WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 7.523
Volume 6, Issue 8, 1012-1018. Research Article ISSN 2277–7105

EVALUATION OF PHYTOCHEMICAL CHARECTERIZATION AND PHYSIOCHEMICAL PROPERTIES OF *SALICORNIA BRACHIATA* L

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Article Received on
25 May 2017,

Revised on 14 June 2017,
Accepted on 04 July 2017

DOI: 10.20959/wjpr20178-8868

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ABSTRACT

Halophytes represent salt tolerant species that thrive in the inhospitable habitat of inland and coastal salt ecosystem and tolerate salinity by various physiological mechanisms. The aim of present study was to evaluate the phytochemical characterization and physiochemical properties of *Salicornia brachiata* L a natural halophytes. The shade dried sample of *Salicornia brachiata* L was subjected to a analytical process to determine the extractive values and various physiochemical properties such as foreign organic matter, loss on drying, total ash content, acid insoluble ash, water soluble ash and water soluble extractive. Further it is subjected to elemental analysis and quantitative estimation of phytoconstituents by using methanol petroleum ether and water extracts. The each extracts confirmed the presence of important active chemical constituents such as flavonoids, tannin, saponin, terpenoids and phenols are presented in the all extracts. In this study, a total of nine elements were determined in the halophytes. The content of Na (38.05%), K (3.65%), Ca (1.25%) and Mg (1.02%) were found in higher concentration respectively. The moderate level concentration of Phosphorus (0.21%) and Cl (0.58%) were noted. Overall the Na (38.05%) was present in high level concentration of *Salicornia brachiata.*

KEYWORDS: Halophytes, *Salicornia brachiata* L, phytochemical, elements, salt tolerant.

INTRODUCTION

Salt tolerant plants that grow in salt marshes, on beaches and among mangroves. The plants grow on coastal marshes are tolerant to varying saline concentration and have ability to

colonise areas characterized by regular food, shifting sedimentation patters and hydraulic power of waves. They grow in shallow gradients, mud flats, sloughs, seashores and drainage channels (Ksouri *et al.,* 2008). Once established a salt marsh may develop series of zones described as high marsh, middle marsh and low marsh. Marine halophytes provide good source of medicinal as well as natural health products or compounds by synthesis or secretion. These groups of plants provides large amount of antioxidants, phenol compounds, enzymes, bio molecules like carbohydrate content and some other biochemical compounds like free amino acids, phytochemical set in terms of reducing the saline stress. Phenolic compounds are synthesized via phenyl propanoid pathway and play a defence mechanism against biotic and abiotic stress. These molecules are widely distributed in leaves, stems, seeds and fruits of many edible plants.

Marine plants have demonstrated antibacterial, antifungal and antioxidant activity reported by several authors (Burits *et al.,* 2001). Coastal medicinal plants also engage in recreation to treat diabetes, particularly where most people have limited resources and do not have access to modern treatment (Ramanathan, 2000). Several species of *Salicornia* possess antibacterial and antihypertensive properties and are quoted in folk medicine for relief of toothache and chronic rheumatism (Rizk, 1986), constipation, obesity, diabetes and cancer. Leaves and stems of *Suaeda monoica* was used for antiviral, antidiabetic and toothache (Revathi *et al.,* 2015).

S*alicornia* recently receive more attention for its effectiveness on hypertension, heat diseases, cardiovascular diseases, diabetes and constipation like organic disorders or improper diet. Of particular interest with respect to its potential for exploitation, significant salt accumulating properties, indeed the vacuole can tolerate 500-600 mM salts (Maathuis *et al.,* 1992). The current research focused on *Salicornia brachiata* L, which is annual halophyte that has the distinctive feature in that it succeeds in both coastal and inland salt marshes. It is found through Europe on most sea coasts and many inland saline marshes. It is also widespread across Russia, East Asia and South India and has recently been recorded in the Americas and Australia. However, in the UK it is found only in coastal salt marshes (Yeo and Flowers, 1977). Thus the present study focuses on the evaluation of phytochemical characterization and physic chemical properties from *Salicornia brachiata* L.

MATERIALS AND MEETHODS

Collection of Plant

Salicornia brachiata L was collected from coastal area of Nagapattinam, Tamil Nadu, and India. The plant material air dried and made to coarse powder using mixer grinder.

Preparation of plant extract

Coarse powders (50 g) of plant was extracted with sufficient quantity of methanol, petroleum ether and water for 48 h by maceration and then filtered to obtain respective extracts. Which was used for further experiments (Udhaya Prakash *et al.,* 2012).

Preliminary Phytochemical analysis

The preliminary qualitative phytochemical investigation of *Salicornia brachiata* extract in different solvents was performed to detect the phytoconstituents such as Flavonoids, Tannins, Steroids, Saponins, Cardiac glycoside, Phlobatannins, Alkaloids, Terpenoids and Phenols was performed by the standard procedure as described by Trease and Evans 1989, Harborne, 1973.

Physicochemical analysis

The shade dried *Salicornia brachiata* was subjected for determination of physicochemical parameters such as foreign organic matter, loss on drying, total ash content, acid insoluble ash, water soluble ash, alcohol soluble extractives and water soluble extractives, according to methods described in Indian Pharmacopoeia and WHO guidelines on quality control methods for medicinal plants materials.

Elemental analysis

The content of minerals in the *Salicornia brachiata* was measured using by atomic adsorption spectrophotometer (AAS) for Ca, K, Mg, and Na. Inductively coupled plasma atomic emission spectrometer (ICP-AES) was used for determination of Cu, Fe and Zn. Gravimetric method for P and chloride analyzer used for Cl analyses.

RESULTS AND DISCUSSION

Phytochemical analysis

Preliminary phytochemical tests of *Salicornia brachiata* was done by using methanol, petroleum ether and water. The each extracts confirmed the presence of important active chemical constituents such as flavonoids, tannin, saponin, terpenoids and phenols are

presented in the all extracts. The steroids, alkaloids and phlobatannins are presented in the methanol extract only and cardiac glycoside was absent in all the extracts. The results of the phytochemical analysis are compiled in Table.1. Phytomedicine has been used for the treatment of chronic diseases. Phenolic compounds have been reported to be potential free radical scavengers (Chao *et al.*, 2002). The plant rich in tannins have significant activity in cancer prevention and are used in treating intestinal disorders (Dharmananda. 2003). Flavonoids are known to possess a wide range of biological activities such as antioxidant, antimicrobial, anti-inflammatory and anticancer activities (Anyasor *et al.*, 2010). Lekshmanan (2013) reported that *S.monoica* and *S.portulacastrum* leaves possess some important primary and secondary metabolities viz., protein, resin, tannin, glycosides, cardiac glycoside, terpenoids, phenol, flavonoids, acidic compounds. Alkaloids and saponin are absent in both the species.

Physicochemical characteristics

The physicochemical parameters including foreign organic matter, loss on drying, total ash content, acid insoluble ash, water soluble ash, alcohol soluble extractives and water soluble extractives values were carried out (Table.2). Foreign organic matters were found be 0.54%. Total ash value was noted in 8.54% and followed by water soluble ash value 5.84%. High water soluble extractive value noted in 36.5% followed by alcohol soluble extractive value (18.7%). Loss on drying turned out to be 8.5 and 1.5 % in wet and dry condition respectively. The physicochemical parameters are support in determining the purity and quality of the drug. The physicochemical proximate composition studies exhibited the composition of water soluble and acid soluble ash contents and extraction percentage. As ash value is useful in determining authenticity and purity of drugs and also these values are important quantitative standards.

Elemental analysis

Regarding the composition of elements in the *Salicornia brachiata* (Table.3), the content of Na (38.05%), K (3.65%), Ca (1.25%) and Mg (1.02%) were found in higher concentration respectively. Major concentration of Na (38.05%) was noted compare to other minerals. The moderate level concentration of Phosphorus (0.21%) and Cl (0.58%) were noted. The trace elements Fe, Zn and Cu were found to be 0.025, 0.015 and 0.004 ppm respectively. Trace elements play an important role in the formation of active constituents responsible for the therapeutic properties. In previous study the concentration of most elements in leaves and

root of *Phragmites australis* are higher compared to our results (Baldantoni *et al.*, 2009). Ohlson (1988) studied the content of Al, Ca, Cu, Fe, K, Na, Mg, Mn, Mo, Zn in eleven plants from the mires of central and north Sweden, and he found that the largest variation in elemental concentration of roots and leaves was observed in Carex rostra . He also reported that the concentration of K in tissues of Carex species was highly correlated with its concentration in the substrate. The concentrations of chemical elements in aquatic plants can be more than 100,000 times higher than in the associated water (Albers and Camardese. 1993).

Table 1: Preliminary phytochemical analysis of different extracts of *Salicornia brachiate.*

S.No	Phytochemical	Extracts		
		Methanol	Petroleum ether	Water
1	Flavonoids	Present	Present	Present
2	Alkaloids	Present	Absent	Absent
3	Tannin	Present	Present	Present
4	Steroid	Present	Absent	Absent
5	Saponins	Present	Present	Present
6	Terpenoids	Present	Present	Present
7	Phlobatannins	Present	Absent	Absent
8	Cardiac glycoside	Absent	Absent	Absent
9	Phenols	Present	Present	Present

Table 2: The physicochemical analysis of *Salicornia brachiate.*

S.No	Parameters	Value (gm %)
1	Foreign Organic matter	0.54
2	Total ash	8.54
3	Acid insoluble ash	0.65
4	Water soluble ash	5.84
5	Alcohol soluble extractive	18.7
6	Water soluble extractive	36.5
7	Loss on drying On wet basis On dry basis	 8.5 1.5

Table 3: Elemental composition of *Salicornia brachiate.*

S.No	Elements	Concentration (%)
1	Calcium (Ca)	1.25
2	Potassium (K)	3.65
3	Magnesium (Mg)	1.02
4	Sodium (Na)	38.05
5	Phosphorus (P)	0.21
6	Chlorine (Cl)	0.58

7	Iron (Fe)	0.025 ppm
8	Copper (Cu)	0.004 ppm
9	Zinc (Zn)	0.015 ppm

CONCLUSION

The present analytical study was carried to detect the physicochemical parameters followed by preliminary phytochemical characteristics and elemental analysis from *S. brachiata*. The majority of phyoconstituents found to be in the metahnolic extracts of *S.brachiata*. The present study concluded that the marine halophytes S. brachiata have the very potential phytoconstituents and minerals. So it is very important role in the formation of active constituents responsible for the therapeutic properties. Further studies are crucial towards isolation, identification and characterization of bioactive compounds of industrial importance.

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