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Analgesic, cytotoxic, sedative and antidiarrheal properties of *Commelina appendiculata:* A review

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Abstract
Commelina apendiculata is an annual herb and highly distributed in Eastern India, Sri Lanka and Bangladesh. Many plants of this genus are used in medicine for the treatment of inflammation, pain, fever, dysentery, diarrhea, diabetes, neurological disorders, cancer, toxicity, heart diseases, asthma, oxidative stress etc. Plants belonging to the genus Commelina have been shown to contain coumarins, anthocyanin, alkaloids, terpenoids, steroids, iridoids, flavonoids and some other molecules such as aliphatic alcohols, polyols and phenolic acids. Here, we have reviewed all the reported pharmacological properties such as analgesic, cytotoxic activities, sedative and anti-diarrheal activities of *Commelina appendiculata*.

Keywords: *Commelina apendiculata*, pharmacological properties, phytochemical constituents

Introduction
Medicinal plants have been used for a wide variety of purposes such as food preservation, alternative medicine, pharmaceutical and natural therapies for thousands of years. Generally it is considered that compounds which are produced naturally rather than synthetically will be biodegraded more easily and therefore being environmentally acceptable. Herbalism is a traditional or folk medicine practice based on the use of plants and plants extract [1]. Herbal therapy is used to treat a large variety of ailment and symptoms, e.g. inflammation, fever and pain, however there are no adequate experimental evidence about their effectiveness [2, 3]. *Commelina appendiculata* locally known as Kanda Loa, belonging to the family of commelinaceae. In Bangladesh it occurs in Tangail, Mymensingh and Sylhet district. It is used in the Sunamganj district as a folk medicine for the treatment cats and dogs bite [4]. It has been reported that many plants of this genus are used in medicine for the treatment of inflammation, pain, fever, dysentery, diarrhea, neurological disorders, cancer, toxicity, heart diseases, asthma, oxidative stress etc. [5, 6-19]. Plants belonging to the genus Commelina have been shown to contain coumarins, anthocyanins, alkaloids, steroids, iridoids, flavonoids and some other molecules such as aliphatic alcohols, polyols and phenolic acids [5, 6]. The group of flavonoids is famous for its anti-inflammatory, antiallergic, antithrombotic, Vasoprotective and protection of gastric mucosa. These properties have been attributed to influence of flavonoids on production of prostaglandins and their anti-oxidant effects [7]. The plant is accounted for to have pain relieving and cytotoxic action [11]. It is also used for sedative and anti-diarrheal activities [20]. This review is about the distribution, phytochemistry toxicity and pharmacological properties of *C. appendiculata* with an urge of further advancements in the medicinal uses of the herbs worldwide.

Synonyms
Commelina alba Buch. - Ham. Ex C.B. Clarke

Binomial name
Commelina appendiculata C.b.clarke

Scientific Classification
Kingdom: Plantae
Subphylum: Euphyllophytina
Order: Commelinales
Family: Commelinaceae
Genus: Commelina
Species: *C. appendiculata*

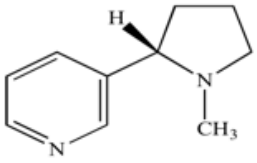
Botanical description
An annual herb, stem creeping, diffusely branched, 40 cm or more long, internodes slightly reddish, root fibrous at the lower nodes. Leaves are 2.5-3.5 ×1.0- 1.5 cm, lanceolate to oblong, acute to acuminate, glabrous, sheath surrounding the stem prominent, 1 cm long and ciliate at the open edge. Flowers in leaf-oppose cymes emerging from a spathaceous bract, spathes 1-2 cm long, axillary, lanceolate, acuminate, base deeply cordate. Sepals are 4 mm long, lanceolate. Petals are 5×3 mm, blue or white, clawed. Fertile stamens 3 (rarely 2), filaments are 2 mm long, naked, anthers oblong, staminodes 2-4, bilobed. Ovary 3 celled, each cell with 1 ovule. Fruit a capsule, mature capsules 2 valved, 5-7 mm long, oblique or oblong with a pointed apex. Seeds 4 mm in ventral cell, oblong, smooth, grey, sometimes flattened appendiculate at both ends, seeds at the dorsal cell shorter or absent [4].

Fig 1: *Commelina appendiculata*

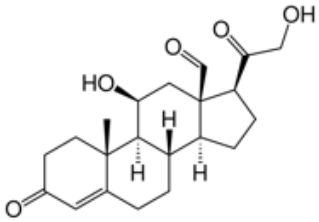
Phytochemical Constituents

Dash and his colleagues [4] reported that ethanol extract of *C. appendiculata* contain carbohydrates, tannins, flavonoids, glycoside and alkaloids. Phytochemical constituents of plants belonging to the genus of Commelina have been shown to contain coumarins, anthocynins, alkaloids terpenoids, steroids, iridoids, flavonoids, carbohydrates, tanins, glycosides and some other molecules such as aliphatic alcohols, polyols and phenolic acids.

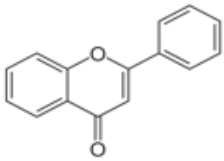
1. Alkaloid



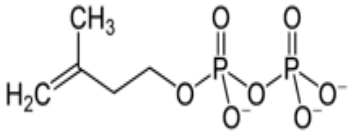
2. Steroid



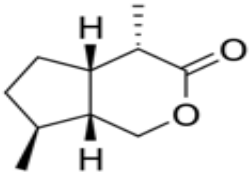
3. Flavonoid



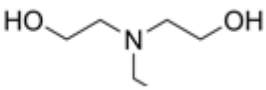
4. Terpenoid



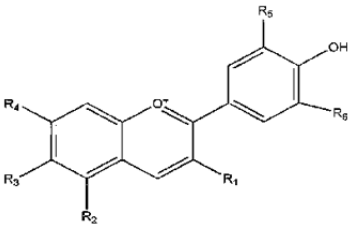
5. Iridoid



6. Polyol



7. Anthocyanin



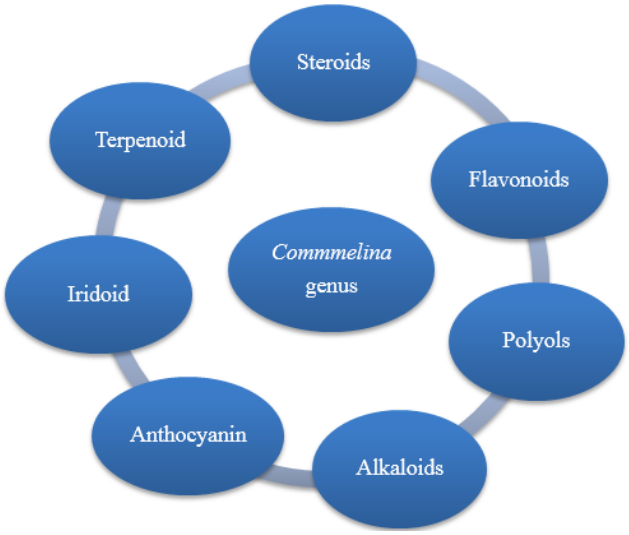


Fig 2: Phytochemical Constituents of *Commelina genus*

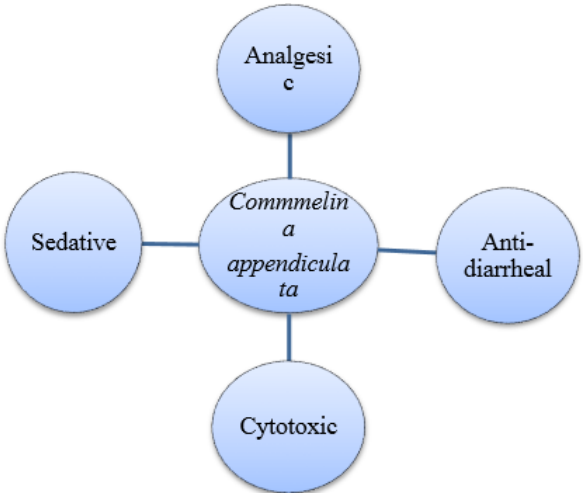


Fig 3: Pharmacological properties of *Commelina appendiculata*

Pharmacological Activities

Analgesic activity

In Acetic acid induced Writhing test Dash and his colleagues [10] obtained that the oral administration of both doses of C. appendiculata extract significantly ($p<0.001$) inhibited writhing response induced by acetic acid in a dose dependent manner. At 200 mg/kg dose showed 76.27% inhibition of writhing in comparison to control. The standard drug Diclofenac-Na (25 mg/kg,i.p.) and Aspirin (100 mg/kg, p.o.) were exhibited 80.72% and 61.94% inhibition of writhing respectively. Again, in Hot Plate Test, Oral administration of EECA significantly ($p< 0.05$ and $p < 0.001$) prolonged the latency period at both 100 and 200 mg/kg doses when compared to the control group. The extract increased the latency time in a dose dependent manner. Maximum effect of the extract was observed 60 and 90 min. In this study, Morphine (5 mg/kg, i.p.) was used as standard. Furthermore, in Tail immersion test, it is found that the tail-withdrawal reflex time of the mice to the hot water induced pain significantly increased after administration of EECA. The maximum effect of the extract was recorded at 60 and 90 min. The effect was statistically significant ($p < 0.001$) in comparison to control. In this test, the increase in latency was highly significant than that were observed in hot plate test.

Cytotoxic Activity

In Brine shrimp lethality bioassay, researchers[10] reported that the degree of lethality shown by the extract was found to be directly proportional to the concentration of the extract ranging from the lowest concentration (1.25ug/ml) to the highest concentration (320 ug/ ml). The plant extract showed mild cytotoxic potency to brine shrimp nauplii, having LC50 values of 26.3 ug/ml while the LC50 of the standard drug vincristine sulphate was 0.52 ug/ml.

Sedative Activity

In thiopental sodium instigated dozing time test, Dash and his colleagues [20] found that the concentrate at the measurements of 100 and 200 mg/kg altogether incited the rest at a prior stage furthermore drawn out the length of dozing time in guinea pigs when contrasted with control. The outcome at the dosage of 200 mg/kg was observed to be measurably huge ($p < 0.001$). In this test, EECA at the doses of 100 and 200 mg/kg showed maximum 147.48% and 195.98% effect in duration of loss of righting reflex respectively, whereas the standard drug Diazepam (2 mg/kg) produced 200% effect. Again in Hole cross test, the EECA demonstrated detectable abatement in the locomotor movement from second perception (30min) to fifth (120 min) perception period. The impact was dose dependent and factually huge ($p <0.05$, 0.001) compared to control. In hole cross test, maximum 89.02% and 96.7% suppression of locomotor activity were exhibited with the EECA at the doses of 100 and 200 mg/kg respectively. In this study, Diazepam (63.42% suppression) was used as standard. Furthermore, the abatement in velocity was likewise obvious from the consequences of open field test. The concentrate delivered dose dependent and measurably critical ($p <0.05$, 0.001) CNS depressant impact. The most extreme impact was seen from third perception (30 min) to fifth perception (120 min) period. In open field test, maximum 84.37% and 90.26% suppression of locomotor activity were exhibited with EECA (100 and 200 mg/kg) respectively, whereas the standard drug Diazepam displayed 65.81% suppression.

Anti-diarrheal Activity

In Castor Oil-Induced Diarrhea method, it is reported by the researchers[20] that in the anti-diarrheal action, the extract showed noteworthy ($p < 0.001$) and a dose dependent reduction in the aggregate number of fecal dropping in castor oil incited the runs in mice. The percentage of inhibition of castor oil-induced diarrhea in the extract-treated mice was 74.64% and 90.64% at the doses of 100 and 200 mg/kg respectively. In this study the standard drug Loperamide (3 mg/kg) produced 54.64% inhibition of defecation. Again, in Magnesium Sulphate-Induced Diarrhea Method, the concentrates demonstrated a dose dependent diminishment in fecal dropping in a comparative way like in castor oil-initiated loose bowels. Critical ($p < 0.001$) diminishment in fecal dropping was appeared by the ethanol extract at 200 mg/kg (80.95%) measurements. At 100 mg/kg measurement likewise demonstrated 65.00% hindrance of diarrheal droppings, ($p < 0.001$).

Conclusion

The literature review of the *Commelina appendiculata* represents that it has extensive Pharmacological properties which effectively perform to treat several disorders. The extracts of *Commelina appendiculta* had successfully identified the exertion of different therapeutic purposes including analgesic, sedative, anti-diarrheal and cytotoxic activities. The study demonstrated on its Phytochemistry and constituents might provide incentive for proper evaluation of the use of the plant in medicine.

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