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Cynodon Dactylon – A Review of Pharmacological Activities

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ABSTRACT

Annual herb Poaceae family; Cynodon dactylon (L) Pers.widely distributed in India. Many Indian languages have distinct names for it: Dhro in Gujarati, Arukampillu in Tamil, Durva in Marathi, Durba in Bengali, Garichgaddi in Telugu, and Shataparva in Sanskrit. Cynodon dactylon is of great importance in traditional medical systems and ethnomedical practices. Owing to its many medicinal qualities, it is used as a powder, paste, or juice to treat a variety of conditions. A phytochemical study of Cynodon dactylon revealed the presence of flavanoids, alkaloids, glycosides, terpenoides, triterpenoids, steroids, saponins, tannins, resins, phytosterols, reducing sugars, carbohydrates, proteins, volatile oils, and fixed oils. Previous studies have indicated that Cynodon dactylon possesses features that are gastrointestinal, antioxidant, antibacterial, antiparasitic, and protecting. In the provided review, we looked at the pharmacological properties of the perennial herb Cynodon dactylon as well as some of its prospective uses. The abundance of potential future developments that we can regard as superior than chemical pharmaceuticals as alternative medicine.

Keywords:- Pharmacology, Pharmacognosy, medicinal plants, constituents, Cynodon dactylon.

INTRODUCTION[1,2]

The low-statured, creeping warm-season perennial grass Cynodon dactylon (family-Poaceae) is often used as turf and in garden lawns. Although it is indigenous to East Africa, it has spread over warmer climates and more than one continent, where it can withstand a wide variety of soil conditions and moisture levels. A cluster of two to six spikes distributed radially from a single point makes up the inflorescence of Bermuda grass, which is characterized by its somewhat flattened stems, hairs protruding at the leaf blade and sheath junctures, and grey-green foliage. Plants can procreate through both roots and seeds. Particularly in riparian zones, Bermuda grass's rapid growth allows it to outcompete native species.

Taxonomical classification of *Cynodon dactylon*[3]

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

COMMON NAMES

Language	Synonvms
Tamil	Aruvaumpullu
Hindi	Dooh
Kanada	Garikehullu
Marathi	Dhoorva
Telugu	Garikehullu

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English	Bermuda and Brahma
Sanskrit	Durva
Other	Weed
German	Bermundagras, Hundezahngras
Italian	Gramina
Portuguese	Capim-Bermunda
Spanish	Garmarastera
Swedish	Hundtandsgras
Chinese	Gou-ya-gen
Afrikaans	Gewonekwcck, Kweekgrass
Arabic	Thaiel, Najeel, Tohma
French	Chieendent pied-de-poule

GEOGRAPHICAL DISTRIBUTION[4]]

Soils that are heavy clay, medium loam, and light sandy are preferred by C.dactylon. Saline, alkaline, and extremely acidic soils can all support its growth. But it can't grow in areas with lots of shadow. In soil, moisture is necessary. Several researchers have noted that it has been spread throughout the warm-temperate and sub-tropical regions, mostly for usage as a lawn grass or as a forage grass, particularly in saline environments.

HABIT AND HABITAT OF PLANT[4,5,6]

The lanceolate leaves of C.dactylon are between 2 and 10 cm in length and 1.25 and 3 mm in width. The presence of spikelets with a single flawless floret distinguishes flowers. Lanceolate glumes can grow up to 2 mm in length. The bottom glume is somewhat smaller than the top one. Tan to yellow anthers, measuring 1 to 1.5 mm in length. Styles have a purple hue. The roots are cylindrical and fibrous. The roots have a thickness of two to four millimeters. The stem has a yellowish green color and is incredibly smooth.

BOTANICAL DESCRIPTION[1,2]

ROOT:

The perennial herb Cynodon dactylon is stoloniferous, prostrate, creeping, and has rhizomes extending from each node. Mature roots have a piliferous layer (hair-bearing layer) that extends radially into the cube cell and is composed of a single layer of thin walls. The hypodermis has thin walls and is made up of one or two layers of long, tangentially oriented cells. A thin-walled, lignified, polygonal, sclerenchymatous zone and a parenchymatous zone with four to six layers of elongated cells were the two zones into which the cortex split. Phloem and xylem are grouped in a ring shape to form vascular bundles.

STEM:

The stem has an oval form and a tiny depression on one side. It displays a single layer when cells are present, and the hypodermis is made up of one or two layers of sclerenchymatous cells. Cortex composed of three to five layers of parenchymatous cells with thin walls that are rounded to oval in shape. The 30-cm-long creeping stem has a slight flattening. Furthermore, the stem is purple in color. It tastes sweet and mucilaginous.

LEAVES:

The green leaf blades of Cynodon dactylon measure 2–15 cm in length and 4 mm in width. The outer wall of the epidermis of the leaf lamina is about square to oval in shape. The veins are located at the bottom of a precise groove, and there are bulliform cells on the dorsal side that are gathered together. These arcs reach far into the thin-walled, chlorophyll-free mesophyll. The flat to slightly keeled, tip-shaw and glabrous leaves of Cynodon dactylon have a circular leaf sheath form.

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PHARMACOLOGICAL REVIEW:

ANTI-DIABETIC EFFECT[7]

Blood sugar levels were dramatically lowered in normal rats by an aqueous extract of Cynodon dactylon for a maximum of six hours. As much as 500 mg/kg bw, a dose-dependent effect was seen. The reaction, however, diminished when the dosage was raised to 1000 mg/kg bw. Using C. dactylon extracts for glucose management. Lignocellin, luteolin, 6-C-pentosyl-8-C-hexosyl luteolin, and 6-C-hexosyl-8-Cpentosyl apigenin were detected in aqueous extracts of C. delicatylon by HPLC–ESI MS analysis. A thorough in silico docking approach was used to assess hypoglycemic activity with PPARγ (Peroxisome Proliferator-Activated Receptor), GLUT-4 (glucose transporter-4), and SGLT2 (sodium glucose co-transporter-2). The results showed that lutein, apigenin, 6-C-pentosyl-8-Chexosyl luteolin, and 6-C-hexosyl-8-C-pentosyl apigenin interacted with SGLT2. The chemicals in question have been shown to exhibit comparable interactions with the SGLT2 residues Asp 294 and Gln 295 to the phase III drug dapagliflozin. The responsibility for sugar sensing and transport has been determined to fall on these residues. Only the non-polysaccharide fraction of the C. dactylon aqueous extract caused hypoglycemia in fasting normal rats, indicating that both the extract and its non-polysaccharide fraction have potent antihyperglycemic capabilities. Low density lipoprotein, high density lipoprotein, glycosylated hemoglobin, and hemoglobin significantly. In comparison, a higher potency of the non-polysaccharide component of the aqueous extract was found. A Diabetes has long been treated orally with a variety of medicinal herbs or their preparations. Cynodon dactylon, or dog grass, is found to include sterols and flavonoids that have been demonstrated to have hypoglycemic activity and the ability to rebuild beta cells in the pancreas, according to a phytochemical investigation. Cholesterols have also been shown to reduce blood sugar in models of experimental animals.

ANTIPYRETIC, ANALGESIC & ANTI INFLAMMTORY EFFECT[8,9,10,11]

In order to study this herb's antipyretic properties, a rat model of yeast-induced hyperthermia was used. Rectal temperature was found to be significantly lowered by the aqueous extract at a dose of 600 mg/kg, which was comparable to the effect of the common drug paracetamol. This result seems to support the hypothesis that the extract influences prostaglandin biosynthesis in some manner, as prostaglandin is believed to control body temperature. 8 At doses of 400 mg/kg and 600 mg/kg, the antipyretic qualities of ethanolic extract were assessed in rabbits suffering from milk-induced pyrexia. The control group received distilled water, and the typical medicine was 100 mg/kg of paracetamol. For four hours, the rabbits' rectal temperatures were measured every hour with a digital thermometer. The experiment showed a reasonable decline in temperature ($p<0.05$) at 600 mg/kg of both medications when compared to the conventional treatment.

The results showed how well the ethanolic extract of Cynodon controlled the elevated body temperatures of the rabbits by acting as a potent antipyretic. Paracetamol, a common antipyretic drug, had an effect quite comparable to this one. Cynodon dactylon ethanolic extract on stressed rodent models. Through the use of the carrageenan-induced rat paw edema method, which involved intraperitoneal administration of a 1% Carrageenan (0.1 ml/100g) suspension and the standard usage of ibuprofen, the anti-inflammatory activity of C. dactylon was ascertained in this work. Ethanol extract from C. dactylon has been shown to considerably reduce the production of carrageenan-induced edema, based on measurements of the paw volume. Utilizing the tail-flick method and the acetic acid writhing test, aspirin was selected as the reference standard to assess both peripheral and central analgesic activity. C. dactylon extract demonstrated a substantial reduction in the writhing in pain test in response to acetic acid-induced abdominal pain. A chloroform-methanolic extract from Cynodon dactylon Pers. (Dhub Grass) was tested for its anti-inflammatory qualities in rat paw edema brought on by carrageenan.

The extract greatly suppressed the paw edema caused by carrageenan at three doses of 125, 250, and 500 mg/kg. Its effects were similar to those of the common anti-inflammatory drug indomethacin, and it was used for both acute and chronic models in the study. Accordingly, the current study finds that the chloroform-methanolic extract of C. dactylon exhibits anti-inflammatory qualities.

The Cynodon dactylon ethanolic and methanolic extracts efficiently inhibited all of the studied bacterial and fungal strains, including E. Coli, B. subtilis, S. typhimurium, M. luteus, K. pneumoniae, S. aureus, P. vulgaris, P. aeruginosa, and C. pneumoniae.Agar well technique for Agar vs flavus, Agar versus fumigatus, P. notatum, Sporothrix schenckii, Stachybotrys charttarum, and Candida neoformans. Every extract that underwent TLC showed UV bands that showed the presence of flavonoids, phenols, glycosoids, and alkaloids.

ANTICANCER EFFECT[12,13]

To investigate the hepatoprotective potential of the methanolic extract of Cynodon dactylon roots against diethyl nitrosamine (DEN)-induced liver cancer, Swiss albino mice were employed. An oral dose of the plant extract, 50 mg/kg per week, was

administered up to 30 days after DEN treatment. Samples of liver tissue and blood were obtained from the slaughtered animals for use in enzyme tests, such as those for glutathione-S-transferase (GST), glutathione peroxidase (GPx), catalase (CAT), asparatate aminotransferase (AST), and alanine aminotransferase (ALT). The AST and ALT production, which are markers of the liver, was implicated considerably in the protective effect. A remarkable anticancer property of C. dactylon's methanolic extract.

In an MTT assay, Cynodon dactylon was tested against HEP2 laryngeal, HELA cervical, and MCF-7 breast cancer cell lines. The results indicated that, at 0.078 mg/ml, 97% of the cells were viable; this proportion decreased as the extract concentration increased. The MCF-7, HELA, and HEP-2 cancer cell lines were all significantly killed by the petroleum ether extract of Cynodon dactylon.

It was shown that the percentages of cytotoxicity inhibition at 10 mg/ml were 93.5%, 88.5%, and 79.2%. These outcomes were comparable to those of cyclophosphamide, the control medication, which showed cytotoxicity of 96%, 92%, and 83%. The Cynodon dactylon petroleum ether extract was therefore shown to be non-toxic to Vero cells but detrimental to HEPA, MCF-7, and HEP-2 cells. Its lowest effective concentration (Ic50) ranged from 0.156 mg/ml to 0.625 mg/ml. The HEP-2 laryngeal cell line has the highest level of activity for Cynodon dactylon among these three cell lines. Cynadon dactylon methanolic extract shown potent antitumor activity against leukemic K-562 cells. Present the facts in tabular form. The hydroxycinnamic acid and other alkaloidal chemicals found in the methanolic extract of Cynodon dactylon (L) (pers) are thought to be the cause of the plant's predicted antioxidant and anticancer properties, according to the previously cited research.

WOUND HEALING EFFECT [14]

The ability of Cynodon dactylon to heal wounds was investigated using rats. The results showed that the topical application of gel containing the aqueous and alcoholic extracts of Cynodon dactylon considerably enhanced the area of the rats' wounds healing as compared to the control group. These outcomes were similar to those of a common medicine called Povidone-Iodine ointment. After preliminary screening, flavonoids, phenols, tannins, and alkaloids were identified in the aerial component extract of Cynodon dactylon. These phenolic compounds and flavonoids may function singly or in concert to hasten the healing of wounds.

The ointments containing Cynodon dactylon and Curcuma longa in a cationic emulsifying ointment base had the fastest initial rate of wound healing. The next, and somewhat closely, was the ointment prepared with non-ionic emulsifying ointment. Due to the lack of medication or extract from Cynodon dactylon or Curcuma longa, the control ointment's early healing rate was incredibly low. The most active ointment was made with a cationic ointment base and extract from Cynodon dactylon and Curcuma longa. This illustrates the potential of using extracts from Cynodon dactylon and Curcuma longa as a cationic emulsifying ointment to promote wound healing.

ANTIVIRAL EFFECT[15,16]

Mice's rectal temperature was found to be considerably lower when the antipyretic efficacy of Cynodon dactylon aqueous extract was tested. An effective dose of 200 mg/kg was found for the methanolic and aqueous extracts of Cynodon dactylon to evaluate their antipyretic activity. There were four sets of six wistar rats apiece. Animals were induced feverish by subcutaneously administering 20 mg/kg of a 20% solution of Brewer's yeast 31. First, the rectal temperature was measured. After 18 hours, animals were selected if their rectal temperatures had increased by 0.3–0.5ºC. A digital thermometer was used to take the rectal temperature 30 minutes before and 0.5, 1, 2, 3, 4, 5, and 6 hours after the test extracts, reference standard paracetamol (150 mg/kg), and control saline vehicle were administered.

Two Cynodon plant ethanol extracts have a potent antipyretic effect in reducing the raised body temperature that milk generates in rabbits, and the phytochemical analysis confirms the presence of sterols and flavanoids. Paracetamol, a popular antipyretic drug, has effects that are comparable to these. Some endogenous substances, such prostaglandins, can induce pyrexia, which is an elevation in body temperature. Any type of antipyretic drug has the ability to stop prostaglandins from forming. A multitude of secondary causes, such as infection, tissue damage, inflammation, cancer, etc., can result in pyrexia, or an increase in body temperature. pro-inflammatory mediators, such interleukin and TNF-α.

ANTIULCER EFFECT[17]

The antisecretory qualities of the plant extract, which have been connected to an enhancement in the local healing process and are comparable to the actions of the prescription drug ranitidine (H2-antagonist), may be the cause of the extract's capacity to heal ulcers. Antiulcer action of flavonoids has been reported. Decoctions of roots are used to treat secondary infections of the urinary system.

A comprehensive evaluation of the plant's possible medicinal applications may be aided by the presence of many phytochemical elements in the pharmacognostical and phytochemical features of different Cynodon dactylon extracts. A preliminary screening of Cynodon dactylon extracts showed the presence of phenolic glycosides, carbohydrates, fixed oils, lipids, alkaloids, and flavonoids. In treating ulcers, flavonoids have been shown to be bioactive, according to a survey. The results of this study suggest that the aerial portions of Cynodon dactylon are a viable material for further investigation, which may lead to the creation of drugs that heal ulcers. Creating phytomedicine requires a lot less money and effort than other medical fields.

ANTIOXIDANT EFFECT[17]

Reports state that the colon cancer cell line COLO 320 DM cells had an antioxidant effect when exposed to the methanolic extract of C. dactylon, which also increased the levels of antioxidant enzymes. Additionally, it has been reported that giving C. dactylon methanolic extract to test subjects caused the concentration of lipid peroxides to drop.This study builds on our earlier research by assessing the antioxidant activity of Cynodon dactylon's aqueous extract in relation to oxidative stress caused by diabetes in rats. In STZ-induced diabetic rats, this plant's notable antioxidant efficaciousness at the tissue level may be attributed to the flavonoids found in its aqueous extract.

CONCLUSION:

The aqueous paste of Cynodon dacylon can be used to treat a wide range of ailments. Studies on antimicrobial activity reveal that the aqueous extract has strong antibacterial, analgesic, and antipyretic qualities against illnesses like white spot disease. It follows that the phytoconstituent of the aqueous extract, which is made up only of flavonoids and glycosides, may be used to make potent antibiotics that combat migraines and viral infections. Grass can be easily cultivated and isolated, making it a more appropriate material for research with potentially more promising results. It was discovered that the adaptable properties and promise of provided grass were helpful in the pharmaceutical industry, prompting further study to confirm its impact. Research that has already been done has shown that herbal remedies are a better option than chemical medications. Therefore, the study has a lot more potential in the future to separate components or create pharmacological dose forms.

REFERENCES:

1.Chiranjit Mandal et.al., A Comprehensive Review on *Cynodon dactylon* in Management of Diabetes & Cardiovascular Diseases,2022; International Journal of Pharmaceutical Research and Applications Volume 7, pp: 624-633.
2. https://en.m.wikipedia.org/wiki/Cynodon_dactylon.
3.Ninad V et.al., A systemic review of Pharmacognosy, Phytochemistry and Pharmacology,2014; International Journal of Pharmacy and Pharmaceutical Sciences, volume 6, ISSN- 0975-1491.
4. Surendra V, Prakash T, Sharma UR, Goli D, Dayalal S, Kotresha F. Hepatoprotective activity of aerial plants of *C. dactylon* against CC14-induced hepatotoxicity in rats. Pharmacogn Mag 2008;4: 195-201.
5. R K Jananie et.al.,Secondary metabolites of *Cynodon dactylon* as an antagonist to angiotensin II type 1 receptor: Novel in silico drug targeting approach for diabetic retinopathy, 2012; Journal Of Pharmacology and Pharmacotherapeutics,3(1):20-5.
6.Shweta Parihar et.al., *Cynodon dactylon*: a Review Of Pharmacological Activities, 2021; Scholars Academic Journal Of Pharmacy, ISSN 2347-9531(Print) | ISSN 2320-4206 (Online).
7. Garg VK, Khosa RL. Analgesic and anti-pyretic activity of aqueous extract of Cynodondactylon. Pharmacology online. 2008;3:12–20.
8. Ahmed AB, Das D, Sengupta R. Comparative antipyretic activity of ethanolic extracts of some species of Cynodon in rabbits. J Pharmacogn Phytochem. 2016;5(6):361–6.
9.Yogesh HS,Kichadi SC, Muchandi IS,Gopalakrishna B. Evaluation of AntiInflammatory activity of Cynodondactylon Pers. India J Nut Prod Resour. 2013;4(2):151-4.
10. Bagewadi ZK, Siddanagouda RS, Baligar PG. Phytoconstituents investigation by LC-MS and evaluation of anti-microbial and antipyretic properties of cynodondactylon. Int J Pharma Sci Res. 2014;5(7):287.
11. Kowsalya R, Kaliaperumal J, Vaishnavi M, Namasivayam E. Anticancer activity of Cynodondactylon L. root extract against diethyl nitrosamine induced hepatic carcinoma. South Asian J Cancer. 2015;4(2):83–90.
12. Venkateswarlu G, Rani TS, Vani M, Vineela PA. In-vitro anticancer activity of petroleum ether extract of Cynodondactylon. J Pharmacogn Phytochem. 2015;4(1):164–72.
13. Dande P, Nmims KS, Shirpur S. Evaluation of wound healing potential of Cynodon dactylon. Asian J Pharm Clin Res. 2012;5:161–4.
14. Al-Snafi AE. Chemical constituents and pharmacological effects of Cynodon dactylon- A Review. IOSR J Pharm (IOSRPHR). 2016;6(7):17–31.
15. Ahmed AB, Das D, Sengupta R. Comparative antipyretic activity of ethanolic extracts of some species of Cynodon in rabbits. J Pharmacogn Phytochem. 2016;5(6):361–5.

16. Kumar EC. Antimicrobial Activity And Phytochemical Analysis Of Cynodon Dactylon: A Review. Int J Acad Res Develop. 2018;3(3):116–21.
17. Rai PK, Jaiswal D, Rai DK. Antioxidant Potential Of Oral Feeding Of Cynodon Dactylon Extract On Diabetes-Induced Oxidative Stress. J Food Biochem. 2010;34(1):78–92.

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