

CHEMICAL COMPOSITION OF THE LEAVES AND STEM BARK: METHANOL EXTRACT OF *SIDA CORDIFOLIA* L.

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Abstract. *The study was conducted to evaluate some chemical constituents of the leaves and stem bark of Sida cordifolia. Standard methods were used in all the analysis. Preliminary phytochemical screening indicated the presence of flavonoids, tannins, polyphenols, anthraquinones, saponins, and glycosides. Quantitative study of some phytoconstituents showed a significant difference ($p < 0.05$) between the leaves contents and that of the stem bark with the exception of tannins. The results of elemental analysis revealed that the levels of potassium (K), sodium (Na), magnesium (Mg) and manganese (Mn) differed significantly ($p < 0.05$) when leaves contents were compared with that of the stem bark, while nickel (Ni), chromium (Cr), iron (Fe) and copper (Cu) contents were not statistically ($p < 0.05$) different. This result indicated that Sida cordifolia has great potentials as it content active pharmaceutical ingredients.*

Keywords: *Sida cordifolia L., phytochemicals, elemental compositions.*

1. INTRODUCTION

About 25% of prescribed drugs in the world are of plant origin [1]. Approximately 80% people rely on traditional plant based medicines for their initial health care needs in developing countries [2]. From the ancient period different parts of medicinal plants have been used for ailments caused by microorganisms. There is a wide range of medicinal plant parts possessing a variety of pharmacological activities like flowers, leaves, barks, stems, fruits, roots extracts are used as powerful raw drug.

Recently there is a widespread interest of plants derived drugs which reflect its recognition of the validity of many traditional claims regarding the value of natural products in health care [3]. For the quality control of traditional medicine phytochemical screening is mainly applied. Now-a-days, secondary plant metabolites previously with unknown pharmacological activities have been extensively investigated as a source of medicinal agents [4]. Thus it is anticipated that phytochemicals with enough antibacterial efficacy will be used for the treatment of the bacterial infections [5].

According to World Health Organisation, to obtain a variety of new herbal drugs medicinal plants are the best sources. Therefore, in order to determine the potential use of herbal medicine, it is important to emphasis the study of medicinal plants that finds place in folklore [3, 6]. To prevent or deter free radical induced lipid oxidation antioxidants are added to a variety of foods [7].

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Continuous exposure to chemicals and contaminants leads to increase the free radicals amount and causes irreversible oxidative damage [8, 9]. Improved antioxidant status plays an important role to minimize the oxidative damage [10]. Currently, the development of resistance of pathogens against antibiotics has become a difficult issue caused by the uncontrolled use of modern antibiotics [11 - 16]. Furthermore there are many reports on antibacterial activity of various plants growing in different region [17, 18].

Sida cordifolia Linn. commonly known as berela (Bengali) is an herb under Family: *Malvaceae* that is extensively used as a common herbal drug in the Indian subcontinent. It is used in Ayurvedic medicine [19], it has anti-inflammatory [20], anti-cancer [21], antibacterial activities [22, 23] and has been investigated for encouraging liver re-growth [24]. It was reported that the water extract of the leaves possess analgesic and anti-inflammatory activities in animal models [25]. On the central nervous system it has a depressive effect [26]. Moreover, the presence of ephedrine, vasicinol, asicinone and N-methyl tryptophan had supported by the earlier phytochemical studies on the roots [27]. Recently, studied that 50% ethanolic extract of *S. cordifolia* has got antioxidant and anti-inflammatory potential and the activity was comparable with the standard drug diphenyl [28].

2. MATERIALS AND METHODS

2.1. PLANT COLLECTION AND EXTRACTION

For this present investigation the *Sida cordifolia* L. was collected from Chittagong region, Bangladesh. The plant was identified by Bangladesh National Herbarium, Mirpur, Dhaka. Leaves and stem bark were each separately washed, wiped-dry, sun-dried, cut in to small pieces and subsequently reduced to coarse powder. 50 gm of each leaves and stem bark were separately extracted overnight with methanol with intermittent vigorous shaking. Each extract was filtered, concentrated with a rotary evaporator and dried over a water bath at 45°C. The residue from each plant part was used for phytochemical screening.

2.2. PHYTOCHEMICAL ANALYSIS

Methanolic extracts of each plant parts were used for preliminary phytochemical analysis using standard methods; alkaloids, saponins, flavonoids [29], anthraquinones [30] and tannins [31]. For the quantitative determination of some phytochemicals; the method of Bohm and Kocipai method [32] was used for flavonoids, while alkaloids, saponins and tannins were analyzed using that of Wasagu et al [33].

2.3. ELEMENTAL ANALYSIS

Elemental composition of each plant part was carried out on the ash sample obtained by the dry ashing method [34]. The ash sample from each plant part was quantitatively transferred to 500 cm³ beaker, using distilled water (100 cm³). Concentrated hydrochloric acid

(10 cm³) was added and the solution boiled for several minutes. After cooling, each solution was then diluted to 500 cm³ and then filtered. The resulting solution was used to measure the absorbance of elements analyzed using atomic absorption spectrophotometer, sodium and potassium was determined using a flame photometer.

3. RESULTS AND DISCUSSION

Table 1. Qualitative phytochemical screening of the leaves and stem bark of *Sida cordifolia*.

Phytochemicals	Leaves	Stem bark
Anthraquinones	+	+
Alkaloids	+	+
Tannins	+	+
Saponins	+	+
Flavonoids	+	+
Polyphenols	+	+
Glycosides	+	+

(+) detected

Table 2. Quantitative phytochemical constituents of *Sida cordifolia*.

Samples	Leaves	Stem bark
Alkaloids (g/100g)	10.5±0.71 ^a	4.75±0.21 ^b
Saponins (g/100g)	8.1±0.35 ^a	4.4±0.28 ^b
Flavonoids (g/100g)	19.3±0.57 ^a	12.4±1.57 ^b
Tannins (g/100g)	4.8±0.28 ^a	5.9±0.28 ^a

All values are means ±SD of four replicates. Values with different superscripts along a row are statistically different ($p < 0.05$).

Table 3. Elemental composition of the leaves and stem bark of *Sida cordifolia*.

Elements	Leaves	Stem bark
Copper (mg/100g)	0.48 ± 0.11 ^a	0.69 ± 0.10 ^a
Iron (mg/100g)	5.74 ± 0.17 ^a	5.51 ± 0.25 ^a
Manganese (mg/100g)	0.77 ± 0.24 ^a	0.88 ± 0.18 ^b
Lead (mg/100g)	0.07 ± 0.02 ^a	0.11 ± 0.03 ^a
Chromium (mg/100g)	1.45 ± 0.08 ^a	1.05 ± 0.11 ^b
Nickel (mg/100g)	3.99 ± 0.38 ^a	3.26 ± 0.25 ^a
Calcium (mg/100g)	88.72 ± 1.75 ^a	95.49 ± 1.76 ^a
Zinc (mg/100g)	11.04 ± 9.14 ^a	18.99 ± 8.01 ^a
Magnesium (mg/100g)	128.31 ± 0.61 ^a	45.29 ± 0.90 ^b
Sodium (mg/100g)	349.88 ± 87.72 ^a	273.16 ± 87.72 ^b
Potassium (mg/100g)	258.01 ± 19.90 ^a	119.82 ± 4.70 ^b

All values are means ±SD of four replicates. Values with different superscripts along a row are statistically different ($p < 0.05$).

Preliminary qualitative phytochemical screening of the leaves and stem bark of *Sida cordifolia* revealed the presence of anthraquinones, alkaloids, tannins, poly-phenols, glycosides, saponins and flavonoids in both the leaves and stem bark (Table 1). To further ascertain the preliminary result, a quantitative estimation of some phytochemicals were carried out, and the result showed that the leaves contents were significantly ($p < 0.05$) higher than that of stem bark. But the level of tannins did not differ significantly (Table 2). These active phytochemicals were known for their medicinal activity as well as exhibiting physiological actions, impact they confer the therapeutic potentials of medicinal plants. Alkaloids, saponins, and tannins have been reported to inhibit bacterial growth and to be protective to plants against fungal infections. Anthraquinones were reported to be used as a laxative [35].

Flavonoids were reported to suppress tumor growth and prevent blood clots [36]. Thus, the medicinal uses reported of *Sida cordifolia*; i.e., managing constipation, antimicrobial effects, antimalarial effect, may be attributed to the presence of these phytochemical constituents.

In addition to phytochemical composition, the elemental profile of medicinal plants is another important factor that determines the medicinal value of these plants. The levels of Mn, Cr, Mg, Na, and K (mg/100g) of *Sida cordifolia* (Table 3) leave differ significantly ($p < 0.05$) from that of stem bark, while Cu, Pb, Ca, Zn and Ni leaves contents did not differ significantly from that of the stem bark.

The need for supplementary diet rich in these minerals cannot be overemphasized, for many reasons; they play a vital role for man and other animals as curative and preventive agents in combating diseases, nutritive and catalytic disorders. They also help towards the catalytic activity of many enzymes and hormones.

Thus, intake of these elements should be such that their intake does not lead to any disturbance, as some clinical abnormalities were reported due to high level of some minerals. The result of this work corresponds to that reported by Smith [37].

4. CONCLUSION

In conclusion, the result of this study supports the fact that *Sida cordifolia* some active bio-components that have therapeutic potentials, and as well support the local uses of this plant. However, these local medicinal uses are subject to further scientific verification.

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