*, 2021)**. The C. dactylon root is cream colored, hair-like, and fibrous, with a cylinder shape and a maximum thickness of 4 mm. **(Papia Khatun *et al.*, 2020)**.

7.3. Stem

Willowy, with a smooth, jointed, horizontal texture up to 1 mm thick, with a yellowish green hue**(Shafaque Rahman., 2014).**

8. PHYTOCHEMICAL CONSTITUENTS

Many C. dactylon compounds have been recognized and measured from various morphological sections of the plant. Proteins, carbohydrates, minerals, and other substances like terpenoids, vitamin C, palmitic acid, and alkaloids are all present in the plant. On a dry matter basis, green grass has 10.47% crude protein, 28.17% fiber, and 11.75% total ash. The flavonoids apigenin, luteolin, orientin, and vitexin were among the other significant phytoconstituents identified from this plant. beta-carotene, violaxanthin, neoxanthin, phenolics, phytosterols, glycosides, saponins, and volatile oils are examples of carotenoids. **(Kaliyaperumal Ashokkumar *et al.*, 2013).**

9. PHARMACOLOGICAL ACTVITIES

9.1. Antimicrobial activity

Via the use of the invitro agar well diffusion method, the antibacterial activity of Cynodon dactylon leaf extracts was assessed against pathogenic bacteria such as gram positive (Bacillus subtilis, Pseudomonas aeruginosa, and Staphylococcus aureus) and gram negative (Escherichia coli and Klebsiella pneumoniae). Compared to chloroform leaf extracts, the plants' aqueous leaf extracts demonstrated a more marked inhibition. Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli, and Klebsiella pneumoniae were all more susceptible to inhibition by leaf extracts. **(Suresh K *et al.*, 2008).**

9.2Anti cancer activity

For the Hep-2 laryngeal, HeLa cervical, and Mcf-7 breast cancer cell lines, Cynodon dactylon demonstrated anticancer agent properties. It might serve as a possible adjuvant therapy for the chemotherapy drugs that are now in use. **(kanimozhi D., 2012).**

C. dentylon's antioxidant activity contributes to its anticancer potential. Cynadon dactylon methanolic extract was isolated from the hydroxycinnamic acid, which was found to have substantial antioxidant and anticancer action in ethyl acetate and methanol extracts of specific species of Cynodon dactylon Linn. **(Koushik OS *et al.*, 2015).**

Assessed the silver nanoparticles' in vitro cytotoxicity against the HEpG-2 cell line. The sample's cytotoxic examination revealed a straight dose-response relationship, with cytotoxicity rising with concentration. The end result demonstrated that silver nanoparticles that were biosynthesized had a significant cytotoxic effect on HEpG-2. The possible application of

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nanoparticles in alternative medicine is investigated in this work. **(Supraja *et al.*, 2015).**

9.3. Wound healing property

Excision and incision wound models were used to assess the effectiveness of Cynodon dactylon aqueous extract in wound healing. The characteristics that were examined were the incision wound's tensile strength, the rate at which the wound contracted, and the duration of full epithelialization. Significant wound healing activity was identified in the aqueous extract of Cynodon dactylon, as demonstrated by a decrease in the epithelialization period, an increase in the rate of wound contraction, and skin breaking strength. **(Vipin Kumar Garg *et al.*, 2009)**.

Using an excision wound model, the hydroalcoholic extract of Cynodon dactylon (L.) Pers. was assessed for its ability to cure wounds. In the excision wound model, the parameters included the rate of wound contraction and the duration of epithelization. It was noted that the incision wound had improved tensile strength and early tissue approximation. It might be caused by the individual or combined effects of the phytoconstituents that speed up the healing of wounds. **(Anand Kumar *et al.*, 2013).** Through the use of HPLC analysis, phytochemical ingredients in the plant C.dactylon's aqueous extract were identified. The extract was subjected to an acute and dermatological toxicity investigation. Wister rats with full thickness punch wounds underwent pharmacological testing of a 15% ointment (w/w) of the extract in comparison to a placebo control and standard comparator framycetin. The effects were assessed using tissue DNA, RNA, protein, hydroxyproline, and histological examination, among other parameters. Wound contraction size (mm2) and tensile strength (g) were also measured. The ointment was used on a limited number of clinical cases with complex and chronic wounds, and its effectiveness was assessed using standard hematological tests in addition to scoring systems for granulation, epithelialization, and vascularity. Both the pharmacological and clinical research produced noteworthy outcomes. The author concluded that an aqueous extract of Cynodon dactylon has the ability to cure wounds in animal models and may also be feasible to use on human beings. Because of its anti-oxidative action, which causes collagenesis, C. dactylon's phenolic acids and flavonoids assist its ability to heal wounds. **(Tuhin Kanti Biswas *et al.*, 2016).**

9.4. Anti-inflammatory activity

Various in vitro techniques such as protein denaturation inhibition, membrane stabilization test, and proteinase inhibitory assay were employed to assess in vitro anti-inflammatory plant medicines. The gold standard for anti-inflammatory research was acetyl salicylic acid. Red blood cells were shown to be protected by all studied extracts from heat-induced membrane damage and proteinase inhibition, indicating that these extracts play a critical role in preserving the integrity of the cell membrane. The aqueous extract of C. dactylon, known as AECD, had an IC50 value of 243.3 µg/mL. The extract's effects were contrasted with those of aspirin, the commonly used medication. **(Kiruba *et al.*, 2014).** On mouse models, the anti-inflammatory properties of Cynodon dactylon L. Pres. were examined using a hydroalchoholic extract of the whole plant. The granuloma pouch technique in rats and pulmonary edema in mice were used in the experimental paradigm. The mice were given hydroalcoholic extract of Cynodon dactylon L. Pres. (HECD). A 0.1 ml intrapleural injection of a 1% carrageenan suspension in saline was administered to mice as a challenge. As a benchmark, indomethacin (10 mg/kg) was employed. Both the substantial effectiveness of HECD against pulmonary edema in mice and the significant impact of HECD on the enhanced protein infiltration brought on by carrageenan were discovered. (**Sneha Sahadeo Kirgat *et al.*, 2018**).

9.5. Antioxidant activity

Using the DPPH free radical scavenging assay, the ethanolic extract of Cynodon dactylon's in-vitro antioxidant activity was assessed. It was also established what the extract's decreasing power was. For the purposes of both analyses, ascorbic acid served as the standard and positive control. When compared to conventional antioxidants, the ethanolic extract of Cynodon dactylon demonstrated very substantial DPPH radical scavenging activity. With increasing concentration, the extract's capacity to scavenge DPPH radicals increased. (**Kanimozhi.D *et al.*, 2012)**. They looked at the methanolic extracts of the entire Cynodon dactylon plant's phytochemical characteristics and antioxidant capacity. In vitro test models, such as the DPPH free radical reduction ability, were used in this work to measure the free radical scavenging activity. The reference standard utilized was quercetin. The results showed that it has various phytochemical components and promising antioxidant activity of Cynodon dactylon crude extracts in a dose-dependent manner. **(Manoj Kumar Kakati *et al.*, 2019).**

Using the disk-diffusion method, the chemical makeup, free radical scavenging activity, and antibacterial qualities of the methanolic extract of C. dactylon rhizomes against specific bacterial and fungal strains were examined. The outcomes showed that palmitic acid, oleic acid, and linoleic acid were the main fatty acid structures of the C. dactylon methanolic extract. The predominant tocopherol and sterol, respectively, were sitosterol and alpha-tocopherol. Free radicals might be scavenged by the methanolic extract of C. dactylon rhizomes, particularly at higher

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concentrations. Higher concentrations of phenolic chemicals, tocopherol, and antioxidants were the cause of this trait. **(Samira Savadi *et al.*, 2020).**

9.6. Antiparasitic activity

The carrageenan-induced rat paw edema method was utilized to assess the anti-inflammatory activity of C. dactylon. Ibuprofen was used as the standard, and the inflammation was produced by intraperitoneal administration of a 1% Carrageenan (0.1 ml/100g) suspension. It has been noted that the ethanolic extract of C. dactylon can considerably reduce the development of edema brought on by carrageenan after measuring the volume of the paw. **(Furhatun-Noor *et al.*, 2022).**

9.8. Antidiabetic activity

The carrageenan induced rat paw edema method was used to assess the anti-inflammatory activity of C. dactylon. Ibuprofen was employed as the standard and a 1% Carrageenan (0.1 ml/100g) suspension was administered intraperitoneally to cause inflammation. The paw volume was measured, and it was found that the ethanolic extract of C. dactylon could considerably reduce the amount of edema caused by carrageenan. **(Jarald EE *et al.*, 2008)**. After giving glucose-loaded normal rats an aqueous and ethanolic extract of Cynodon dactylon and having them fast for eighteen hours, hypoglycemia was seen thirty minutes later. At two hours, the blood sugar level started to decrease to its maximum. **(Das Mukesh Chandra *et al.*, 2013).**

9.9. Antifungal activity

Analyzing Cynodon dactylon's antifungal activity was Prince Ekisha Gideon et al. The extracts of C. dactylon in methanol and n-butanol were made. Using the agar disc diffusion method, the antifungal activity of C. dactylon's n-butanol and methanol extracts was screened at concentrations of 1000 µg/ml, 750 µg/ml, and 500 µg/ml on Muller-Hinton agar medium and Sabouraud dextrose agar medium, respectively. The zone of inhibition's diameter was measured and compared to the standard control, amphotericin B. When applied at 1000 µg/ml, the methanol extract of C. dactylon demonstrated good antifungal activity against Aspergillus, Penicillium, and Trichoderma viride. Potential antifungal efficacy against Aspergillus, Penicillium, T. viridae, and Candida sps. **(Prince Ekisha Gideon *et al.*, 2016).**

10. CONCLUSION

The plant Cynodon dactylon is a weed that has been shown to have a wide range of potential medical uses. Enough details regarding the pharmacological and pharmacognostic characteristics of this plant were provided by this review article. The presence of phytoconstituents with their superior pharmacological qualities greatly aids in the treatment of infections and illnesses. The existence of different components indicates that the plant can function secondarymetabolite in the target of numerous receptors and can work as a medicine for a variety of diseases, including cancer, diabetes, and epilepsy.

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