

Study of nutritive value and preliminary phytochemical screening of the leaf extract of *Ficus nervosa* Heyne ex Roth, a lesser known medicinal plant

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ABSTRACT

The present study was undertaken to evaluate the nutritive value and phytochemical constituents in the leaf extract of *Ficus nervosa* Heyne ex Roth, which is traditionally used as a medicinal plant. A preliminary phytochemical analysis was carried out and concluded the presence of various phytochemicals. Biochemical estimation of total carbohydrate, protein, free amino acid, lipid, ascorbic acid, Vitamin E, crude fiber, alkaloids, flavonoids, and phenols were performed by standard procedures. The nutritive value (Kcal/100 g) was found to be 90.6 Kcal/100 g. Phytochemical studies indicated that the leaf contains a broad spectrum of secondary metabolites and presence of these medicinally important bioactive compounds justifies their use in the traditional medicines for the treatment of different diseases.

KEY WORDS: *Ficus nervosa*, leaf extract, phytochemical, screening

INTRODUCTION

North-East (NE) region of India is a rich source of biodiversity which includes the high potential of naturally occurring medicinal plants. It is one of the biodiversity hot spot of the world supporting about 50% India's biodiversity. The states of NE region are mostly hilly with varying climate and forest vegetation zone which contains varying types of medicinal plants. The wild plants are used by many indigenous tribal communities in this region, still more are unexplored.

Since the beginning of human civilization, medicinal plants have been used by mankind for its therapeutic value. Nature has been a source of medicinal agents for thousands of years, and an impressive number of modern drugs have been isolated from natural sources. Many of these isolations were based on the uses of the agents in traditional medicine. Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body, and these

chemical substances are called phytochemicals. These are non-nutritive chemicals that have protective or disease preventive property. The most important of these phytochemicals are alkaloids, flavonoids, tannins, and phenolic compounds [1]. Many of these indigenous plants are used as food plants. The demand for natural food and vegetable is rising day-by-day. So, it becomes important to study the nutritive value of such plants, which are traditionally used by many tribal communities. Moreover, it is found that most of the microbes become resistant against the available antibiotics and also that these chemicals may cause some side effects in human; it become important to determine the new source of antibiotics with more effectiveness.

The knowledge of the chemical constituents of the plant would be valuable in discovering the actual value of folkloric remedies [2]. Many efforts have been made to discover new antimicrobial compounds from various kinds of sources such as micro-organisms, animals, and plants. One of such resources is folk medicines. Systematic screening of them may result in the discovery of novel effective compounds [3]. The increasing prevalence of

multidrug-resistant strains of bacteria and the recent appearance of strains with reduced susceptibility to antibiotics raises the specter of untreatable bacterial infections and adds urgency to the search for new infection-fighting strategies [4].

The plant selected is used by local ethnic communities for food as well as various medicinal purposes. This is a wild plant, easily available and no systematic study has been carried out on these. So, an attempt has been made, aimed to provide a scientific basis for their traditional use in ethnomedicine and to preserve the traditional knowledge on the scientific ground.

MATERIALS AND METHODS

The fresh and disease free plant leaf specimens collected from Dibrugarh and other nearby region were washed in running tap water, dried under the sun then crushed in a mortar and pestle and were subjected to various biochemical analysis. The moisture content was determined by taking the fresh plant samples in Petri dishes and kept overnight in an air oven at 100-110°C until they attained a constant weight. The loss in weight was regarded as a measure of moisture content (Indrayan *et al.*, 2005) [5]. Qualitative analysis of carbohydrates, protein, steroids, and terpenoids was done by the method of Sujatha *et al.*, 2011 [6]. Qualitative analysis of amino acids was done by the method of Jacob, Shenbagaraman, 2011 [7]. The presence of phytochemicals viz. alkaloids, flavonoids, tannins, phenol, and saponins were tested following the method of Tyler and Herbalgram, 1994; Harborne, 1973 [8,9]. The total carbohydrate content was estimated by anthrone method (Sadasivam and Manickam, 1996) [10]. Total protein was estimated by Lowry's method (Lowry *et al.*, 1951) [11]. The lipid was determined by extracting the sample with chloroform:methanol (2:1) following the method of Folch (Folch *et al.*, 1957; Unni *et al.*, 1996) [12,13]. Quantitative estimation of amino acid: Sadasivam and Manickam (2003) [9]. Quantitative estimation of Vitamin C by Folin phenol reagent method (Jagota *et al.*, 1982) [14]. Quantitative estimation of Vitamin E by spectrophotometric method (Prieto, *et al.* 1999) [15]. Quantitative estimation of alkaloids by Daniel's method [16], estimation of phenolics was done following Folin–Cicalteu reagent method [17], estimation of flavonoid by aluminum chloride colourimetric method [18] and estimation of saponins following the method of Krishnaiah *et al.* [19].

Crude fiber was calculated by the following formula [9]:

$$\text{Crude fiber (\%)} = \frac{\left(\text{Loss in weight on ignition} \right)}{\text{Weight of the sample}} = \frac{(W2 - W1) - (W3 - W1)}{\text{Weight of the sample}}$$

Where,

W1 = Weight of ashing dish

W2 = Weight of sample after drying at $139 \pm 15^\circ\text{C}$

W3 = Weight of sample after drying at $600 \pm 15^\circ\text{C}$.

The nutritive value was finally determined by the formula:

Nutritive value = $4 \times \text{percentage of protein} + 9 \times \text{percentage of fat} + 4 \times \text{percentage of carbohydrate}$ (Indrayan *et al.*, 2005) [5].

RESULTS AND DISCUSSION

Results of phytochemical screening of leaf extracts of *Ficus nervosa* Heyne ex Roth are given in Table 1. The results of the percentage of various biochemical constituents are presented in Table 2.

Good nutrition is often a major problem in most developing countries of the world, and consequently the case of under nutrition is increasing in these countries, so be able to reduces the adverse effect of under nutrition it is pertinent that some lesser known source are investigated for their nutritive value. The main goal of this study was thus to determine the content of certain essential nutrients in the plant sample which is consumed by certain tribes of this region. The nutritive value (Kcal/100 g) was found to be 90.6 Kcal/100 g. The overall data presented were supported the conclusion that these vegetable source represent a useful dietary source.

Plants such as vegetables and fruit have satisfactory edible protein with high quantity so that we can use them in the food industry and as nutrition. The total protein and nitrogen is related to albumins, globulin, free amino acid, peptides, and other nitrogen compounds. The protein that contain essential amino acid has high nutritional value, therefore, are suitable for consumption. The level of dietary fiber is quits high in the leaves. The presence of high fiber in the diet can cause intestinal irritation, lower digestibility, and overall decreased nutrient utilization (Oyenuga and Fetuga 1975) [20]. However, the dietary fiber plays an important role in decreasing the risk of many disorders such as constipation, diabetes, cardiovascular diseases, and obesity. Vitamin C (Ascorbic a) is soluble in water but insoluble in fat. It is one of the important biological redox systems; since it can be oxidized

Table 1: Results of phytochemical screening of leaf extracts of *Ficus nervosa* Heyne ex Roth

Bioactive compounds	Carbohydrates	Protein	Amino acids	Steroids	Terpenoids	Alkaloids	Flavonoids	Tannins	Saponins	Phenol
Presence (+) or Absence (-)	+	+	+	+	+	+	+	+	+	+

Table 2: The results of the percentage of various biochemical constituents in leaf extracts of *Ficus nervosa* Heyne ex Roth

Constituents	Amount present mg/g wt	Percentage
Protein	38.64±0.0095	3.84
Carbohydrate	51.3±0.0084	5.13
Lipid	68±0.0065	6.8
Amino acid	0.990±0.0095	0.09
Vitamin C	23.22±0.0095	2.3
Crude fiber	308±0.0080	30.8
Vitamin E	52.33±0.0104	5.23
Alkaloids	36.4±0.0093	3.6
Phenolics	4.21±0.0030	0.42
Flavonoids	0.868±0.0025	0.08

reversibly to dehydroascorbic acid. Chemically it is a hexose derivative. Vitamin deficiency causes scurvy. The presence of Vitamin C in moderate amount shows that these leafs may be used as a source of Vitamin C. Vitamin C is beneficial in preventing gastric cancer by its ability to neutralize nitrosamines. Plant leaf extract is found to have 5.23% Vitamin E. Vitamin E is an antioxidant.

The presence of an antimicrobial substance in plants is well-established (Srinivasan 2001) [21]. Phytochemical analysis conducted on the plant extracts revealed the presence of constituents such as alkaloids, phenols, flavonoids, and saponins, which are known to exhibit medicinal as well as physiological activities [22]. Flavonoids are hydroxylated phenolic substances known to be synthesized by plants in response to microbial infection, and they have been found to be antimicrobial substances against a wide array of microorganisms *in vitro*. Their activity is probably due to their ability to complex with extracellular and soluble proteins and to complex with bacterial cell wall [23]. Alkaloids have been associated with medicinal uses for centuries, and one of their common biological properties is their cytotoxicity [24]. Several workers have reported the analgesic [9,25], antispasmodic, and antibacterial [26,27] properties of alkaloids. Plants have provided a source of investigation for novel drug compounds as plant-derived medicines have made a significant contribution toward human health. Phytomedicine can be used for the treatment of disease as is done in a case of Unani and Ayurvedic system of medicine or it can be the base for the development of a drug.

CONCLUSION

The uses of medicinal plants are well-known to the people of NE India. In our study, we tried to find out

the biochemical constituents and nutritive value of the folk medicinal plants so that the nutritive supplements could be made from these plants. Overall data presented herein support the conclusion that both the plants as vegetable represent useful dietary source. The preliminary photochemical screening of the plants for secondary metabolites and shows that it may be a potent source of the useful drug.

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