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Review Article

Phytochemical and pharmacological review of cynodon dactylon grass with its potential effects

Shruti Amritkar[1]*, Jagruti Chavan[1], Amit Kakad[1], M.R.N. Shaikh[1]

[1]*MET's Institute of D Pharmacy, Bhujbal Knowledge City, Nashik, Maharashtra, India*

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ABSTRACT

Perennial herb Cynodon dactylon (L) Pers, family: Poeaceae, widespread throughout India. In several Indian languages, it is referred to by different names, including Durva in Marathi, Durba in Bengali, Dhro in Gujarati, Garichgaddi in Telugu, Arukampillu in Tamil, and Shataparva in Sanskrit. In traditional medical systems and ethnomedical practices, Cynodon dactylon plays a significant role. It is used in the form of powder, paste, or juice to treat a wide range of ailments due to its extensive therapeutic properties. Flavanoids, alkaloids, glycosides, terpenoides, triterpenoids, steroids, saponins, tannins, resins, phytosterols, reducing sugars, carbohydrates, proteins, volatile oils, and fixed oils were all found in Cynodon dactylon, according to the phytochemical examination. According to earlier research, Cynodon dactylon has properties that are protective, antimicrobial, antiparasitic, insecticidal, gastrointestinal, antioxidant, immunological, antiallergic, antiinflammatory, antipyretic, analgesic, anticancer, dermatological, diuretic, and immune system-related was found. In given review we studied some pharmacological aspects of Perennial herb Cynodon dactylon as well its versitile potential effect. The wide range of future aspects we can consider as best alternative medicine over chemical drugs.

1. Introduction

One of the most prevalent weeds in India is the hardy perennial grass Cynodon dactylon (Poaceae). Other frequent names for it are durba (Bengali), garikoihallu (Kanarese), durua (Marathi), durua or haritali (Sanskrit), arugampullu (Tamil), garikagoddi (Telugu), and dhubkhabbal (Punjabi). It is commonly known as dhub, doob, or harialil.[1] This hardy perennial grass is found all throughout the world, although it is native to warm temperate and tropical climates in particular.[1–3] The Unani medical system describes C. dactylon as having a pleasant smell and a hot, harsh flavor. The plant's rhizomes and aerial portions include diuretic, antidiabetic, antibacterial, antimicrobial, antioxidant, and wound-healing properties in addition to cardioprotective properties.

Traditional healers employ C. dactylon to treat biliousness, itching, diarrhea, gonorrhea, conjunctivitis, anuria, and stomachaches. It also purifies the blood. The review of the literature also reveals that rats' CNS functions were studied using dried extracts of C. dactylon aerial components. Analgesic and antipyretic, antiulcer, antihypertensive, antihysteric, antipyretic, antibiotic, antikidney stone, antiviral, antipsychotic, antigonorrheal infection, and hypoglycemic agent are some of this plant's other vital uses.[1,4]

2. Phytochemistry & Pharmacological Potential

28.17% enzymes, 11.79% ash, and 10.47% proteins are found in dactylon.2.08% potassium, 0.34% manganese, 0.58% phosphorus, 0.23% sodium, and 0.77% calcium are

* *Corresponding author*.
E-mail address: shruti.amritkar06@gmail.com (S. Amritkar).

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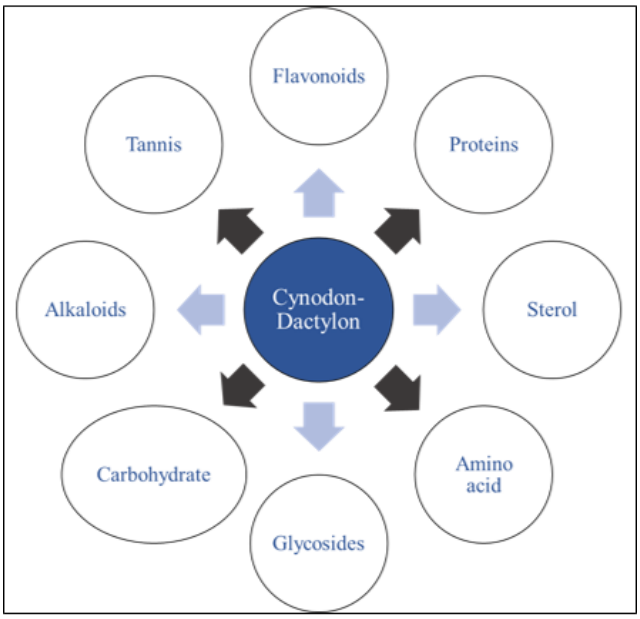

Figure 1: Phytochemical composition of Cynodon dactylon grass

all present in ash. 36.16% of the 400 grams of dry grass are carbohydrates, and 6.04% are proteins. It has phenolic phytotoxins, such as orthohydroxy phenyl acetic acid, ferulic, syringic, paracoumaric, vanillic, and parahydroxyl benzoic acid.

While alkaloids, glycosides, and flavonoids were reported to be present in the plant's ethanol extract, flavonoids and glycosides were shown to be present in the aqueous extract of C. dactylon. There have also been reports of additional substances, such as vitamin C, β carotene, lipids, and palmitic acid.[2,5]

3. Antidiabetic Effect

In normal rats, an aqueous extract of Cynodon dactylon significantly reduced blood sugar levels for up to six hours. A dose-dependent response was observed up to 500 mg/kg bw. When the dosage was increased to 1000 mg/kg bw, the response, however, reduced. (6)Glycemic control with extracts from C. dactylon. Using HPLC–ESI MS analysis, aqueous extracts of C. dactylon were found to contain luteolin, apigenin, 6-C-pentosyl-8-C-hexosyl luteolin, and 6-C-hexosyl-8-C-pentosyl apigenin. Lutein, apigenin, 6-C-pentosyl-8-C-hexosyl luteolin, and 6-C-hexosyl-8-C-pentosyl apigenin interacted with SGLT2, according to an extensive in silico docking approach used to evaluate hypoglycemic activity with PPARγ (Peroxisome Proliferator-Activated Receptor), GLUT-4 (glucose transporter-4), and SGLT2 (sodium glucose co-transporter-2). It has been demonstrated that these compounds' interactions with the SGLT2 residues Asp 294 and Gln 295 are quite similar to those of the phase III medication dapagliflozin. It has been established that these residues are in charge of sugar sensing and transport. Tthe C. dactylon aqueous extract and its non-polysaccharide fraction were found to have strong antihyperglycemic effects; in fasting normal rats, only the non-polysaccharide fraction caused hypoglycemia. glycosylated hemoglobin, low density lipoprotein, high density lipoprotein, and hemoglobin considerably. In contrast, it was discovered that the aqueous extract's non-polysaccharide fraction was more potent.[6] A Several medicinal plants or their extracts have been used orally to treat diabetes since ancient times. A phytochemical analysis reveals that Cynodon dactylon, or dog grass, contains sterols and flavonoids that have been shown to have hypoglycemic action as well as the capacity to regenerate beta cells in the pancreas. In models of experimental animals, cholesterols have also been demonstrated to lower blood sugar.[7]

4. Antipyretic, Analgesic & Anti Inflammtory Effect

An antipyretic effect of this herb was thus investigated using a rat model of yeast-induced hyperthermia. The aqueous extract at the level of 600 mg/kg was discovered to exhibit a notablereduction in rectal temperature comparable to that observed with the common medication, paracetamol.This finding appears to corroborate the theory that the extract affects prostaglandin biosynthesis in some way, as prostaglandin is thought to regulate body temperature.[8] The antipyretic properties of ethanolic extract were evaluated in rabbits with milk-induced pyrexia at doses of 400 mg/kg and 600 mg/kg. The conventional medication was 100 mg/kg of paracetamol, while the control group was given distilled water. Using a digital thermometer, the rabbits' rectal temperatures were taken every hour for four hours. When compared to the standard treatment, the 600 mg/kg dose of both drugs demonstrated a reasonable drop in temperature ($p<0.05$), according to the investigation.

The findings demonstrated that the ethanolic extract of Cynodon had a strong antipyretic impact in keeping rabbits' increased body temperatures under control. This effect was similar to that of the common antipyretic medication, paracetamol. Ethanolic extract of Cynodon dactylon on stressed rodent models. In this study, the anti-inflammatory activity ofC. dactylon was determined using the carrageenan induced rat paw edema method, in which the inflammation was generated by intraperitoneal administration of a 1% Carrageenan (0.1 ml/100g) suspension, where ibuprofen was used as standard. After assessing the paw volume, it has been observed that the ethanolic extract of C. dactylon could significantly decrease the formation of edema induced by carrageenan. For the evaluation of both peripheral and central analgesic activity, the acetic acid writhing test as well as tail-flick method were utilized and aspirin was chosen as the reference standard. In the acetic acid writhing test, C. dactylon extract showed a significant reduction

in pain against acetic acid- induced abdominal[9] In rat paw edema caused by carrageenan, the anti-inflammatory properties of a chloroform-methanolic extract extracted from Cynodon dactylon Pers. (Dhub Grass) were examined. At three doses of 125, 250, and 500 mg/kg, which were employed for both acute and chronic models in the study, the extract significantly inhibited the paw edema caused by carrageenan, and its effects were comparable to those of the common anti-inflammatory medication indomethacin. Thus, the current investigation concludes that C. dactylon's chloroform-methanolic extract has anti-inflammatory properties.[10]

All of the investigated bacterial and fungal strains, including E. Coli, B. subtilis, S. typhimurium, M. luteus, K. pneumoniae, S. aureus, P. vulgaris, P. aeruginosa, and C. pneumoniae, were effectively inhibited by the ethanolic and methanolic extracts of Cynodon dactylon.Agar well method for Candida albicans, A. flavus, A. fumigatus, P. notatum, Sporothrix schenckii, Stachybotrys charttarum, and C. neoformans. TLC for every extract revealed bands in UV indicating the presence of glycosoids, phenols, alkaloids, and flavonoids.[11]

5. Anticancer Effect

Swiss albino mice were used to test the methanolic extract of Cynodon dactylon roots for hepato-protective properties against diethyl nitrosamine (DEN)-induced liver cancer. Up to 30 days following DEN treatment, a weekly oral dose of 50 mg/kg of the plant extract was given. Following the animals' slaughter, liver tissue and blood samples were taken for use in enzyme assays, including those for glutathione-S-transferase (GST), asparatate amino transferase (AST), alanine aminotransferase (ALT), catalase (CAT), and glutathione peroxidase (GPx). The protective effect was significantly attributed to the production of the liver marker enzymes AST and ALT. C. dactylon's methanolic extract has notable anticancer qualities.[12]

When Cynodon dactylon was tested against HEP-2 laryngeal, HELA cervical, and MCF-7 breast cancer cell lines and compared to normal Vero cell lines using the MTT assay, the results showed that 97% of the cells were viable at 0.078 mg/ml, and this proportion decreased as the extract concentration increased. Cynodon dactylon petroleum ether extract exhibited strong cytotoxic activity against the cancer cell lines HEP-2, HELA, and MCF-7. At 10 mg/ml, the cytotoxicity inhibition percentage was determined to be 93.5%, 88.5%, and 79.2%. These results were similar to those of the control drug, cyclophosphamide, which demonstrated cytotoxicity of 96%, 92%, and 83%. As a result, the lowest effective concentration (Ic50) of Cynodon dactylon petroleum ether extract was found to be 0.156 mg/ml to 0.625 mg/ml, and it was non-toxic to Vero cells but harmful to HEP-2, HELA, and MCF-7 cells. Cynodon dactylon exhibits the greatest activity in the HEP-2 laryngeal cell line out of these three cell lines.(16)Cynadon dactylon (pers) methanolic extract shown strong anticancer efficacy against K-562 leukemic cells. Tabulate and illustrate the data. Based on the aforementioned data, we deduced that the methanolic extract of Cynodon dactylon (L) (pers) contains hydroxycinnamic acid and other alkaloidal compounds, which are responsible for the anticipated antioxidant and anticancer action.[13]

6. Wound Healing Effect

Rats were used to study Cynodon dactylon's capacity for wound healing. The findings demonstrated that, in comparison to the control group, the topical administration of gel containing the aqueous extract and alcoholic extract of Cynodon dactylon significantly increased the area of the rats' wounds healing. These results were comparable to those of Povidone-Iodine ointment, a common medication. Upon initial screening, the aerial component extract of Cynodon dactylon was found to include flavonoids, phenols, tannins, and alkaloids. These flavonoids and phenolic chemicals may work alone or in combination to speed up the healing process of wounds.

The ointments that were made in a cationic emulsifying ointment base using Curcuma longa and Cynodon dactylon showed the fastest initial rate of wound healing. The ointment made with non-ionic emulsifying ointment came next, quite closely. The initial healing rate of the control ointment was extremely poor because it did not contain any medicine or extract from Cynodon dactylon or Curcuma longa. The ointment comprising Cynodon dactylon extract and Curcuma longa in cationic ointment base showed the best activity. This demonstrates that the extract from Cynodon dactylon and Curcuma longa can be used as a cationic emulsifying ointment to aid in wound healing.[14]

7. Antiviral Effect

When the antipyretic activity of Cynodon dactylon aqueous extract was investigated in mice, it was discovered that the mice's rectal temperature significantly decreased. For both the methanolic and aqueous extracts of Cynodon dactylon, an effective dose of 200 mg/kg was determined to assess antipyretic efficacy. Four sets of six wistar rats each were created. By subcutaneously injecting 20 mg/kg of a 20% suspension of Brewer's yeast, animals were made feverish 31. The rectal temperature was taken at first. Animals with a rectal temperature increase of 0.3–0.5oC after 18 hours were chosen. Rectal temperature was measured using a digital thermometer 30 minutes prior to and 0.5, 1, 2, 3, 4, 5, and 6 hours following the administration of the test extracts, reference standard paracetamol (150 mg/kg), and control saline vehicle.[15]

The phytochemical analysis reveals the presence of sterols and flavanoids, and the ethanol extract of two Cynodon plants has a strong antipyretic effect in lowering the elevated body temperature that milk causes in rabbits. These effects are similar to those of the common antipyretic medication paracetamol. Pyrexia, or an increase in body temperature, is caused by some endogenous chemicals such as prostaglandins. Any kind of antipyretic rug has the power to prevent prostaglandins from being formed. Pyrexia, or an increase in body temperature, can be caused by a number of secondary reasons, including infection, tissue injury, inflammation, cancer, etc. Pro-inflammatory mediators, such as TNF-α and cytokines like interleukin. [16]

8. Antiulcer Effect

The plant extract's ability to heal ulcers may be attributable to its antisecretory properties, which have been linked to an improvement in the local healing process and are analogous to the effects of the prescription medication ranitidine (H2-antagonist). There are reports of flavonoid antiulcer activity. Root decoctions are used to treat urinary organ irritation and secondary. [17]

Pharmacognostical characteristics and phytochemistry in various Cynodon dactylon extracts show the existence of several phytochemical elements that may encourage a thorough assessment of the plant's potential medical uses. Cynodon dactylon extracts were subjected to a preliminary screening process that revealed the presence of flavonoids, alkaloids, phenolic glycosides, carbohydrates, fixed oils, and lipids. According to a survey, flavonoids are proven to be bioactive when it comes to ulcer treatment. The current study's findings indicate that the aerial sections of Cynodon dactylon seem like a promising material for additional research, which could result in the development of ulcer-treating medications. The process of developing phytomedicine takes comparatively less time and money. [3]

9. Antioxidant Effect

According to reports, the methanolic extract of C. dactylon boosted the levels of antioxidant enzymes and had an antioxidant effect on colon cancer cell line COLO 320 DM cells. Furthermore, it has been documented that administering C. dactylon methanolic extract to experimental animals resulted in a reduction in the concentration of lipid peroxides.(20) .The present study is an extension of our previous research work and it deals with the scientific evaluation of antioxidant potential of the aqueous extract of Cynodon dactylon on diabetes-induced oxidative stress of diabetic rats. The flavonoids present in the aqueous extract of this plant might be responsible for its marked antioxidant efficacy at tissue level in STZ-induced diabetic rats. [3]

10. Conclusion

Numerous illnesses can be treated using Cynodon dactylon's aqueous paste. According to research on antimicrobial activity, the aqueous extract exhibits potent antibacterial, analgesic, and antipyretic properties against diseases such as white spot illness It follows that the phytoconstitute of aqueous extract, which consists solely of flavonoids and glycosides, might be utilized to create powerful antibiotics that fight viral infections and migraines. The availability of grass is easy, its cultivation and isolation again possible thing, so it can be more compatible to do research and findings of more potential. It was found that versatile effects and potential of given grass useful in pharmaceutical to conduct more research to proven its effect. According to already condusted research it was found more suitable herbal alternative against chemical drugs. Hence given study having many more future scope to isolates constituent or to make pharmaceutical dosage form.

11. Source of Funding

None.

12. Conflict of Interest

None.

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Author biography

Shruti Amritkar, Student

Jagruti Chavan, Student

Amit Kakad, Assistant Professor https://orcid.org/0000-0001-7419-2496

M.R.N. Shaikh, Principal

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