

Pharmacognostical and pharmacological profile of *Cynodon dactylon*: A review

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ABSTRACT:

Cynodon dactylon (L.) Pers. (family- Poaceae), is a long-lived herb found in various regions of India. It is native to Europe, Africa, Australia and much of Asia. It has been introduced to the Americas. The plant has been rich in metabolites notably proteins, carbohydrates, minerals, flavonoids, carotenoids, alkaloids, glycosides and triterpenoides. This review includes several biological activities of the plant *C. dactylon* such as, antimicrobial, antiviral and wound healing properties.

KEYWORDS: *Cynodon dactylon*, Pharmacognostical, pharmacological profile.

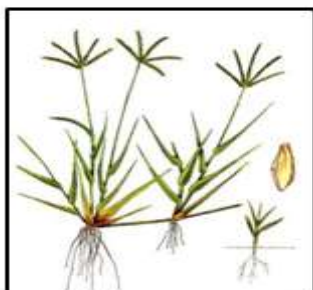
I. INTRODUCTION:

From the olden days plants and its secondary metabolites are used in various disease divisions of medicine and used to cure various disease and disorders. And we knew few plants by observing its many plants are yet unidentified. Though our ancestors had left us some knowledge about plants which have medicinal activity.^[1] According to an estimation of the World Health Organization, about 80 percent of the world's population uses herbs to fulfil its primary healthcare needs. More than 35,000 plant species are being used around the world as medicinal plants in traditional and ethnomedicinal practices. Among numerous species of plants growing in India, *Durva* or taxonomically the *Cynodon dactylon* occupies a key position in ethno medicinal practices and traditional medicinal knowledge systems (Ayurveda, Unani, Nepalese, and Chinese).^[2]

During the last few decades there has been an increasing interest in the study of medicinal plants and their traditional use in different parts of the world.^[3] Herbal products were being the effectual source of both traditional and modern medicines which are used widely to treat several medical problems. It is evident that the plant

kingdom contains enormous and inexhaustible source of active ingredients vital in the management of many diseases. Use of plants as to cure health related problems in the traditional way is very popular. America and Middle Eastern countries. Use of such plants has minimal side effects. In recent years, pharmaceutical companies spent substantial amount of time and money in developing therapeutic products which is based upon natural products extracted from plants [Ben Sassi et al., 2007 and Coruh et al., 2007]. Whole plant of the *Cynodon dactylon* is traditionally used to treat painful and inflammatory condition. *C. dactylon* was generally known to be in the east of Africa. It was then distributed extensively at above the sea level of 2000 meters of height or altitude. It is one kind of monocot weed that is inherent to Africa. It started to grow along the coastal region in the temperate parts and in the tropical areas where 650-1750 millimetres of rainfall was seen. It also grew along the riverside and the landscape regions irrigated in the arid zones of the Earth. It can grow nearly anywhere in the world between about 30° S and 30° N scope and it can tolerate annual precipitation of 10 to 430 cm. It is indeed a perennial, monocot warm weather grass that occurs on almost all kind of soil types.^[4] *Cynodon dactylon* may be applied both externally as well as internally due to its various medicinal value.^[5]

TAXONOMICAL CLASSIFICATION OF CYNODON DACTYLON:



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

Table 1: Selected vernacular names:

S.NO	LANGUAGE	COMMON NAMES	Referance
1.	TAMIL	Aurvampillu, arukampulu, muyalpullu.	[6]
2.	ENGLISH	Cough grass, bermuda grass, dun grass	
3.	TELUGU	Garik, harvali, pacchgaddi	
4.	MALAYALAM	Korukapullu, karuka	
5.	BENGALI	Durva, durba, dub	
6.	PUNJABI	Tilla, khabbal, dubada	
7.	URDU	Doob ghas, doob	
8.	ORIYA	Duba	
9.	SINDHI	Chhabbar, chhabbar, chibbur	
10.	MARATHI	Harali, dhurva, karala	

BOTANICAL DESCRIPTION OF CYNODON DACTYLON:

A perpetual creeping herb, stem (culms) lean and wiry. Leaves are 2-10cm x 1.25-3 mm, narrowly linear or non-subdivided, acute and soft. It contains spikes 2-6, diverging from slender ascending peduncle, green or purplish. Grains are 1.05 mm long. Flowering and Fruiting time is August- October (also throughout the year). Other characteristics are stated below,

Root – Fibrous, cylindrical, up to 4 mm thick, minute hair like roots arise from the main roots; cream coloured.

Stem – willowy, horizontal, up to 1 mm thick, jointed, leafy, very smooth, yellowish green in colour.

Leaf – 2 to 10 cm long and 1.25 to 3 mm wide, narrowly linear or unsubdivided, finely acute more or less opaque, usually conspicuously opaque in the barren shoots and at the base of the stem; covered light, sometimes bearded, ligule a very fine ciliate rim.^[7]

PHYTOCHEMICAL PROPERTIES OF CYNODON DACTYLON:

Different morphological parts of C. dactylon, most evidently provided many recognized phytoconstituents. Minerals, carbohydrates, proteins, carotenoids, phenols, terpenoids, flavonoids, alkaloids etc. are some of the plant compounds.^[8] Quantification of other procured phytoconstituents is mentioned in Table 2

Table2:Phyto-constituents present in Cynodondactylon

Solvent/methodsusedforextraction	Phyto-constituentsobtained	Amountobtained	References
Gaschromatography-massspectrometry(GC-MS)	Propane-1,2,3-triol	38.49%	[9]
	Linoleoylchloride	15.61%	
	Ethylacetate	9.50%	
	Ethylhexopyranoside	8.42%	
	Ethyllinoleate	5.32%	
	Phytol	4.89%	
Ethanol	Tricosane	22.05%	[10]
	1,2-propanediol	20.30%	
	3-benzyloxy-1,2diacetyls	12.62%	
Hydro-alcoholic	hexadecanoicacid,	17.49%	[10]
	D-mannose	11.48%	
	Linolenicacid	11.28%	
Phenol	Hydroquinone	69.49%	[11]
	Furfural	6.0%	
	Levogluosenone	2.72%	

PHARMACOLOGICAL ACTIVITY OF CYNODON DACTYLON:

The grass has various pharmacological activities. The dried extracts of aerial parts of Cynodon dactylon was examined for CNS activities in mice. Antidiabetic, antiulcer, analgesic and anti-pyretic, diuretic and antimicrobial activity are some of the various essential functions of it. Cynodon dactylon is very effective in snakebite therapy and the anti snake venom from the plant extract is very effective to treat patients who are bitten by a snake. The grass is used as a traditional folk medicine in India and many other places for the treatment for various diseases and disorders. Other prominent activity

includes anti-inflammatory and antioxidant activity.^[12]

ANTI-DIABETIC ACTIVITY:

Hypoglycemic and hypolipidemic effects was significantly observed in the aqueous extract of Cynodon dactylon. Aqueous extract of C. dactylon decrease Total Cholesterol Level (TCL), Low Density Lipoprotein (LDL) and triglyceride level (TGL) in severely diabetic rats up to 35, 77 and 29% respectively and increase high density lipoprotein level (HDL) up to 18%.^[13] Ethanolic and aqueous extract of C. dactylon significantly increase in the liver glycogen and decrease the fasting blood glucose and glycosylated hemoglobin levels.^[14] C. dactylon leaves extract able to reduce

oxidative stress in diabetic rats as well as hyperglycemia and hyperlipidemia risk.^[15]

ANTIMICROBIAL EFFECT:

The aqueous extract of *Cynodon dactylon* (50-400 mg/ml) was used to determine the antimicrobial activity against *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Proteus mirabilis* and *Candida albicans*. The aqueous extract of *Cynodon dactylon* exerted concentration dependent antimicrobial activity against all the tested microorganisms except *Candida albicans*.^[16]

HEPATOPROTECTIVE ACTIVITY:

The doses of ethanolic extract of aerial parts of *C. dactylon* such as 100, 250 and 500 mg/kg were administered to animals. The ethanolic extract also prevented decrease in secretion of ascorbic acid in urine in carbon tetrachloride intoxicated group. The hepatic damage in animals treated with ethanolic extract was minimal causing no damage to structure and architectural frame of hepatic cells. Researchers concluded that, the activity of extract could be attributed to preservation of structural integrity of cell membrane of hepatocytes and thereby maintaining normal function of liver.^[17]

ANTICONVULSANT ACTIVITY:

In a study, it was reported that, the *C. dactylon* imparts protective action against convulsions induced by chemo convulsive agents in mice. The amount of GABA, which is most likely to be involved in seizure activity, was increased significantly in mice brain after six-week treatment. Results revealed that the extracts of *C. dactylon* showed a significant anticonvulsive property by altering the level of catecholamine and brain amino acids in mice.^[18]

CARDIOVASCULAR ACTIVITY:

In a research study, it was found that the rhizome part of *C. dactylon* existed in use to cure heart failure in traditional medicine. It wielded a sturdy protective upshot on heart failure patients, by accompanying positive action of muscle contraction and refining the heart's functions.^[19]

ANTI-ARRHYTHMIC ACTIVITY:

Najafi. M. along with Gajrani A. (2008) investigated probable antiarrhythmic effects of *C.*

dactylon against ischemia/ reperfusion (I/R)-induced arrhythmias in isolated rat.^[20]

ANTI-INFLAMMATORY ACTIVITY:

Cynodon dactylon is one of the 10 auspicious herbs that constitute the group *Dasapushpam* in Ayurveda. Traditionally *Cynodon dactylon* L. is used against many chronic inflammatory diseases in India.^{[21][22]}

WOUND HEALING:

Druva gritha was evaluated by charde for wound healing property by incision and excision wound model in male wistar rat promotes wound contraction and reduces the time for closure showing healing potential comparable to Framycetin sulphate 1% cream.^[23]

DIURETIC ACTIVITY:

C. dactylon extract shows significant diuretic activity when administered orally in different concentration like 0.125, 0.250, and 0.500 g/kg of body weight to hydrated male Wistar rats and 0.500 g/kg dose shows more significant result.^[24] Root stalk of *C. Dactylon* was extracted by aqueous extract method and administered orally at different dosage like 100, 250, 500 and 750 mg/kg body weight shows significant diuretic activity with increased sodium, potassium, and chloride ions from body.^[25]

ANTIVIRAL:

Cynodon dactylon exhibited potent antiviral activity against white spot syndrome virus (WSSV) and they have also been reported to possess antiviral activity against human vaccinia virus.^[26]

ANTIOXIDANT ACTIVITY:

The antioxidant, antiproliferative and apoptotic potentials of the plant were investigated by 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay, nitric oxide radical scavenging activity (NO(-)) and MTT assay on four cancer cell lines (COLO 320 DM, MCH-7, AGS, A549) and a normal cell line (VERO).^[27]

ANTI-NEPHROLITHIASIS ACTIVITY:

Aqueous-ethanolic extract of *Cynodon dactylon* can reduce calcium oxalate stones in the rat kidney by 40 and 55% respectively. It has beneficial effects on kidney stone removal and might be used in human beings.^[28] Urinary biochemical and other variables were measured

during the course of study along with the examination of crystal luria and renal histology. Beneficial effect of Cynodon extract was seen in kidney tissues where reduced levels of Calcium oxalate deposition have been noticed especially in medullary and papillary sections from treated rats.^[29]

DERMATOLOGICAL EFFECT:

The wound healing activity of hydroalcoholic extract of Cynodondactylon was evaluated by using excision wound model. The parameters included the rate of wound contraction and the period of epithelization in excision wound model. Herbal ointment was prepared using different bases and concentrations 7.5% and 10% compared with standard clipladine (povidone-iodine).^[30] The wound healing activity of flavonoid fraction of Cynodon dactylon was evaluated in excision wound in mice. The flavonoid fraction of Cynodon dactylon were applied externally daily on the excised wound area for 8 days. The flavonoid fraction facilitated the healing process as evidenced by increase in collagen and protein and decrease in lipid peroxide in granulation tissue.^[31]

IMMUNOMODULATORY ACTIVITY:

It has been implicated that, C. dactylon possesses immunomodulatory activity which was tested by Mangathayaru and co-workers, using its freshly prepared juice. The test was conducted on BALB/c mice by the humoral antibody response (determined by haemagglutination antibody titre and spleen cell assay). It was found that, oral administration of the juice at 250 and 500 mg/kg in BALB/c mice increased humoral antibody response upon antigen challenge, as evidenced by a dose-dependent, statistically significant increase in antibody titre in the haemagglutination antibody assay and plaque forming cell assay.^[32]

CENTRAL NERVOUS SYSTEM RELATED ACTIVITY:

The dried extracts of aerial parts of Cynodon dactylon Pers. were evaluated for CNS activities in mice. The ethanol extract of aerial parts of C. dactylon (EECD) was found to cause significant depression in general behavioral profiles in mice.^[33]

CHEMO-PREVENTIVE ACTIVITY:

Albert-Baskar A. evaluated in vivo chemo-preventive property of the plant extract of Cynodon dactylon in DMH induced colon

carcinogenesis. The methanolic extract of C. dactylon was found to be antiproliferative and antioxidative at lower concentrations and induced apoptotic cell death in COLO 320 DM cells. Methanolic extract of C. dactylon increased the levels of antioxidant enzymes and reduced the number of dysplastic crypts in DMH-induced colon of albino rats.^[34]

ANTICANCER ACTIVITY:

An investigation conducted by Albert-baskar and Ignacimuthu revealed the anticancer activity of C. dactylon; where in-vivo chemoprotective property of plant extract of C. dactylon was found to be antiproliferative and antioxidative at lower concentrations and induced apoptotic cell death in COLO 320 DM cells. Researchers found that, the treatment with methanolic extract of C. dactylon increased the levels of antioxidant enzymes and reduced the number of dysplastic crypts in DMH-induced colon of albino rats. This investigation proved the anticancer potential of methanolic extract of C. dactylon.^[35]

ANTIULCER:

Alcoholic extract of Cynodon dactylon was screened for antiulcer activity in albino rats at dose level of 200, 400 and 600 mg kg⁻¹ b.wt. The extract at 400 mg kg⁻¹ and 600 mg kg⁻¹ showed significant (>0.001) antiulcer activity as compared to the standard drug, ranitidine. This activity may be due to the presence of flavonoids.^[36]

ANTIDIARRHEAL:

In an investigation hexane, dichloromethane, ethyl acetate and methanol extracts of Cynodon dactylon whole plant were tested in albino rats for antidiarrheal activity on castor oil induced diarrhea. Methanolic extract exhibited considerable reduction in inhibition of castor oil induced diarrhea and also showed a significant decrease in gastrointestinal motility. These results indicate that the plant possess good antidiarrheal property.^[37]

ANALGESIC ACTIVITY:

50% each of 300 mg/kg and 600 mg/kg amount of C. dactylon's ethanolic extract was made and taken to evaluate the analgesic impact on albinorats against pain, inflammation, oedema (induced with carrageenan), enzymes' activity and the formation of lipid peroxide and granuloma while practising inflammation

experimentally. The extract was then administered orally for a week to albino rats. Substantially, it worked significantly in repressing oedema in the paw. It also helped reducing peroxide output, the elevated formation of granuloma and the elevated activity of enzymes during and causing inflammation. To study the analgesic effect of the extract, albino mice were induced muscle contractions with acetic acid. It was later observed that the extract profoundly helped in elevating the threshold of the pain in albino mice.^[38]

HYPOGLYCAEMIC ACTIVITY:

The hypoglycaemic potential of ethanolic extract of *C. dactylon* has been studied by Singh and co-workers; by its oral administration of 250, 500 and 750 mg/kg body weight of the extracts to normal as well as Streptozocin-induced diabetic rats. The dose of 500 mg/kg body weight was identified as the most effective dose as it lowered the blood glucose levels of normal by 42.12% and of diabetic by 43.42% during fasting blood sugar (FBG) and glucose tolerance test respectively. The study proved that, the ethanolic extract of *C. dactylon* had high antidiabetic potential along with good hypolipidemic profile.^[39]

II. CONCLUSION:

Cynodon dactylon is extremely useful in ayurvedic, unani and siddha medicine. It has significant role in wide variety of disease and disorder. It is found all over the year and very easily. Different types of therapeutic actions show the medicinal value of *Cynodon dactylon*. *Cynodon dactylon* have significant role in management of diabetics and cardiovascular disease and anti-ulcer, anti-cancer, anti-diarrheal, Anti-nephrolithiasis activity, Hypoglycaemic activity, Analgesic activity, Anti-diabetic activity, Anticancer activity, Chemo-preventive activity, Central Nervous System related activity, Immunomodulatory activity, Dermatological Effect, Antioxidant activity, Anti-microbial effect, Hepatoprotective activity, Immunomodulatory activity, Wound Healing. The review shows *Cynodon dactylon* is very important medicinal herbs, easily available cheap and very negligible and abundant in respect of pharmaceutical field.

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