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(Research Article)

Preliminary Phytochemical Evaluation and Flavanoids Quantification of *Terminalia arjuna* Leaves Extract

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ABSTRACT

Arjuna (Terminalia arjuna) is a widespread medicinal plant used in the Ayurvedic system of medicine to care for various ailments and is one of the active ingredients in numerous polyherbal hepatoprotective formulations used in India. Its stem, bark and leaves possess glycosides, large quantities of flavonoids, tannins and minerals. Flavonoids have been found to possess antioxidant, anti-inflammatory and lipid lowering effects whereas glycosides are cardioprotective, therefore making *Terminalia arjuna* distinctive amongst currently used medicinal plants. The present investigation was aimed at Preliminary phytochemical evaluation, Flavonoids quantification and FTIR analysis of hydroalcoholic extract of *Terminalia arjuna* leaves.

Key Words: FTIR, Arjuna, Flavonoids, Phytochemical evaluation.

INTRODUCTION

The Indian system of Medicine owes its origin^{1, 2}. *Terminalia arjuna* (Fig.1) (Combretaceae) is a good hypocholesteremic, hypolipidemic, anticoagulant, antihypertensive, antithrombotic, antiviral, antifungal and antibacterial agent. Many useful phytoconstituents have been isolated from *Terminalia arjuna* which includes, triterpenoids for cardiovascular properties, tannins and flavonoids for its anticancer properties, and so on. The bark, leaves and fruits of *Terminalia arjuna* have been used in indigenous system of medicine for different ailments³. *Terminalia arjuna* bark contains a very high level of flavonoids compared to other commonly used plant item. Flavonoids detected from its bark are namely, arjunolone, flavones, bicalcin, quercetin, kempferol and pelargonidin⁴. Medicinal plants are the oldest existing complete medical system in the world. And now green-chemistry move toward has demonstrated to be a dexterous and speedy tool for natural drug development. Natural products are important sources for biologically active drugs⁵. There has been an growing interest in the study of medicinal

plants as natural products in diverse parts of the world⁶. Medicinal plants containing active chemical constituents with high antioxidant property play an important role in the prevention of various degenerative diseases⁷ and have possible benefits to the humanity. Phenolics are commonly found in medicinal plants and have been reported to have multiple biological effects, including antioxidant activity. The present investigation was aimed at Preliminary phytochemical evaluation, Flavonoid quantification and FTIR analysis of hydroalcoholic extract of *Terminalia arjuna* leaves.

MATERIALS AND METHODS

Plant Material Collection

Terminalia arjuna leaves (CMBT Plant library Herbarium code No. 11) of plants were collected from Sanjivani Ayurvedic Nursery, Bhopal during October month. Leaves were dried under the shed for three week and then powdered.

Soxhlet Extraction

Soxhlet extraction is only required where the desired compound has a limited solubility in a solvent, and the impurity is insoluble in that solvent. *Terminalia arjuna* leaves were extracted in Soxhlet Apparatus using Hydroalcoholic solvent (1:1).

Phytochemical Analysis

The hydroalcoholic extract of *Terminalia arjuna* leaves was tested for the presence of various phytoconstituents such as Carbohydrate, Starch, Protein, Aminoacids, Steroids, Flavanoids, Alkaloids, Tannins, Phenolic Compounds, oxalic acid and inorganic compounds. All phytochemical tests were done as per the procedure given in the standard book (Practical Pharmacognocny by C.K. Kokate). The FT-IR analysis of the *Terminalia arjuna* leaves extract was done and the functional groups associated were determined.

Spectrophotometric Determination of Total Flavanoid Contents

Total flavanoid contents were measured by Aluminum chloride colorimetric assay. Hydroalcoholic extracts that has been adjusted to come under the linearity range and different dilution of standard solution of Quercetin (10-100 μ g/ml) were added to 3ml of water. To the above mixture, 0.1ml of 5% C₄H₄O₆KNa.4H₂O (Potassium Sodium L-(+)-Tartrate Tetrahydrate) was added. After 5 minutes, 0.1ml of 10% AlCl₃ was added and the total volume was made up to 3 ml with distill water. It was left at room temperature for 30 min after which the absorbance of the reaction mixture was measured at 430nm with a single beam spectrophotometer (Systronic)⁸. The concentration of flavanoids in the sample was calculated from the calibration plot and expressed as mg Quercetin equivalent per g of sample.

RESULT AND DISCUSSION

Phytochemical Evaluation

The results of preliminary phytochemical evaluation are summarised in Table-1.

FT-IR Spectral Analysis

The FT-IR spectrum (Fig.2) of the *Terminalia arjuna* leaves extract recorded the number of peaks lying between 3350.73 cm⁻¹, 2959.08 cm⁻¹, 2933.51 cm⁻¹, 2873.98 cm⁻¹, 1714.36cm⁻¹, 1457.89 cm⁻¹, 1378.43cm⁻¹, 1210.83cm⁻¹, 1113.18 cm⁻¹, 1070.84 cm⁻¹, 1041.56 cm⁻¹, 1028.36 cm⁻¹, 1009.84 cm⁻¹ respectively. This finding will help in further research in the investigation of medicinally active chemical compounds present in *Terminalia arjuna* leaves.

Flavanoids Quantitation

Calibration curve was plotted by preparing the Quercetin standard solutions at of various concentration and taking its absorbance {Fig.3, y=0.002x+0.0148, R² =0.993}. Total flavanoid content of the extract was found to be 4.35 μ g/ml equivalents per dry weight of sample.

CONCLUSION

In the present time herbal products are considered to be symbols of protection in comparison to the synthetic product that are regarded as risky to human life and environment. Some Medicinal plants have therapeutic potential due to the presence of natural antioxidants functioning as reducing agents, free radical scavengers and quenchers of singlet oxygen. Majority of their antioxidant activity is due to bioactive compounds viz. phenolic and polyphenolic compound. The present literature supports the potential of *Terminalia arjuna* leaves. More research can be done to investigate the unknown and unexplored potential of this plant. Further structural analysis of *Terminalia arjuna* leaves (flavanoid compounds) can be carried out by making use of different analytical methods such as NMR and Mass spectrophotometer analysis.

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Table -1:Preliminary Phytochemical Tests

Sr.No.	Phytoconstituent	Test	Result
1	Carbohydrate	Molish Test	+VE
2	Starch	Iodine	-VE
4	Protein	Millons Test	+VE
5	Amino-acid	Cysteine Test	+VE
6	Steroid	Salkowski Test	+VE
7	Flavanoids	Ferric Chloride Test	+VE
8	Alkaloids	Mayers Test	+VE
9	Tannins and Phenolic compounds	5% FeCl ₃ Test	+VE
10	Oxalic acid	Calcium Chloride	+VE
11	Inorganic Acid	Sulphate Test	+VE

+VE = Positive, -VE = Negative



Scientific classification:

Kingdom: Plantae
 Division: Magnoliophyta
 Class: Magnoliopsida;
 Order: Myrtales;
 Family: Combretaceae;
 Genus: Terminalia;

Fig.1: Terminalia arjuna Plant and its scientific classification

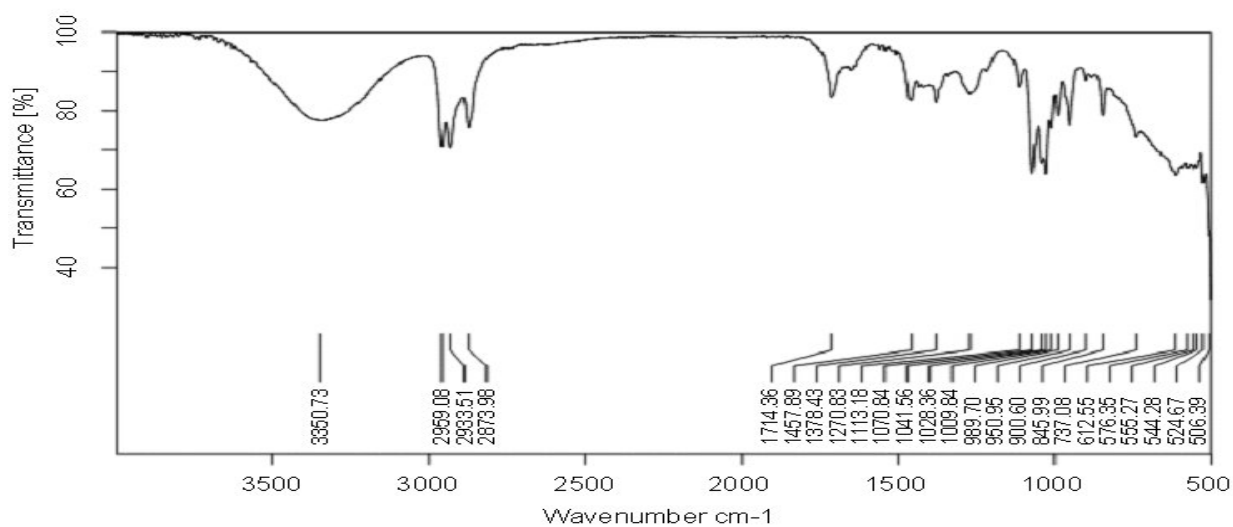


Fig. 2: FTIR Spectrum of Terminalia arjuna leaves extract

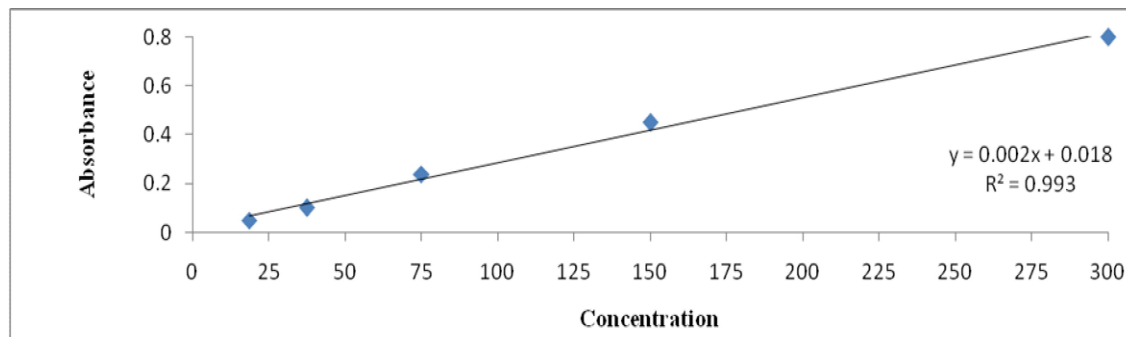


Fig .3: Calibration Curve

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