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"REVIEW OF COMMELINA BENGHALENSIS LINN.,(COMMELINACEAE) : FROM A PHYTOMORPHOLOGY , CHEMICAL AND TOXICITY STUDY OF INDIAN MEDICINAL HERB AS A PHARMACOLOGICAL APPROACH."

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ABSTRACT In the current healthcare system, herbal remedies are gaining prominence. It was the primary motivator for improved care since the beginning of time. The annual herbaceous weed known as Bengal Dayflower, Commelina benghalensis Linn., is a member of the Commelinaceae family. Polyphenols, flavonoids, tannins, and alkaloids are the primary phytochemicals present in this plant. The plant's various parts have been linked to significant therapeutic activities, including antimicrobial, anti-cancer, anti-inflammatory, anti-oxidant, anti-diarrheal, anthelmintic, fertility-inducing, antiviral, anxiolytic, hepato-protective, anti-urolithiasis, analgesic, thrombolytic, sedative, and larvicidal qualities, according to a review of the literature.This review study focuses on Commelina benghalensis's morphology, phytochemistry, pharmacology and therapeutics activities and toxicity study. A general understanding of the plant under study may be obtained from this review process.

KEYWORDS : Phytochemistry, Pharmacological and Therapeutic Activities, Toxicity, Commelina benghalensis, Herbal Weed.

INTRODUCTION

Throughout the world's health care systems, traditional medicines are extremely important. People use plants and plant extracts to treat a variety of health conditions and have done so for decades. As part of the conventional medical system, C. benghalensis is used to treat a variety of illnesses. Jaundice, leprosy, fever, constipation, headaches, and snake bites have all been treated with it[1-3].Moreover, it has been used to treat psychosis, thrush in the mouth, epilepsy, and insanity [4-7].Commelina benghalensis is a medicinal plant that is used in Chinese medicine as a laxative, anti-inflammatory, febrifuge, and diuretic[8-9].It has been possible to Isolate certain significant phytochemicals from both the vegetative and flowering sections of the entire plant, including stigmasterol, campesterol, n-octacosanol, and n-triocotanol, hydrocyanic acid. The plant has been demonstrated to be a suitable source for pharmaceutical phytochemistry research for commercial applications as well[10-11].

Taxonomic Description :

A succulent, pubescent, heavily branched creeping grass that roots at the lower nodes. Acute to obtuse, elliptic-ovate to broadly ovate, glabrous or pubescent, closing but occasionally opening towards the apex, leaves are 4–6 cm long and 2–3 cm wide. Typically, spathaceous bracts in the shape of funnels are followed by 2-fid cymes of flowers. Spathes 1–3 together, 1–2 1.5–1.8 cm pubescent, base auricled on one side, cyme branches uneven, and cleistogamous blooms are sometimes seen underground. White, ovatelanceolate sepals measuring 3 mm long.Blue, uneven, longer 3-4 mm, smaller 5-6 mm, petals.3 mm long, 6 mm wide, perfect stamensAnthers are oblong, staminodes are3, 6-7 mm long, filaments are bare, and there are one yellowish staminode and two bluish staminodes.three-celled, stout-styled, and capitated stigma. Fruit is a capsule that is 3 cells long, membranous, and 5–6 mm long.About transversely rugose, cylindric or semicylindric, 2 mm long seeds that are generally truncate at one end.

Figure 1: The Plant of Commelina benghalensis Linn.

Plant Description:

Biological Source: It is annual or perennial weed, whole plant part of Commelina benghalensis Linn.
Family: Commelinaceae
Telugu: Neerukaassuvu, Nirukassuvu
Tamil: Kanangkozai, Adutinnathalai
Nepali: Kane

Taxonomy Of Commelina benghalensis [12]

Domain: Eukaryota
Kingdom: Plantae

Subkingdom: Tracheobionta
Superdivision: Spermatophyta
Division: Magnoliophyta
Class: Liliopsida
Subclass: Commelinidae
Order: Commelinales
Family: Commelinaceae
Genus: Commelina L.
Botanical name: commelina benghalensis L.

Vernacular Names Of Commelina benghalensis [13]
Hindi: Kana, Kankawa, Buchna
English: Tropical spiderwort, Benghal Dayflower, Wondering Jew
Marathi: Kena
Sanskrit: Kanchata, Kosapuspi, Marishajalaja
Gujrati: Sheshmuli
Malayalam: Kanankoai, Kanchatam
Manipuri: Wanden khoibi
Kannada: Hittangani

Synonyms Of Commelina benghalensis [14]
Commelina mollis, Commelina nervosa, Commelina poligama, Commelina procurrens, Commelina prostata, Commelina canescens, Commelina cavaleriel, Commelina cuculiata, Commelina delicatula, Commelina hirsuta, Commelina rhizocarpa, Commelina turbinata, Commelina uncata, Commelina senegalensis, Commelina villosiuscula and Commelina radiciflora.

Phytoconstituents
Commelina benghalensis demonstrated the presence of flavonoids, astringents,8-hydroxyquinoline, quinolones, caffeic acid, chlorogenic acid, catechol, resorcinol, salicylic acid and p-coumaric acid . The anthocyanin that was present in the highest concentration in the flower was cyanidin3,7, 3-triglucoside, which is acylated with caffeine. In plants, hydroxycinnamic acids, flavone C-glycosides, and flavonol O-glycosides are all found. The plant's most prevalent aglycone is quercetin [15-17].

In earlier research, it was discovered that an alkanol and sterol were present, along with a mixture of stigmasterol, beta-sitosterol, and campesterol in the sterol and n-triacontanol, n-doctriacontanol and n-octacosanol in the alkanol. Another investigation revealed the presence of lutein and zeaxanthin pigments. This plant also had high levels of carotenoids. Proteins, calcium, iron, and vitamin C are among the nutraceuticals that are present. Alkaloids, glycosides, saponins, polyphenols, carbohydrates, phytosterols, tannins, and flavonoids are examples of phytoconstituents that have been documented in various research studies [18-20].

In a prior study, the components of Commelina benghalensis and a few other historically used medicinal herbs were estimated. According to the study, the ethnomedicinal plant had a total chlorophyll content of 2.142 mg/g tissue, 0.024 mg/g tissue of carotenoids, and 0.978 mg/g tissue of total phenolic compounds. Several studies on plant pigments came to the conclusion that the amount of pigments in plants may vary depending on a number of environmental, biogeochemical, or ecological conditions, including the effects of air pollution, as well as depending on the season. Diverse solvents and plant components can also cause changes in the bioactive contents [21-24].

Physico-Chemical Parameters
The leaves of Commelina benghalensis display the following close-up characteristics, including total ash of 25.02%, acid-insoluble ash of 9.03%, and water-soluble ash of 12.14% w/w.The leaves had a range of extractive values during hot extraction, including pet ether soluble extractive values of 2.99%, ethanol soluble extractive values of 12.56%, and water soluble extractive values of 22.33% w/w. Their moisture content was 13.33%w/w (loss on drying at 105°C)[25].

Pharmacological And Therapeutic Activity
Analgesic Activity: An analysis of the ethanol extract containing root sample 20 from Commelina benghalensis was conducted in order to identify the analgesic properties of this plant and support its traditional medical use. By blocking the release of pain receptors, the ethanol root extracts demonstrated effective analgesic effects and were considered to have a similar mechanism of action as other NSAIDs [26].Commelina benghalensis extracts from aerial parts were tested to see if they had any centrally acting analgesic properties. The results show that they do, and they are comparable to the drug nalbuphine 1.In a different investigation, Swiss Albino mice also demonstrated a dose-dependent analgesic response to the perennial plant Commelina benghalensis [27].

Anti-Inflammatory Activity: Commelina benghalensis roots extracts were found to have significant anti-inflammatory activity in a study using in-vivo experimental models. This is because the extracts contain resins, balsams, flavonoids, and tannins [26].According to a preliminary phytochemical analysis of C. benghalensis, saponins, tannins, carbohydrates, flavonoids, and alkaloids are present [28-29].Due to the presence of primarily saponins, tannins, and flavonoids, the extract of this plant exhibits promising anti-inflammatory properties. The possibility of C. benghalensis as a potent and secure medication for both short-term and long-term use inflammations is also raised [28].Airway inflammation and additional symptoms like shortness of breath, coughing, wheezing, chest tightness,etc. are what define asthma.22The 15-lipoxygenase enzyme, which is the cause of asthma [29], was found to be 33.61% inhibited by dried C. benghalensis leaf extracts in methanol extracts. When compared to a control group, Commelina benghalensis root extracts in both aqueous and alcoholic forms significantly improved wound healing.

Diuretic Activity : Commelina benghalensis is a plant that is high in secondary metabolites, and a study indicated that this plant may have diuretic qualities [30].

Larvicidal Activity: A. aegypti is the main vector from which dengue fever spreads to humans, making it a serious health issue, particularly in developing nations. Due to the presence of phyto-chemicals like phenol, flavonoids, resins, and others, the petroleum ether extract of C. benghalensis appeared to kill 80% of the mosquito larvae in 24 hours [31].

Fertility-Inducing Property: C. benghalensis has long been used as a traditional medicine to treat female infertility [32].According to a study, this plant's leaf extract appears to have therapeutic benefits for women who are infertile. Another study revealed that C. benghalensis extract can effectively prevent testicular toxicity caused by environmental hazardous chemicals, making it a possible therapy option for male infertility [33].

Anti-viral Activity : Investigations into C. benghalensis's inhibitory effects against dengue virus serotype 2 were conducted using five different fractions extracted using methanol, ethanol, chloroform, n-hexane, and benzene. All of the fractions demonstrated significant prophylactic effects against the virus. As a result, prophylactic treatment with Commelina benghalensis appeared to have good antiviral activities. Investigations into C. benghalensis's inhibitory effects against dengue virus serotype 2 were conducted using five different fractions extracted using methanol, ethanol, chloroform, n-hexane, and benzene. All of the fractions demonstrated significant prophylactic effects against the

virus. As a result, prophylactic treatment with Commelina benghalensis appeared to have good antiviral activities [34].

Anti-microbial : A study was done using 10 medicinal plant extracts against gram +(ve) and gram (-)ve bacterial strains in-vitro to evaluate the therapeutic properties of plants. Plant constituents have been used as folk medicine and natural therapies for the majority of the world's population since ancient times. With regard to Streptococcus lactis and Enterobacter aerogenes, C. benghalensis' crude leaf demonstrated potential inhibition zones in this study [35].

Free Radical – scavenging Activities: A study looking into the antioxidant activity of C. benghalensis discovered a positive correlation between the plant's total polyphenols and its antioxidant properties [36].Also, this plant is a fantastic natural source of antioxidants and has strong antioxidant activity, all of which prevent oxidative damage, slow down the ageing process, and lower the risk of tumor and other cardiovascular and neurological illnesses [36].Because they contain mainly phenolic groups, which successfully neutralize free radicals [37], methanolic extracts from the leaves of C. benghalensis demonstrate to be rich in antioxidants in a different experiment. As a result, they can be successfully applied in the pharmaceutical industry [37].Fresh aerial parts of C. benghalensis that have been extracted with acetone and methanol exhibit strong anti-oxidant properties that demonstrate the ability to inhibit free radicals [38].These diseases are prevented by the antioxidative properties of this plant. Superoxide radicals and oxidative stress increase the risk of diseases like diabetes, cancer, heart disease, autoimmune diseases, ageing, and neurological diseases.

Thrombolytic Activity: Thrombosis is a serious medical issue, and thrombolytic therapy is typically used to dissolve the blood clot. However, the thrombolytic medications that are currently on the market have drawbacks [39]. Commelina benghalenis has a strong thrombolytic activity of 40.94% when standard streptokinase, which is around 75%, is taken into account in a study to explore its thrombolytic properties using methanol extract [39].

Antidiarrheal And Anthelmintic Activity: C. benghalensis methanol extract was tested for its antidiarrheal and anthelmintic properties, and it was discovered that a dose-dependent methanolic extract took a maximum of 22.17 minutes to paralyse and nearly an hour to completely kill the parasite [40].On the other hand, the methanol extract from this plant stifled the propelling movement of charcoal through the GIT, offering excellent chances to avoid diarrhoea[40].

Hepatoprotective Activity: It is known that a number of medicinal plants are used to treat conditions like this [41]. Alcohol consumption can cause degenerative fibrotic hepatic diseases. This plant's alcohol and water extracts both shown strong hepatoprotective action against paracetamol-induced hepatic tissue damage, according to a study, however the alcoholic extracts appeared to have performed better than alcoholic extract [42].Commelina benghalensis (200 mg/kg, b.w.) water and alcoholic extracts both shown notable hepatoprotective efficacy against paracetamol-induced liver damage (2gm/kg, b.w. in 1% CMC).Compared to aqueous extract, alcoholic extract shows greater efficiency [43].

Sedative And Anxiolytic Properties: Sedative and Anxiolytic Properties of the four different fractions of Commelina benghalensis' aerial parts, the chloroform (CFCB) and pet ether (PECB) soluble fractions have the strongest sedative and anxiolytic potential. These four fractions are coded as CFCB, PECB, NBCB, and HMCB, respectively. Since anxiety and other related neuropsychiatric disorders can both be treated with these fractions, there may be a major therapeutic benefit [44].Also, the evidence from this study may support the use of this plant in traditional medicine to treat agitated mental diseases such psychosis, insanity, epilepsy, etc.[45] Commelina benghalensis was added to S. almum-based diets, and this improved the wethers' growth and DM intake, demonstrating their potential as supplements for ruminants [44].Strong sedative and antianxiety properties are demonstrated by C. benglalensis (200 mg/kg and 400 mg/kg), [46].The presence of sleep-inducing qualities in the plant's aerial portions makes it possible to produce sedation or hypnosis by potentiating GABA-mediated postsynaptic inhibition through allosteric alteration of GABA receptors. Alkaloid and flavonoid [46] are additional components of C. benghalensis. Flavonoids are believed to interact with the brain's GABA/benzodiazepine receptor complex to provide the sedative and anxiolytic effects. It can therefore be used to treat neuropsychiatric diseases such as anxiety and those that are associated to them.

Anti-cancer Activity: Several pharmacologically significant compounds, including tannins, phenols, steroids, coumarins, triterpenes, lactones, resins, alkaloids, reducing agents, and flavonoid, are reported to be present in C. benghalensis and to have anticancer properties [47].Commelina benghalensis methanol extract effectively decreased tumour volume in albino mice, normalised Hb levels, and extended mouse lifetime [47].In a different study, MECB's ability to inhibit the growth of cancer cells in the ascetic fluid from Swiss albino mice was used to evaluate its anticancer properties [47].The rate restriction of viable cell counts, rate augmentation life expectancy, rate restraint of aggregate cell count, and improved haematological parameters were all taken into consideration when determining the strength of MECB anticancer ability [47]. The OECD standard was followed when estimating the LD50 of CB's methanol leaf concentrates, but no mouse deaths were seen, even at a dosage of 2000 mg/kg body weight, so the results were regarded as safe [47].The research of the histological perception of test bunches suggested a typical liver tissue design, less thick divider CV, twisted tissue corruption of the core, parenchyma, and hepatic cells were recovered, which were damaged in EAC treated control groups (I-V) [48].These metrics and impressions demonstrate the anticancer activity of MECB.The creation of a potent anti-neoplastic medication may be facilitated by Commelina benghalensis semi-pure extracts, which offer hope for the future treatment of malignant skin expansion [48].p53 tumour protein and the Bcl-2 family of proteins-related malignant growths can be successfully treated with Commelina benghalensis crude methanolic extract because it contains bioactive substances (Bax and Bcl- 2).Moreover, dysregulated expression of genes that are susceptible to apoptosis results in this apparent antineoplastic action [49]. Due to the presence of flavonoids, this plant may have antioxidant characteristics [50-51].Because C. benghalensis contains phenolics, researchers have discovered that it has the ability to scavenge free radicals. For the quantification of ferulic acid, kaempferol, protocatechuic acid, apigenin, and vanillic acid in the tuber of this plant, the author developed a straightforward, quick, and sensitive method [52]. Additionally, the anti-oxidant potential of the plant's extract was examined and confirmed.

Toxicity Study

The cytotoxic assay of Commelina benghalensis was conducted in a study to ascertain the toxicity qualities of this plant using the Brine Shrimp Lethality test (LC50) for 24 hours. Plant toxicity is a significant concern for scientists and medical professionals. This cytotoxicity test was significant because the results may be used to identify new anticancer chemicals and improve the assessment of the plant's anti-neoplastic qualities. The median fatal concentration, or the concentration at which 50% of the brine shrimp nauplii were

seen, was displayed in the study's findings. Using DMSO as the negative control and Vincrintine sulfate as the positive control, the methanol extract of this plant showed strong cytotoxic activities against brine shrimp at a concentration of 278.68 g/ml [53-54]. However, even at high doses of 2000/kg, hydroethanoic extracts of Commelina benghalensis leaves did not exhibit any harmful responses or death in another investigation, indicating that the lower limit of tolerance (LD50) for hydroethanoic extracts of Commelina benghalensis must be more than 2000 mg/kg [55].

CONCLUSION:

A thorough assessment of the plant's potential medical applications could be encouraged by the comprehensive data on the biological characteristics of the extracts included in this review. For this reason, more research on the plant to extract the bioactive component and find potential drug development leads would be beneficial. Various, chemical Several pharmacological characteristics were demonstrated by compounds that were extracted from Commelina benghalensis extracts, and these compounds have been used for millennia in traditional or folk medicine. Significant therapeutic activities were demonstrated by the crude extracts of the plants, which included anti-oxidant , anti-inflammatory, hepatoprotective, analgesic, anti-cancer, anti-thrombolytic, anti-diarrheal, anti-plasmodial, anti-helminthic, anti-microbial, anti-viral, sedative and anxiolytic effects. For its better application in the pharmaceutical, cosmetic and agrochemical industries, more thorough research must be conducted.

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