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A REVIEW ON CYNODON DACTYLON

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ABSTRACT
Cynodon dactylon (Bermuda grass) is a medicinally important plant. It's used for various treatments especially ayurveda medicines. this plant contains various primary and secondary metabolic compounds like alkaloid and flavonoids which contributes its wide-ranging therapeutic effects including anti-cancer, anti-diabetic, anti-inflammatory, anti-microbial, anti-parasitic, analgesics, dermatological activities. It has shown potential in cancer and diabetic treatment. Cancer is a condition in which abnormal cell divide uncontrollably and destroy body tissue. Diabetes mellitus is a common disease in patients with cancer. This review explores the botanical descriptions, taxonomy, synonyms, phytochemical constituents and pharmacological activities of plant.

KEYWORDS: Cynodon dactylon, ayurveda medicines, anti-cancer.

INTRODUCTION
C. dactylon is commonly known as bermuda grass, bahama grass, dūrvā grass, devil's grass, ethana grass, dog's tooth grass dhoob, dubo, wiregrass, couch grass, Indian doab, arugampul, grama, and scutch grass's.[1] it is a herb of great religious importance and is reported to be of use in Ayurvedic, Unani, Nepalese, and Chinese systems of medicine. Preclinical studies have shown that the oral administration of the durva grass (20 mg/kg/b.wt) decreased the adjuvant-induced inflammatory response and oxidative stress, and ameliorated the arthritic changes to near normal conditions.[2] 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, diarrhoea, dropsy, dysentery, epilepsy, headache, haemorrhage, hypertension, hysteria, insanity, laxative, measles, rubella, snakebite, sore stones, tumors, urogenital disorders, warts, and wounds.[3] C. dactylon used for treatment of gastric cancer. Gastric cancer (GC) is a prevalent disease that has remained one of the leading causes of cancer-related deaths globally. It was reported as the 5th most common cancer and the 4th leading cause of cancer death worldwide in 2020.[4] The antioxidant enzyme assay results concerning the improved activity of GPx, GST and CAT. These results concluded that enhanced levels of antioxidant enzyme and reduced amount of serum amino transaminase, which are suggested to be the major mechanisms of Cynodon dactylon has also been studied for potential medicinal properties including, antioxidant and anti-inflammatory effects, anticancer properties, Immunomodulatory effects and Wound healing and antimicrobial properties.[5] Some chemical constituents included in the C. dactylon helps to inhibition of cancer cells in GIT.

Figure 1: Bermuda grass (Cynodon dactylon).

Botanical Description
Cynodon dactylon a prostrate mat forming grass belongs to Poaceae family. The genus Cynodon is small but contains species that are important warm-season forage grasses.[6] It is a creeping grass, very tough, drought resistant, light green in color, has a coarse texture, and fast growing. It is found in short cylindrical pieces about 3 to 20 mm long & 2 to 3 or sometimes 4 mm in

diameter.[7] There are ten species and nine varieties of Cynodon in the world .is a major tropical grass found in tropical and subtropical regions.[8]

Taxonomy[9]

Kingdom - plantae
Sub kingdom - Tracheobionta
Super division. - Spermatophyta
Division - Magneliophyta
Class. - Liliosida
Sub class. - Commelinidae
Order - Cyperales
Family - Poaceae
Genus. - Cynodon
Species - *Cynodon dactylon.*

Traditional Use

The plant has been long used in the traditional medicines to treat various ailments.[10] Traditional Indian pharmacopoeia agarampul can be used in the treatment of asthma, bronchitis etc.

Synonyms

Capriola dactylon (L.) Kuntze, Cynodon coursii A. Camus, Cynodon dactylon var. densus Hurcombe, Cynodon polevansii Stent, Digitaria stolonifera, Panicum dactylon L.

Phytochemical Composition

The plant has been rich in metabolites notably proteins, carbohydrates, minerals, flavonoids, carotenoids, alkaloids, glycosides and triterpenoids.[11] The cynodon dactilon also contains terpenoides, saponins, tannins, resins, phytosterols, reducing sugars, volatile oils and fixed oils.[12] Quantitative estimation of phytoconstituents showed glycosides reached 12.2 %, tannins 6.3%, alkaloids 0.1%, resins 1.0%, free reducing sugar 10% and total reducing sugar 12%. According to the instrumental analysis, the total phenolic compounds of methanolic extract were equal to 917.08 mg·kg−1 and the main compound was hydroquinone (66.89%). Antioxidant activity of the methanolic extract at concentrations of 100–1000 ppm was 9.81–67.87%, which is significantly different from the 200-ppm synthetic antioxidant (BHT) with free radical scavenging activity equal to 48.93%.[13]

Chemical Structure of Compounds Present in C. Dactylon[14]

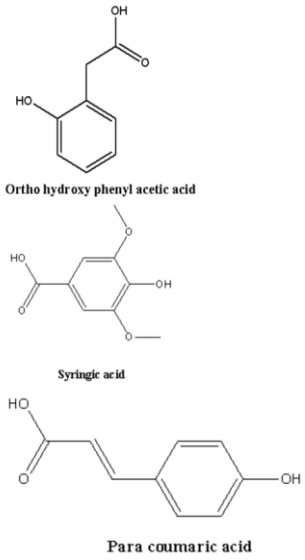

Figure 2: Chemical Structure.

Pharmacological Activities

Pharmacological and nutraceutical properties which progressively make science to aim for C. dactylon's enormous nutraceutical potential in curing problems like ulcers, diabetes, arrhythmia, diarrhoea, inflammation, edema, etc.[15] According to earlier research, Cynodon dactylon has properties that are protective, antimicrobial, antiparasitic, insecticidal, gastrointestinal, antioxidant, immunological, antiallergic, anti-inflammatory, antipyretic, analgesic, anticancer, dermatological, diuretic, and immune system-related was found.[16] The rhizomes are reported to act as a diuretic in humans and the grass juice can act as an astringent. it has been observed that Cynodon dactylon may be selectively eaten by dogs to swiftly induce vomiting when they have gastrointestinal problems. The effect may be due to irritation caused by bristles on the leaf margin.[17]

Cynodon Dactylon Activity in Cancer and Diabetes
Anticancer activity

Plant derived agents are being used for the treatment of cancer. Several anticancer agents from plants include; taxol, vinblastine, vincristine, the camptothecin derivatives, topotecan and irinotecan, and etoposide derived from epipodo phyllotoxin are in clinical use all over the world.[18] Cancer is the second leading cause of death worldwide at all income levels.[19] Cynodon dactylon shown anti-cancer activity. Chemo preventive effect of plant extract has been observed in 1, 2-dimethyl hydrazine or DMH-induced colon carcinogenesis in experimental animals (Albert-Baskar and Ignacimuthu, 2010). Hexane, ethyl acetate and methanol extract of C. dactylon reportedly demonstrated antiproliferative activities in human colon adenocarcinoma cell line, COLO 320 DM (Baskar et al., 2012). Root extract of the plant has been found to be active against diethyl nitrosoamine induced hepatic carcinoma (Kowsalya et

al., 2015). Ethanolic extract of the plant reportedly showed anticancer activity against Hep2 cell line (Salahuddin et al., 2016). Thus, the plant merits potential to be studied for its beneficial effects against leukemia.[20] Cynodon dactylon (Doob) is a natural source of antioxidants and metformin which is an antidiabetic and has anti-cancerous properties too. The combinatorial regimen of Cynodon dactylon and metformin along with cisplatin may increase the drug efficacy and reduce cisplatin-related toxicity.[21] Cynodon dactylon extracts possess antiulcer activity hepatoprotective activity cardioprotective effect and also protein fractions of cynodon dactylon possessed immunomodulatory activity and antioxidant activity in Swiss albino mice has been reported.[22]

Some chemical constituents of C. dectylon has shown potential in cancer treatment likes flavanoid has anti-oxidant and anti-inflammatory properties may help reduce cancer cell growth. Alkaloids may inhibit cancer cell proliferation and induce apoptosis (cell death). Saponins may enhance immune response and inhibit tumour growth. Phenolic acid has antioxidant properties may help protect against cancer cell damage. The antioxidant enzyme assay results concerning the improved activity of GPx, GST and CAT. These results concluded that enhanced levels of antioxidant enzyme and reduced amount of serum amino transaminase, which are suggested to be the major mechanisms of C. dectylon.[23]

Silver nano particles of leaf extract of C. dactylon showed dose dependent 23 cytotoxicity against HepG2 cells. EA fraction of C. dactylon Showed increased levels of enzymic and non-enzymic antioxidants, in Helich's Lymphoma ascites mice.[24]

The aqueous plant extract is used as an anti-inflammatory, antidiabetic, diuretic, antiemetic, and purifying agent. More than 20 compounds have been characterized from C. dactylon, of which, hydroquinone (69.49 %), levoglucosenone (2.72 %), and furfural (6.0 %) are the most abundant. Nadkarni reported the use of C. dactylon roots by practitioners of traditional medicine in India for curing certain types of cancer.[25]

Antidiabetic activity

Diabetes mellitus, an endocrine disorder that cannot be transmitted from person to person, is characterized by abnormalities in glucose metabolism and hyperglycaemia. The occurrence of both micro-vascular (nephropathy, retinopathy, and nephropathy) and macro-vascular (peripheral vascular disease and coronary heart diseases) complications have been linked to it.[26] Individuals can regulate the glucose produced by doing more exercise, reducing their weight and avoiding high carbohydrate foods. Insulin resistance, of course, can be continued, so patients should continue and adjust properly by means of special training, physical exercise, diet, control of their body weight, and an addition of medication (antidiabetic pills). Over time, if pancreatic cells become increasingly inactive, then patients switch to insulin therapy to properly regulate glucose and insulin levels. Type 2 diabetes appears much later in age than Type 1 diabetes and is the most common type of diabetes.[27]

Blood glucose (BGL) levels are important in diabetes management. A normal BGL range is 72–108 mg/dL (4–6 mmol/L). A BGL level above 140 mg/dL (7.8 mmol/L) is considered hyperglycaemia, which can occur when there isn't enough insulin or insulin isn't working properly. A BGL level below 60 mg/dL (3.3 mmol/L) is considered hypoglycaemia. The aqueous extract of C. dactylon (whole plant) lowers BGL around 31% after 4 h of administration in normal rats and the dose 500 mg/kg was evaluated as the most effective dose. At the dose of 500 mg/kg after 7 days, the ethanolic extract of C. dactylon root stalks showed a good antidiabetic activity against the treated model.[28]

Cynodon dactylon has been reported to contain C-glycosides and since the C-glycosides have demonstrated SGLT-2 inhibition, identification of structures of compounds presents in this plant and evaluation of in silico docking study with SGLT-2 was undertaken. Although aqueous extracts of C. dactylon have been shown to possess anti-diabetic activity, their mechanism of action has not been established.[29] Ethanolic extract of C. dactylon showed significant activity in alloxan induced diabetic rat. The aqueous extract of C. dactylon and the non-polysaccharide fraction of aqueous extract were found to exhibit significant antihyperglycemic activity and only the non-polysaccharide fraction was found to produce hypoglycaemia in fasted normal rats.

Treatment of diabetic rats with aqueous extract and non-polysaccharide fraction of the plant decreased the elevated biochemical parameters, glucose, urea, creatinine, serum cholesterol, serum triglyceride, high density lipoprotein, low density lipoprotein, haemoglobin and glycosylated haemoglobin significantly. Comparatively, the non-polysaccharide fraction of aqueous extract was found to be more effective than the aqueous extract.[30] The presence of saponins and flavonoids in C. dactylon extracts might have played an imperative role in lowering the glucose level and plasma lipids in alloxan induced diabetic rats. Presence of such wide range of phytochemicals in this family may open a new dimension in the field of discovery of new drugs against diabetes.[31] C. dactylon contains glycosides, flavonoids, alkaloids, tannins, and saponins, which may control the hydrolysis of lipoproteins, inhibit cholesterol absorption, or modulate lipogenic enzymes.[32]

CONCLUSION

Cynodon dactylon commonly known as bermuda grass is a perennial grass belongs to family Poaceae. It possesses a wide range of therapeutic properties including anti-cancer properties. In this study concluded the use of C.

dactylon has beneficial impact on cancer and diabetic treatment. It may inhibit cancer cell growth and induce apoptosis. It enhances antioxidant defences and reduces oxidative stress cancer. In diabetic treatment it reduces carbohydrate absorption, enhance insulin signalling and preserve insulin producing cell.

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