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Preliminary phytochemical studies on ethyl acetate extract of *Terminalia arjuna* root

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Abstract

The aim of the present study is to evaluate the effect of ethyl acetate extract of *Terminalia arjuna* root. To cure human diseases, medicinal plants have been a major source of therapeutic agents since ancient time. *Terminalia arjuna* is one kind of widely used medicinal plant throughout India. This plant has been reported to contain active constituents including flavanoids, Alkaloid, Carbohydrate, Steroid, Tannins, phenols, Saponin, Protein, amino acids, calcium, magnesium, zinc, copper etc. which proved to be effective pharmacological test. The present study is therefore an effort to give detailed information on phytochemical studies of *T. arjuna* root.

Keywords: *Terminalia arjuna* root, Phytochemicals evaluations, FT-IR

1. Introduction

Since ancient times, people have been exploring the nature particularly plants in search of new drugs. This has resulted in the use of large number of medicinal plants with curative properties to treat various diseases (Verpoorte R., 1998) [2]. Medicinal plants are the richest bio-resources of folk medicine, traditional system of medicines, food supplements, nutraceuticals, pharmaceutical industries and chemical entities for synthetic drugs (N Cube NS *et al.*, 2008) [1]. Modern medicine has evolved from folk medicine and traditional systems, only after through chemical and pharmaceutical screening (Boopathi CA *et al.*, 2011) [3]. According to the present scenario it is estimated that 40% of the world populations depends directly on plant based medicine for their health care (Patwardhan B *et al.*, 2004) [4]. India is the birth place of renewed system of indigenous medicine such as Unani, Ayurveda, Homeopathy and Siddha. Traditional systems of medicine are prepared from a single plant or combinations of number of plants, the efficacy depends on the use of proper plant part and its biological potency which in turn depends upon the presence of required quantity and nature of secondary metabolites in raw drug (Vinoth S and Savithramma N *et al.*, 2011) [5].

Plant materials are used for the treatment of malignant diseases for centuries. Recent phytochemical examination of plants which have a suitable history of use in folklore for the treatment of cancer had induced often resulted in the isolation of principles with anti-tumour activity. An intensive survey of plants, microorganism and marine animals for anti-tumour activity began in the later 1905s mainly because the United States National Cancer Institute instigated and fund a major screening programme. Random selection screening programme was adopted, since novel compounds may be found anywhere from plant or animal kingdom. In recent years, there has been an increasing awareness about medicinal plants. This is because they are easily available less expensive and has least side effects. The modern chemical analysis of plants does not reveal the true nature of the drugs ultimately leading to deleterious effects on plant. Even if all the details on prescription and preparation are known, success will be severely hindered, in the identity of the medicinal plants is not correct. Thus correct identification and authentication based on accepted scientific criteria are of almost importance in any study on medicinal plants (Gupta, *et al.*, 1985). Pharmacognosy is one method for correctly determining the botanical identify of the dry sample.

Phytochemicals are the natural bioactive compound found in plants these phytochemicals act as a defense system against diseases of more accurately to protect against diseases (Krishnaiah *et al.*, 2009). This study was under taken for phytochemical analysis for anticancer activity. Here are several Indian medicinal plants known for their beneficial

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therapeutic effects which also might have antioxidant properties. *Terminalia arjuna* is one of these plants credited from its cardiostimulant and cardioprotective properties. The bark of the tree is used in 'Ayurvedic' system of medicines for over three centuries, primarily as cardiac tonic besides cure for haemorrhages, fractures, diarrhea, ulcers and acne (Kirtikar and Basu, 1984). It has also been known to possess anti-mutagenic, anti-ischemic, hypocholesterolemic, cardioprotective, and anti-oxidant abilities.

Flavonoids are important phytochemicals in plants. They act as antioxidant, hepatoprotective and anticarcinogenic agent in many parts of the body. So now day's flavonoids compounds are used as hemotherapeutic agent in medicinal field.

Aim of the study: To analysis qualitative and quantitative phytochemicals in *Terminalia arjuna* root.

Materials and methods

Plant materials collection

Terminalia arjuna roots were collected from Lagoon area of Muthupet, Thiruvavur district during the period of September – 2014 to October – 2014.

Preparation of Plant material

Terminalia Arjuna plant root was collected from Lagoon area of Muthupet, Thiruvavur district and cut into small piece dried under the shed for 3 weeks at room temperature. The plant was shaded and dried for grinding to get crude powder.

Preparation of plant extract using Soxhlet apparatus:

10 g of crude powdered drug were taken and shifted into filter paper thimble. 250 ml of Ethyl acetate (70%) were poured into round bottom flask (1000 ml capacity) followed by fitting in on Soxhlet apparatus. The powdered drug was extracted with Ethyl acetate for 24 hours. A semisolid extract was obtained after completed elimination of ethyl acetate under reduced pressure. The extract was stored in refrigerator until use.

Extraction of flavonoids

Fatty constituents from *Terminalia arjuna* root powdered drug were extracted with ethyl acetate by Soxhlet extraction. About three and half hour was taken to extract all fatty constituents and solvent became colorless and the solvent was then evaporated under vacuum and the extract was diluted with double distilled water and volume was made 100 ml in volumetric flask.

Phytochemical Analysis

The ethyl acetate extract of *Terminalia arjuna* root powdered drug was tested for the presence of various phytochemical constituents such as flavonoids, phenolic compounds, protein, Carbohydrate, tannin, alkaloid, steroids, calcium and Magnesium. All phytochemicals test were done as per the procedure given in the standard books.

Result

Table 1: Qualitative Phytochemical analysis of *Terminalia arjuna* root

S. No.	Name of the compound	Name of the test	Colour	<i>Terminalia arjuna</i> root
1.	Steroid	Salkowski's test	Red	++
2.	Flavanoids	Ferric chloride test	Magenta Red	+++
3.	Alkaloid	Mayer's test	Yellow ppt	++
4.	Carbohydrate	a) Molisch's test	Blue	+++
		b) Iodine test for starch	Blue	+++
5.	Tannin and phenols	Ferric chloride test	Blue	++++
6.	Saponin	Foam test	Foam	trace
7.	Protein & amino acids	(a) Biuret test	Purple	++++
		(b) Xanthoprotein test	Yellow to orange	++

(+) indicates the presence of compound

Number of (+) indicates concentration of the substances.

Table 2: Quantitative Phytochemical analysis on *Terminalia arjuna* root

S. No	Parameters	Percentage Values in <i>Terminalia arjuna</i> roots
1	Phenol mg/g	0.92%
2	Tannin mg/g	0.8%
3	Alkaloid µg/g	0.043%
4	Flavanoid µg/g	0.080%
5	Protein g/g	26
6	Calcium mg/g	1.42%
7	Magnesium µg/g	1.80%
8	Carbohydrate g/g	41%



Fig 1: the plant *Terminalia arjuna* root

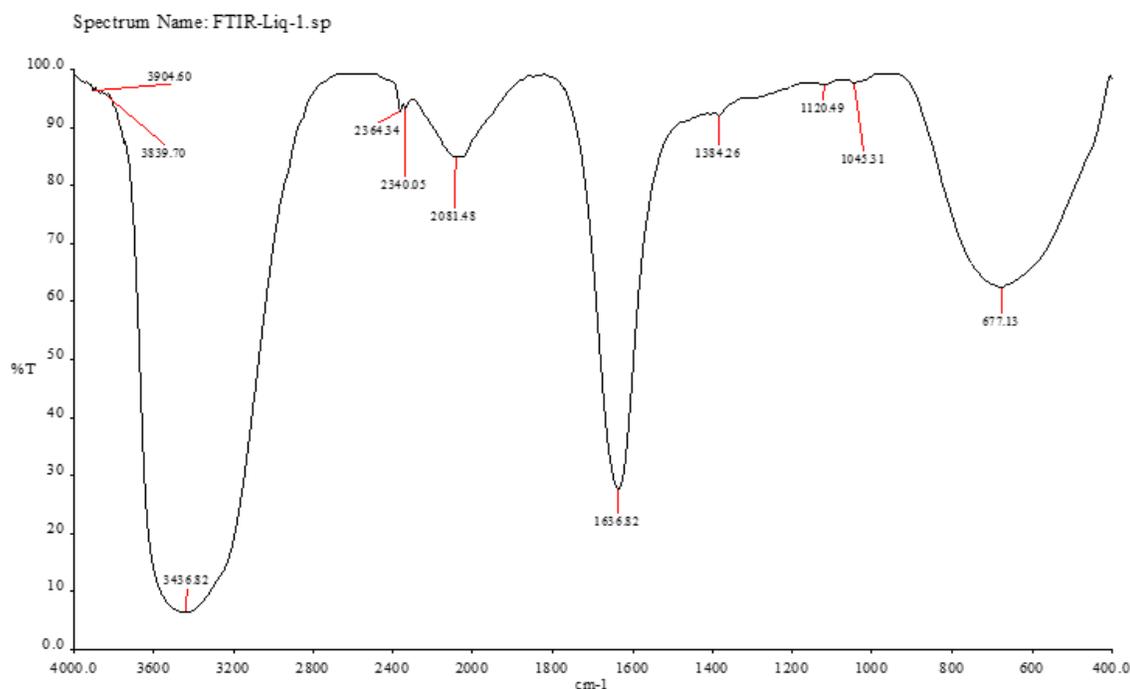


Fig 2: FT-IR spectrum of *Terminalia arjuna* root extract

The FT-IR spectrum of the ethyl acetate extract of *Terminalia arjuna* root were recorded the number of peaks lying between 3904.60cm⁻¹, 3839.70cm⁻¹, 3436.82 cm⁻¹, 2364.34 cm⁻¹, 2340.05 cm⁻¹, 2081.48cm⁻¹, 1636.82 cm⁻¹, 1384.26 cm⁻¹, 1120.49 cm⁻¹, 1045.31 cm⁻¹ and 677.13 cm⁻¹ respectively. The FT- IR analysis of *Terminalia arjuna* root extract was done and the functional groups associated were determined. This finding will help in further research in the investigation of medicinally active chemical compounds present in *Terminalia arjuna* root.

Summary and Conclusion

Qualitative and Quantitative phytochemical analysis confirmed that the ethyl acetate extract of *Terminalia arjuna* root had rich content of all phytochemicals specially phenol, flavonoid and Carbohydrate. Most of the bioactive compounds having antioxidant activity such as polyphenolic and phenol compounds. Further structural analysis of *Terminalia arjuna* root (flavonoid fraction) can be carried out by making use of different analytical methods such as NMR and Mass spectroscopic analysis.

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