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"Dactyloctenium Aegyptium: A Review Of Its Pharmacological Properties"

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ABSTRACT

Dactyloctenium aegyptium (L.) Wild. commonly known as Egyptian crowfoot grass is a member of the family Poaceae. It is extensively used in folk medicines for various diseases. The plant's phytochemical study revealed that it included phenols, steroids, alkaloids, saponins, tannins, proteins, amino acids, terpenoids, and fixed oils. Pharmacological activities such as hypoglycemic effect, anti-inflammatory, anti-oxidant activity, anti - proliferative and cytotoxic activity, wound healing abilities has been studied. This review summarized the pharmacological activities of the plant.

Key words: ***Dactyloctenium aegyptium*, pharmacological activity,extract**

INTRODUCTION

Herbal medicines are naturally occurring compounds produced from plants that are used in traditional local or regional medicine to treat various ailments. The practice of herbal medicine has origins in all global cultures[1].

Dactyloctenium aegyptium (L.) Wild. commonly known as Egyptian crowfoot grass is a member of the family Poaceae endemic to Africa and extensively dispersed over the warm temperate, tropical, and subtropical region.[2] It is extensively used in folk medicines for various diseases. This review aims to summarize and analyse its pharmacological activities.

DESCRIPTION

scientific classification:

Kingdom	Plantae
Phylum	Tracheophyta
Division	Magnoliophyta
Class	Liliopsida
Order	Poales
Family	Poaceae
Genus	Dactyloctenium
Species	*Dactyloctenium aegyptium*

Common Names: Crowfoot grass, Egyptian crowfoot grass

MORPHOLOGY:

Growth Habit: Dactyloctenium aegyptium is an annual grass. It has a prostrate to ascending growth habit, often forming mats.

Height: The plant typically grows to a height of 15-60 cm.

Stems: The stems are slender, erect or decumbent, and can root at the nodes.

LEAVES:

Leaf Blades: The leaf blades are linear, flat, or slightly folded. They are 2-10 cm long and 2-6 mm wide.

Leaf Sheaths: The sheaths are generally loose and may be hairy or smooth.

Ligule: The ligule is a short membrane, often with a fringe of hairs.

INFLORESCENCE:
Structure: The inflorescence is distinctive, consisting of 2-7 digitate (finger-like) spikes that radiate from a central point at the top of the stem, resembling a crow's foot, hence the common name.
Spikes: Each spike is 1-6 cm long and bears two rows of spikelets.
Spikelets: The spikelets are 3-5 mm long, containing 3-8 florets.
REPRODUCTIVE FEATURES:
Flowers: The flowers are typical of grasses, with small, wind-pollinated florets.
Seeds: The plant produces small caryopses (grains), which are the main mode of propagation.

HABITAT:
Native Range: Dactyloctenium aegyptium is native to tropical and subtropical regions of Africa and Asia.
Introduced Range: It has been introduced to many parts of the world, including the Americas, Australia, and the Pacific Islands.
Preferred Habitat: It commonly grows in disturbed areas such as roadsides, fields, waste lands, and sandy soils. It thrives in both moist and dry conditions.
ECOLOGICAL ROLE:
Ground Cover: The grass provides ground cover, which helps prevent soil erosion.
Forage: It can serve as forage for livestock, particularly in areas where more nutritious grasses are scarce.[3-4]
FOLKLORE USES
WOUND HEALING: In traditional medicine, Dactyloctenium aegyptium has been used to treat wounds and skin infections. The plant's leaves and extracts are applied topically to promote healing
DIGESTIVE DISORDERS: The plant is used in various cultures to alleviate digestive issues such as diarrhea and dysentery. It is believed to have antidiarrheal properties.
ANTIPYRETIC: Dactyloctenium aegyptium is used to reduce fever in traditional medicine practices.
Traditionally it also used as diuretic, bitter tonic, anti-anthelmintic, used for smallpox, heart burn, urinary lithiasis and other renal infection[5-11].

PHYTOCHEMICAL ANALYSIS

The plant's phytochemical study revealed that it included phenols, steroids, alkaloids, saponins, tannins, proteins, amino acids, terpenoids, and fixed oils[12-14] Carbohydrates, proteins, amino acids, saponins, flavonoids, and tannins were all detected in the aqueous extract. Alkaloids, proteins, carbohydrates, amino acids, tannins, terpenoids, flavonoids, and saponins were all detected in the hydroalcoholic extract. Alkaloids, proteins, carbohydrates, amino acids, tannins, terpenoids, flavonoids, and saponins were all found in ethanolic extract. Terpenoids were detected in ethyl acetate extract along with flavonoids, tannins, and alkaloids; terpenoids were also detected in extracts from chloroform and n-hexane [15].

According to quantitative analysis *Dactyloctenium aegyptium* leaf extract was found to contain 0.540 ± 0.083 alkaloids, 0.246 ± 0.041 phenols, 1.120 ± 0.047 saponins, and 0.430 ± 0.032 tannins mg/g dry weight, [16] . Cyanogenic glycosides, oxalic acid, oxalates, glutamic and aspartic acids, cystine, and tyrosine were also present in Dactyloctenium aegyptium

The aerial parts of Dactyloctenium aegyptium were used to isolate 5hydroxypyrimidine-2,4 (3H,5H)-dione, 6'Glyceryl asysgangoside, and 2 amino, 2 methyl, (5,6 di hydroxymethyl), 1,4 dioxane, P. hydroxy benzaldhyde, tricin, P. hydroxy benzoic acid, vanillic acid, β-sitosterol-3-O-β-D-glucoside, asysgangoside, adenine, uridine, and sucrose.[17-19]. from high performance liquid chromatography results showed that Fourteen compounds were identified including 8 phenolic acids, 2 phenolic derivatives, and 4 flavonoids. Includes quercetin, catechin, gallic acid, naringenin and chlorogenic acid are the major compounds, while caffeic acid is the minor compound[20]

PHARMACOLOGICAL ACTIVITIES
ANTIDIABETIC ACTIVITY

Streptozotocin-induced diabetic rats were used to test the anti-diabetic properties of several solvent extracts of Dactyloctenium aegyptium. The antidiabetic effectiveness of the extracts was in the following order: ethanolic extract > hydroalcoholic extract > aqueous extract > ethyl acetate extract > chloroform extract > n-hexane extract. All extracts shown a significant drop in serum glucose levels. substantial increases in insulin, Hb, SOD, catalase, decreased glutathione, and body weight were observed in the animals treated with ethanolic extract, while substantial decreases in blood glucose, HbA1c, and malondialdehyde levels were observed. In streptozotocin-induced diabetic rats, the antidiabetic effects of n-hexane, chloroform, ethyl acetate, and methanolic fractions from ethanolic extract of Dactyloctenium aegyptium were studied. Reducing the severity

of diabetes is one of the benefits of Dactyloctenium aegyptium's ethanolic extract's methanolic fraction. Blood glucose, HbA1c, and malondialdehyde levels significantly decreased in animals treated with methyl fraction, while insulin, Hb, and SOD levels significantly increased [15].

GASTROINTESTINAL AILMENTS

To support the traditional usage of Dactyloctenium aegyptium in gastrointestinal disorders, the crude extract and its fractions were assessed. D. aegyptium has a concentration-dependent spasmogenic action (0.01-0.1 mg/mL) in a spontaneously contracting rabbit jejunum preparation, followed by a spasmolytic effect at higher dosages (0.3-3.0 mg/mL). The spasmogenic response was suppressed after atropine was pretreated on the tissue preparations. Additionally, in isolated rabbit jejunum preparations, D. aegyptium (1.0 mg/mL) elicited relaxation of K+ (80 mM)-induced spastic contractions and a non-parallel shift towards the right in the Ca++ dosage response curves (0.1-0.3 mg/mL). These results were compared to those of a common Ca++ channel blocker, verapamil. The separation of spasmogenic and spasmolytic effects in the corresponding aqueous and dichloromethane fractions was reflected in the solvent-solvents fractionation. The results indicated above demonstrated the existence of cholinergic as well as Ca++ channel blocking activity in ethanolic extract of D. aegyptium thus providing scientific basis for its folkloric use in constipation and diarrhea [21].

ANTI-FERTILITY ACTIVITY

Dactyloctenium aegyptium (D. aegyptium) ethanol extract was used to determine male albino rat fertility. Each of the four groups of six experimental animals was broken up. The group that functioned as the control was first given regular saline. Ethanolic extract of D. aegyptium was given to the animals in the second, third, and fourth groups for a duration of 30 days at doses of 200, 400, and 600 mg/kg body weight, respectively.As a result The weight of the testes, accessory sex organs, sperm count, motility, abnormalities, and drop in sperm count were all found to have significantly decreased and to have increased non-significantly. Along with a marked fall in serum hormone levels, several biochemical parameters of the serum exhibited notable alterations. In female rats, D. aegyptium exhibited dose-dependent antifertility effect as evidenced by decreased levels of sperm count, weight of reproductive organs, serum hormonal levels, and number of implantations[14].

ANTIPROLIFERATIVE AND CYTOTOXIC EFFECTS

The study evaluated the cytotoxic and antiproliferative properties of the two grass species Dactyloctenium aegyptium (L.) P.B.and Eleusine indica (L.) hexane and butanolic extracts. Human lung cancer (A549) and cervical cancer (HeLa) cells showed a selective growth suppression effect in response to all of the grass extracts. compared to MRC-5 fibroblasts from normal human lung, which have IC50 values ranging from 202 to 845 mg/ml. HeLa cells appeared to be more responsive to the extracts than A549 cells. Furthermore, at doses almost equal to 1,000 mg/ml, every extract caused mortality in both cancer cell lines, demonstrating its selective cytotoxic properties. The apoptotic level in extract-treated A549 cells was considerably raised only by the hexane extract of D. aegyptium (L.) P.B. and E. indica (L.) Gaerth., according to the results of the ELISA experiment. However, in both cancer cell lines treated with all of the extracts in a dose- and time-dependent manner, the DNA ladder assay found classic DNA ladder patterns, an indicator of apoptosis. When combined, these findings show that the grass extracts' cytotoxic action on cervical and lung cancer cells is mediated by the induction of apotosis[22]

ANTI MICROBIAL ACTIVITY

The study examined the antibacterial sensitivity o Methanol (MeOH) and aqueous extracts of plants were subjected to sensitivity test against S. aureus ATCC 25953, two hospital isolated virulent strains of S. aureus SA1 and SA2 following disc diffusion assay to determine sensitivity and agar dilution method to test minimum inhibition concentration using Mueller-Hinton agar. Resulted in potential antibacterial activity was recorded for MeOH extracts against test pathogens, while moderate antibacterial activity was observed in case of aqueous extract[23].

With MICs of 6.5-7 mg/ml, the methanolic extract of Dactyloctenium aegyptium demonstrated antibacterial activity against Escherichia coli and Stapylococcus aureus[24].

The antimicrobial properties of Dactyloctenium aegyptium aerial parts fractions in n-hexane, ethyl acetate, and n-butanol were examined against strains of fungal (Aspergillus fumigates (RCMB 02568) and Bacillis subtilis (RCMB 010067)), as well as Gram positive and Gram negative bacteria (Escherichia coli (RCMB 010052) and Pseudomonas aeruginosa (RCMB 010043)). Comparing the extracts with n-butanol and ethyl acetate, the latter proved more effective against both E. Coli and Candida albicans. When tested against every type of bacteria, nhexane had no antimicrobial action[25].

ANTI OXIDANT ACTIVITY

The study evaluated effect of extraction conditions on phenolic compounds and antioxidant properties of koreeb (Dactyloctenium aegyptium) seeds flour .Using single-factor experiments, examined the effects of solvent type (methanol, acetone, ethanol, n-propanol, and water), solvent-to-solid ratio (20–100 mL/g), solvent acidity (0–1.25% HCl), extraction time (60–300 min), and extraction temperature (30–70 °C) on the total phenolic content (TPC), total flavonoid content (TFC), and the free radical-scavenging capacity (2,2′-diphenyl-1-picrylhydrazyl (DPPH) and ABTS radical scavenging assay) of koreeb (Dactyloctenium aegyptium) seeds[26].

The antioxidant and antibacterial properties of Dactyloctenium aegyptium's aqueous (AE) and ethanol (EE) extracts, as well as the biosynthesised silver nanoparticles (AgNPs-AE and AgNPs-EE) were studied As a result of the investigation, silver nanoparticles may be successfully produced at room temperature using Dactyloctenium aegyptium aqueous and ethanol extracts[27].

Evaluation of Antioxidant and Antifungal Activity of the Whole Part of Dactyloctenium aegyptium Weed on Bengal Gram were studied ; The extract was made in a 1:10 ratio using various organic solvents, including water, benzene, butyl alcohol, ethyl acetate, and methanol. Weed extract antioxidant activity measured using the DPPH, FRAP, and ABTS techniques. Every component of this plant exhibited activity [28].

WOUND HEALING ABILITIES

Study included the biosynthesis and in Vivo Wound Healing Abilities of Dactyloctenium Aegyptium-Mediated Silver Nanoparticles Used as Hydrogel Dressing. The prepared hydrogel dressing may be used in clinical settings to treat infections and aid in wound healing [29].

AMELIORATIVE IMPACTS ON HORMONAL, HISTOLOGICAL, AND ULTRASTRUCTURAL CHANGES IN THYROID GLAND

Exhibited the ameliorative effects of alcoholic extracts of Dactyloctenium aegyptium (D. aegyptium) and Parapholis incurva (P. incurva) against histological, hormonal, and ultrastructural alterations in rat thyroid gland-induced hypothyroidism through daily oral administration of sodium fluoride (NaF) (5 mg/kg) for a period of 28 days. six equal groups of forty-two adult male albino rats—a control group, a NaF group (5 mg/kg/d), a D. aegyptium group (100 mg/kg/d), a P. incurva group (100 mg/kg/d), a NaF + D. aegyptium group, and a NaF + P. incurva group—were evenly distributed by random. When the experiment is over, the animals' sacrificed blood samples were tested for thyroid-stimulating hormone (TSH), triiodothyronine (T3), thyroxine (T4), and other hormones using an assay. The following were measured: malondialdehyde (MDA), reduced glutathione (GSH), superoxide dismutase (SOD), and calcium. Thyroid gland tissue specimens were prepared for histology, immunohistochemistry, histochemistry, and scanning electron microscopy analyses. When compared to the control group, NaF significantly altered the hormonal, antioxidant, and calcium status (causing a decrease in serum TSH and T4 levels and an increase in serum TSH)[30].

AMELIORATING ROLE OF DACTYLOCTENIUM AEGYPTIUM (D. AEGYPTIUM) ON ADRENAL GLAND

Analyzed the effects of sodium fluoride on the rat adrenal gland and the potential reducing effect of Dactyloctenium aegyptium (D. aegyptium) using biochemical, histological, and immunohistochemical methods. Thirty-five male albino rats were split into five equal groups: group I was the control group; group II got sodium fluoride (5 mg/kg); group III got D. aegyptium (200 mg/kg); groups IV and V got both sodium fluoride and D. aegyptium (100 and 200 mg/kg, respectively) at the same time for a period of 28 days. Serum samples were tested for aldosterone, corticosterone, nitric oxide, sodium, potassium, and chloride. When D. aegyptium extract and NaF were administered together, serum corticosterone and aldosterone secretion returned to normal levels. The extract of the plant is rich in antioxidants, a type of phenolic compounds that may improve adrenal hormones.hemorrhage and disturbed basement membrane), as well as histomorphometric, histochemical, immunohistochemical, and ultrastructural (thyroid calcification) alterations. The groups that received D. aegyptium or P. incurva extract in combination with NaF showed a significant improvement in all of these areas. Because D. aegyptium and P. incurva extracts have a high concentration of flavonoids and phenolic compounds, they can be beneficial in preventing thyroid gland calcification and toxicity caused by NaF [20].

DISCUSSION

Over all Dactyloctenium aegyptium possess pharmacological activities such as hypoglycemic effect, anti-inflammatory, anti-oxidant activity etc. these pharmacological activities that have been understudied.

Detailed analytical studies needed for identifying the phytoconstituents and possible mechanism of action. Preclinical studies provide valuable insights, but clinical trials are essential to establish safety, efficacy, and appropriate dosages in humans.

CONCLUSION

Numerous studies have demonstrated the effectiveness of using herbs to heal ailments and diseases around the world. Over time, some of these products have found their way into the Western medical industry as complementary and alternative medicines. This paper aimed to summarize the pharmacological activites of Dactyloctenium aegyptium and potentially can be developed as herbal medication.

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