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REVIEW ARTICLE

Pharmacological Perspectives of *Cynodon dactylon*

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ABSTRACT

Plant *Cynodon dactylon* (L.) Pers. Family (Graminae/Poaceae) is extensively used in clinical practice but it has various pharmacological activities have been reported. It is a very familiar plant almost available in the entire world. In ethno medicinal practices, the plant *Cynodon dactylon* used in the treatment of various diseases and has pharmacological action. The present reviews represent the different pharmacological activities and medicinal properties of *Cynodon dactylon* (L.)

Keywords: *Cynodon dactylon*, pharmacological activity

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INTRODUCTION

India has tremendous wealth of medicinal plants and its resources which are of different kinds they grow in different climatic and ecological conditions. In ancient time India was not so advanced in therapeutic values of medicinal plants. The earliest mention of the use of medicinal plant is found in Rig-Veda (4500-1600B.C). The number of drugs in the olden days was not large and hence no elaborated descriptions were given with regard to their identification.

In the course of time more herbs growing in the different parts of country were gradually included in India Materia Medica but unfortunately their variation in the identity of various plant drugs, extorted in the Ayurvedic and Unani system of medicine. Considerable work has been carried out on medicinal plant and many new drugs have been brought to the light along with the screening of their Phytoconstituents and their biological importance. India is one of the world's leading bio-diversity centers with the presence of over 45,000 different plant species. India's diversity is unmatched due to their presence 16 different agro climetic zones, 10 vegetation zones, 25 biotic provenances and 426 biomass. Innumerable herbs have been exploited since ancient times for the treatment of various ailments. The genus name *Cynodon* was derived from the Greek *kuon*, dog and *odous*, a tooth. The specific epithet *dactylon* is derived from the Greek *daktulos*, a finger, and refers to the inflorescence which is digitate (arranged like fingers on the hand). Eight species of *Cynodon* are found in southern Africa.

Cynodon dactylon is hardy, perennial grass, very variable, with long rapid growing, creeping runner or stolons, rooting at nodes, forming a dense tuft on the surface of the soil, runners sometimes 20m long, 2-6mm broad, flat or sometimes folded or convolute; inflorescence on culms 15cm to 1m tall consisting of 2-12 spikes arranged star like at apex of stem; spikes 2.5-10cm long with numerous spikelets, arranged in 2 rows on one side of spike; spikelets flat, 2-2.5mm long, awnless, with 1 floret; glumes unequal, the upper longer and one third to three fourth length of floret. The grass grows throughout India ascending up to a height above sea level of 8000ft. A hardy perennial grass with creeping culms, rooting at nodes and forming spreading mats on the surface of the soil. It is abundant on road sides and paths, and readily takes possession of any uncultivated area. It flowers nearly throughout the year [1-3].

Cynodon dactylon occurs on almost all soil types especially in fertile soil. e.g. loamy soil. It is common in disturbed areas such as gardens, roadsides, overgrazed, trampled areas, uncultivated lands, localities with high levels of nitrogen, and is often found in moist sites along rivers. It is suitable for cultivation under dry land conditions. It is widely distributed in southern African countries, in biomes such as grassland, Savanna, Nama-Karoo and Fynbos[4-6].

It can be a serious weed, rapidly invading cultivated lands, and it is difficult to eradicate. Animals such as white rhino, reedbuck, impala and many other wild animals graze it. As a result, these animals aid in the dispersal of this grass which is essentially wind-pollinated. After fire, new shoots and leaves sprout quickly as they are nourished by ample underground reserves.

Plant remains green in mild winters. *Cynodon dactylon* plays an important role in conservation, because it prevents soil erosion. It provides good grazing, is very useful as a lawn grass and is recommended for the protection of waterways[4]. In traditional medicine it is used for indigestion and the treatment of wounds. According to an old Venda tradition, it is used in the fermentation process to make beer sour [5]. It is reported to be alterative, antiseptic, aperients, astringent, cyanogenetic, demulcent, depurative, diuretic, emollient, sudorific, and vulnerary; it is reported to be photosensitizing in animals, to cause contact dermatitis, and hay fever. It is folk remedy for anasarca, calculus, cancer, carbuncles, convulsions, cough, cramps, cystitis, diarrhea, dropsy, dysentery, epilepsy, headache, hemorrhage, hypertension, hysteria, insanity, laxative, measles, rubella, snakebite, sore stones, tumors, urogenital disorders, warts, and wounds [7-9].

SCIENTIFIC CLASSIFICATION

Kingdom- Plantae (Plants), **Subkingdom** -Tracheobionta –(Vascular plants), **Super division-** Spermatophyta – (seed plants) , **Division-** Magnoliophyta –(Flowering plants) , **Class-** Liliopsida (Monocotyledons), **Subclass-** Commelinidae, **Order-** Cyperales, **Family-** Poaceae (Grass family), **Genus-** *Cynodon*, **Species-** *Cynodon dactylon* (L.) Pers. – Bermuda grass.

VERNACULAR NAMES

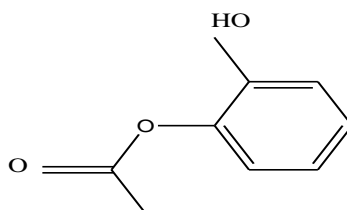
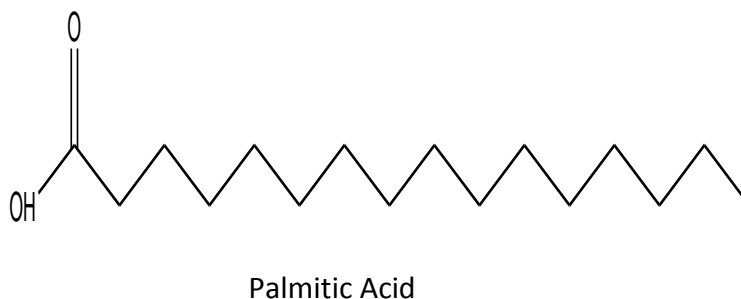
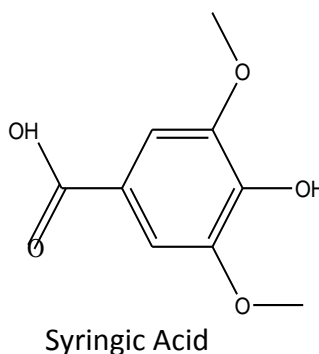
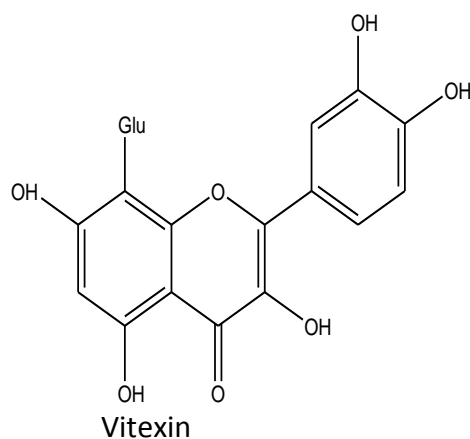
Hindi- Doob, Dub, Dubra, Khabbal, Kaligas, Neelee Doob. **English-** Creeping panic grass, Couch grass, Bahama grass, Bermuda grass, Dun grass, Devil's grass, Doab grass, Doorwa, Dog's teeth grass. **Sanskrit-** Sataparva, Satavalli, Niladurva. **Bengali-** Durva, Dub, Dubla, Durba, Doorva, Neel Doorva. **Gujrati-** Khadadhro, Lilidhro, Dhro, Dhrokad, Gharo. **Marathi** - Doorva, Harali, Dhurva, Karala. **Kannad-** Garike hullu, Kudigarike, Kudigarikai. **Punjabi-** Dubada, Daurva, Dun, Dubra, Khabbal, Tilla, Talla, Dhub. **Tamil-** Aruvam pillu, Hariali, Muyalphul, Arugam Pullu. **Telgu-** Garika, Pacchgaddi, Ghericha, Garicagaddi, Gerike, Harvali. **Urdu-** Doob ghas, Doob.

BOTANICAL DESCRIPTION

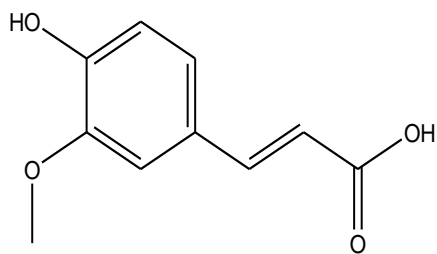
A perennial creeping herb, stem (culms) slender, wiry, rooting at the nodes forming matted tufts. Leaves 2-10 cm x 1.25-3 mm, narrowly linear or lanceolate, acute, glaucous-green and soft. Spikes 2-6, radiating from slender ascending peduncle, green or purplish. Grain 1.05 mm long, oblong. Flowering and Fruiting: August- October (also throughout the year). **Root** – Fibrous, cylindrical, up to 4 mm thick, minute hair like roots arise from the main roots; cream coloured. **Stem** – Slender, prostrate, 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 lanceolate, finely acute more or less glaucous, soft, smooth, usually conspicuously distichous in the barren shoots and at the base of the stem; sheath light, glabrous or sometimes bearded, ligule a very fine ciliate rim[10-13].

CHEMICAL CONSTITUENTS

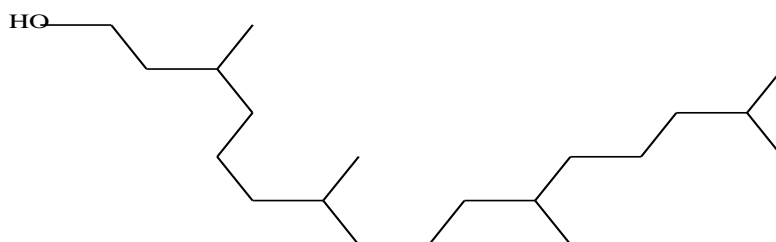
The chemical constituents present in *Cynodon dactylon* are – β - sitosterol, β - carotene, vitamin C, palmitic acid, triterpenoids, arundoin, friedelin, selenium, alkaloids- ergonovine and ergonovinine, Ferulic, syringic, p- coumaric, vanilic, p hydroxybenzoic and o-hydroxyphenyl acetic acids, Cyanogenic hyperoside, Cyanogenic glucoside- triglochinin, furfural, furfural alcohol, phenyl acetaldehyde, acetic acid, phytol, β - ionone; mono and oligosaccharides, lignin (whole plant); hydrocarbons (tritriacontane) esters, eicosanoic and docosanoic acids,[14-18]free alcohol, free aldehydes (hexadecanal) and free acids (hexadecanoic acid) (surface cuticular wax); flavone – apigenin, luteolin, flavone glycosides – orientin (8-C- β -D-glycosyl luteolin), vitexin (8-C- β -D-glycosyl apigenin), iso –orientin (6-C- β -D-glycosyl luteolin) and iso- vitexin (6-C- β -D-glycosyl apigenin) (aerial parts)[19-24].



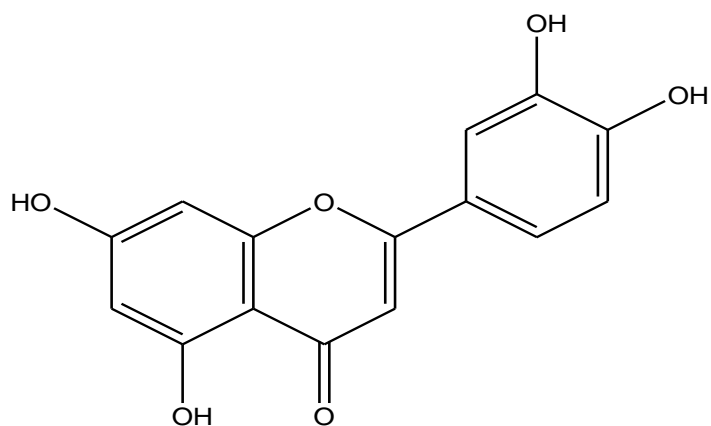
Ortho Hydroxy Phenyl Acetic Acid



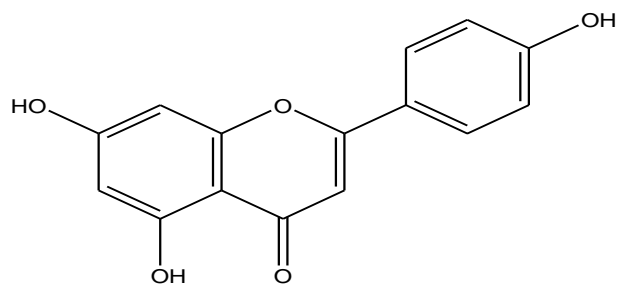
Ferulic Acid



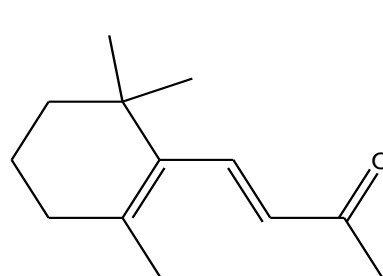
Phytol



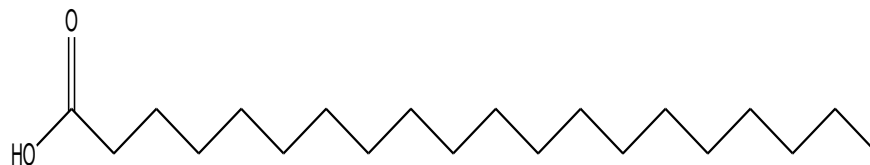
Luteolin



Apigenin



Beta Ionone



Eicosanoic Acid



Hexadecanal

PHARMACOLOGICAL ACTIVITY

CNS ACTIVITY

Pal Dilip Kumar, worked on the, Evaluation of the CNS activities of aerial parts of *Cynodon dactylon* (L.) Pers. in mice. The dried extracts of aerial parts of *Cynodon dactylon* (L.) Pers. (Graminae) was evaluated for CNS activities in mice. The ethanolic extract of aerial parts of *C. dactylon* (EECD) was found to cause significant depression in general behavioral profiles in mice. EECD significantly potentiated the sleeping time in mice induced by standard hypnotics' viz. pentobarbitone sodium, diazepam and meprobamate in a dose dependent manner [25].

ANTIDIABETIC ACTIVITY

Singh SK. et. al., worked for the, Assessment of antidiabetic potential of *Cynodon dactylon* extract in streptozotocin diabetic rats. The effect of repeated oral administration of aqueous extract on serum lipid profile in diabetic rats was also examined. A range of doses viz. 250,500,1000 mg/kg body weight of aqueous extract of *Cynodon dactylon* were evaluated and the dose of 500 mg/kg body weight was identified as the most effective dose. It lowers blood glucose level around 31% after 4hr. of administration in normal rats. The same dose of 500 mg/kg body weight produced a fall of 23% in glucose level with in 1hr. during glucose tolerance test (GTT) of the mild diabetic rats. This dose has almost similar effect as that of standard drug tolbutamide (250 mg/kg bw). Severely diabetic rats were also treated daily with 500 mg/kg b.wt for 14 days and a significant reduction of 59% was observed in fasting blood glucose level [26].

ANTIULCER ACTIVITY

Patil MB. et. al., studied the, Antiulcer properties of alcoholic extract of *Cynodon dactylon* in rats. Alcoholic extract of *Cynodon dactylon* was evaluated for preliminary identification of Phytoconstituents and screened at 200, 400, and 600 mg/kg body weight given orally for pylorus ligated and Indomethacin induced gastric ulcer models in albino rats. Results

showed the presence of flavonoids and proteins. Alcoholic extracts at 400 mg/kg and 600 mg/kg showed significant (>0.001) antiulcer activity, comparable to the standard drug ranitidine, which may be due to the presence of flavonoids [27].

ANTIARRHYTHMIC ACTIVITY

Najafi M et. al., studied the, Effect of the hydroalcoholic extract of *Cynodon dactylon* on ischemia/reperfusion- induced arrhythmias. During ischemia, the extract produced marked reduction in the number, duration and incidences of ventricular tachycardia (VT) at 25 and 50 μ g/ml ($p<0.001$ and $p<0.01$, respectively). Total number of ischchemic ventricular ectopic beats (VEBs) were lowered by 25-100 μ g/ml ($p<0.001$ and $p<0.05$, respectively). At the reperfusion phase, *Cynodon dactylon* (25 and 50 μ g/ml) decreased incidence of VT from 100% (control) to 13 and 33% ($p<0,001$ and $p<0.05$) respectively. Duration and number of VT and total VF incidence were also reduced at the same concentration ($p<0.05$ for all). Perfusion of the extract (25 –100 μ g/ml) was markedly lowered reversible VF duration from 218 \pm 99 sec to 0sec, 0sec and 10 \pm 5 sec ($p<0.01$, $p<0.01$ and $p<0.05$) respectively. Moreover, *Cynodon dactylon* (25 and 50 μ g/ml) decreased number of total VEBs from 349 \pm 73 to 35 \pm 17 ($p<0.001$) and 66 \pm 26 ($p<0.01$) [28-29].

ANALGESIC AND ANTI-PYRETIC ACTIVITY

Garg VK., Khosa RL., studied the, Analgesic and Anti-Pyretic activity of aqueous extract of *Cynodon dactylon*. Whole plant of *Cynodon dactylon* is traditionally used to treat painful and inflammatory conditions. Analgesic and anti-pyretic activities of aqueous extract of *Cynodon dactylon* at different doses was studied using hot plate, acetic acid induced writhing and yeast induced hyperthermia method. *Cynodon dactylon* showed significant analgesic and anti-pyretic in all models studied. It was found that the aqueous extract at the dose of 600 mg/kg showed a significant decrease in rectal temperature similar to that shown by standard drug, paracetamol. Analgesic activity of aqueous extract of the plant was evaluated using hot plate method and writhing test in mice. Acetic acid, which is used as an inducer for writhing syndrome, causes algesia by libration of endogenous substances, which then excite the pain nerve endings. The fact that aqueous extract of *Cynodon dactylon* showed analgesic activity in both models studied, indicate that this effect could be due to the presence of two components; one acting centrally and the other via peripheral route[30].

DIURETIC AND ANTIMICROBIAL ACTIVITY

Artizzu N. et. al., studied the, Diuretic and Antimicrobial activity of *Cynodon dactylon* essential oil. The essential oil of *Cynodon dactylon* shows significant diuretic activity in rats at a dose of 150 mg/kg body weight as compared to the standard drug and increases the urine volume secretion in rats [31-32].

SNAKEBITE THERAPY

Selvanayagam ZE. et. al., survey of the medicinal plants with antisnake venom activity in Chengapattu district, Tamilnadu, India. The survey in Chengapattu district, Tamilnadu shows that the *Cynodon dactylon* is very effective in snakebite therapy and the antisnake venom from the plant extract is very effective in the treatment of snakebite [33].

HEPATOPROTECTIVE EFFECT

Singh SK. et. al., studied the, Protective effect of *Cynodon dactylon* against STZ induced hepatic injury in rats. The present study was designed to investigate the hepatoprotective effect of aqueous extract of *Cynodon dactylon*, widely used in India as a traditional treatment for diabetes mellitus. Male Albino Wister rats (180-220 g) were administered with streptozotocin (STZ, 50 mg/kg) intraperitoneally to induce experimental diabetes. Alkaline phosphatase (ALKP), serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), creatinine (CRTN) and total protein (TP), urine sugar (US) and total haemoglobin (Hb) were estimated at the beginning and after 14 days of treatment. Daily oral administration of aqueous extract of *Cynodon dactylon* suspended in distilled water at 500 mg/kg dose almost normalized various biochemical parameters. This suggests that *Cynodon dactylon* can be used as a hepatoprotective agent [34].

DIURETIC ACTIVITY

Shivalinge Gowda KP. et. al., studied the, Diuretic Activity of *Cynodon dactylon* root stalk extract in albino rats. The present study was carried out to evaluate the diuretic activity of aqueous extract of *Cynodon dactylon* which is used as traditional folk medicine in India for the treatment of various diseases and disorders. On oral administration of the aqueous extract of root stalk of *Cynodon dactylon* at a dose of 100mg, 250mg, 500mg, 750 mg/kg body weight shows diuretic activity which can be quantified in experimental rats[35].

ANTICONVULSIVE PROPERTY

Pal Dilip kumar, worked on the, Determination of brain biogenic amines in *Cynodon dactylon* and *Cyperus rotundus* treated mice. The ethanol extract of aerial parts of *Cynodon dactylon* (EECD) and roots & rhizomes of *Cyperus rotundus* (EECR) showed marked protection against convulsions induced by chemoconvulsive agents in mice. The catecholamines contained were significantly increased in the processed extract treated mice. Results of the present study revealed that both the processed extract showed a significant anticonvulsive property by altering the level of catecholamine and brain amino acids in mice [36-40].

IMMUNOMODULATORY AND DNA PROTECTIVE ACTIVITIES

Mangathayarua K. et. al., worked on the, Evaluation of the immunomodulatory and DNA protective activities of the shoots of *Cynodon dactylon*. Fresh juice of *Cynodon dactylon* of

1.46% (w/w) solid content had a phenolic content of 47 ± 0.33 mg/kg GAE. At doses equivalent to 50, 100 and 200mg total solids/kg body weight the juice protected human DNA against doxorubicin-induced DNA damage as demonstrated in DNA spectral studies, where the ratio of absorbance of DNA at 260 and 280nm in samples pretreated with the juice was 1.66, 1.53 and 1.63 respectively, while it was 1.37 for DNA treated with doxorubicin only. This indicates nucleic acid purity in the *Cynodon dactylon* treated samples. Oral administration of the juice at 250 and 500 mg/kg in mice increased humoral antibody response upon antigen challenge, as evidenced via dose-dependent, statistically significant increase in antibody titer in the haemagglutination antibody assay and plaque forming cell assay [41-42].

CHEMO PREVENTIVE EFFECT

Baskar AA. et. al., worked on the, Chemo preventive effect of *Cynodon dactylon* (L.) Pers. extract against DMH-induced colon carcinogenesis in experimental animals. The present study was aimed at evaluating the chemo preventive property of *Cynodon dactylon*. 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). In vivo chemo preventive property of the plant extract was studied in DMH-induced colon carcinogenesis. The methanolic extract of *Cynodon dactylon* was found to be antiproliferative and antioxidative at lower concentrations and induced apoptotic cell death in COLO 320 DM cells [43].

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. The present finding was to evaluate the protective effect of *Cynodon dactylon* against rats with adjuvant- induced arthritis. Arthritis was induced by intradermal injection of complete Freund's adjuvant into the right hind paw produce inflammation of the joint. A significant increase in the levels of inflammatory mediators, myeloperoxidase, nitrite, C-reactive protein, ceruloplasmin was observed. This was associated with oxidative stress with a marked reduction in the activity of catalase, superoxide dismutase, glutathione peroxidase and the levels of glutathione, vitamins C and E and an increase in the lipid peroxidation as indicated by the higher levels of thiobarbituric acid reactive substances. *Cynodon dactylon* (20mg/kg) body weight was orally administered to arthritic rats after adjuvant injection produced a significant attenuation in the inflammatory response, oxidative stress and ameliorated the arthritic changes to near normal conditions. Hence, findings clearly indicate that *Cynodon dactylon* extract has a promising protective role against arthritis [30].

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)[52-54].

OTHER REPORTED ACTIVITIES

Srihareni D et. al., studied the, Effect of the supplementation of *Cynodon dactylon* juice/powder on anaemic pregnant women (20-30 years).

Najafi M. et. al., studied the, Effect of hydroalcoholic extract of *Cynodon dactylon* rhizome on infarct size in ischemic isolated heart.

Subramanian S. et. al., studied the, Wound healing properties of *Cynodon dactylon* and *Pongamia glabra*. Rodriguez S. et. al., studied the, Clinico-diagnostic trial in adults allergic to pollen extracts from *Cynodon dactylon* (L.) Pers.

Poonguzhali KP. et. al., studied the, Effect of *Cynodon dactylon* and tenoxicam on the lysosomal enzyme activities in the cartilage tissue of osteoarthritic guinea pigs.

Kanchanamala V. et. al., studied the, Chemo preventive action of *Cynodon dactylon* extracts against cyclophosphamide induce toxicity in mice.

Odenigbo GO. et. al., studied the, Anticonvulsant activity of aqueous ethanolic extract of *Cynodon dactylon*. The ethanolic extract of *Cynodon dactylon* shows significant anticonvulsant activity in mice at doses 5, 10 and 20 mg/kg body weight as compared to the standard drug Diazepam.

Ramiraz et. al., studied the, Effect of urea treatment on chemical composition and digestion of *Cenchrus ciliaris* and *Cynodon dactylon* hays and zea mays residues.

Song YC. et. al., studied the, Anti-Helicobacter pylori metabolites from *Rhizoctonia* sp. Cy064, an endophytic fungus in *Cynodon dactylon*.

Shen HD. et. al., studied the, Identification of allergens and antigens of Bermuda grass (*Cynodon dactylon*) pollen by immunoblot analysis.



***Cynodon dactylon* (Doob grass)**

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