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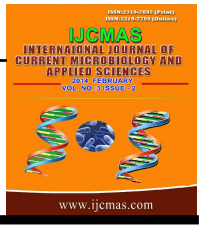

Original Research Article

Study on medicinal plant *Teminalia chebula* collected from Sathyamangalam wildlife sanctuary

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A B S T R A C T

India is one of the foremost biodiversity countries of the World having gorgeous vegetation with a wide variety of plants with medicinal value. In several countries, scientific investigations of medicinal plants have been initiated because of their contribution to healthcare. Herbal medicines have good values in treating many diseases including infectious diseases and non-infectious diseases. That they can save lives of many, particularly in the developing countries, is undisputable. Rural communities, in particular paliyar tribes, depend on plant resources mainly for herbal medicines, food, forage, construction of dwellings, making household implements, sleeping mats, and for fire and shade. Rural people not only depend on wild plants as sources of food, medicine, fodder and fuel, but have also developed methods of resource management, which may be fundamental to the conservation of some of the world's important habitats. Phytochemical are naturally present in the plants and shows biologically significance by playing an essential role in the plants to defend themselves against various pathogenic microbes by showing the antimicrobial activity by inhibition or killing mechanisms. The secretion of these compounds is varying from plant to plant some produce more and some produce in minimal quantity. The present study was focused to find out the reasonable studies on photochemical analysis of *Terminalia chebula* plant extracts of leaves, fruits, seed, stem and roots. The phenol content was maximum in roots (85.79mg/gdw) followed by seed leave, stem and fruit. The sugar content was highest in leaves (9.34mg/gdw) followed by fruits, stem, root and seed. The protein content was maximum in fruits (65.48mg/gdw) followed by seeds leaves, stem and root.

Keywords

Quantitive analysis; Western ghat; Sathya-mangalam; *Terminalia chebula.*

Introduction

Sathyamangalam Wildlife Sanctuary (SWS) is a protected area in south India, declared in 2008 and enlarged in 2011, which covers forest area of 1,411.6km^2 (545.0 sq mi). This sanctuary is significant as wild life corridor in the Nilgiris biosphere Reserve between the Western Ghats and the Eastern Ghats a genetic link

between the four other protected areas which it adjoins, including the Biligirnaga samy temple wildlife sanctuary, sigur plateau, Madumalai national park and Bandipur National park (Aravind, 2011). This sanctuary covers Sathyamangalam taulk and parts of Gobichettipalayam Taulk of Erode District in the north western Tamil Nadu. Conservation of the Sathyamangalam Forest Division is administered by the Tamil Nadu Forest Department Conservator of Forests, Erode Circle and the Deputy conserve of forest, Gobichettipalayam Forest District (Sundaradevan, 2008). One of the most significant medicinal plants, which are widely used in the traditional system of medicine, is *Terminalia chebula* (Mitalays et al., 2003). This initiative the need to monitor medicinal plants for novel bioactive compounds as plant based drugs is biodegradable and safe (Sandhya et al., 2006). A natural product plays a vital role in the field of new drugs research and development because of their low toxicity, easy availability and cost effective (Ahmad et al., 1989). The primary metabolite like chlorophyll, amino acids, nucleotides, simple carbohydrates or membrane lipids, play recognized roles in photosynthesis, respiration, solute transport, translocation, nutrient assimilation and differentiation (Patrick 2002). Secondary metabolites are synthesized by the plants as part of the defense system of the plant (Borthakur, 1981). The plant contains anthroquinone gallic acid, chebulinc acid, sennoside, resin, and tannic acid. It also contains triterpenoids, steroids, glycosides, sugar and small quantity of phosphoric acid these compounds were confirmed to exhibit anti-carcinogenic, anti-fungal, anti-bacterial, and anti-viral activities (Gemedo-Della et al., 2005). *Terminalia chebula* is rich in tannin, which is hydrolysable to pyrogallal was found in fruits (Chattopadhyay et al., 2009). The *Terminalia chebula* shows anti-anaphylactic, hepato protective, cardio protective, antioxidant, hypolipidemic, wound healing, anti-diabetic, , immuno-modulatory and chemo preventive (Muthukumarasamy et al., 2003).

Materials and Methods

Collection of Plant

Herbal Plant *Terminalia chebula* was collected from the Sathyamangalam wildlife sanctuary to the south, in the Erode District of Tamil Nadu. The hills that gave the range its name are situated 90 kilometres (56 mi) from Mysore and 254 kilometres (158 mi) from Bangalore. The hills reached either from Yelandur or via Chamarajanagar. The hills are located at the easternmost edge of the Western Ghats and support diverse flora and fauna in view of the various habitat types supported. The sanctuary derives its name *Biligiri* from the white rock face that constitutes the major hill crowned with the temple of Lord Rangaswamy or from the white mist and the silver clouds that cover these hills for a greater part of the year.

Powder Preparation

The roots, stems, seeds, fruits and leaves powders were prepared by adopting method of Ncube et al., (2008) were washed with boiled distilled water, surface sterilized with 12% sodium hypochlorite solution, rinsed with sterile distilled water and air dried at room temperature under shadow and then milled to fine powder.

Extraction of plant material

Methanolic extract

The methanol extract was prepared by followed Chessbrough (2000) in which 15grams of powdered sample were taken, soaked in 50ml of methanol and it was kept in Soxhled apparatus at 80 degree Celsius for 48 hours. This extraction was taken and allowed for evaporation and it was concentrated with Dimethyl Sulfoxide (4.64g).

Analysis of Phytochemical activity

Analysis of phytochemical activity of *Terminalia chebula* was carried out by followed a method of Yankanchi and Koli, 2010).

Test for flavonoids

0.4grams of plant extracts such as leaves, fruits, stem and root was added into test tube containing 4ml of diluted sodium hydroxide and mixed well. After mixing 2ml of diluted hydrochloride was added into the test tubes and observed for colour change.

Test for terpenoids

0.10grams of plant extracts such as leaves, fruits, seed, stem and root was added to test tubes containing 4ml of chloroform and content was mixed well. Then 4ml of concentrated sulphuric acid was added carefully and observe for presence of reddish brown colour.

Test for alkaloids

The *Terminalia chebula* extracts of leaves, fruits, seed, stem and root were filtrated then treated with Potassium mercuric iodide (Dragendroffs reagent) and observed for the colour change in the test tubes.

Quantities assay for tannin

The quantities assay for tannin acids was followed method of Phan et al., (2001) by taking the 1000mg finely dried plant extract was added into a glass beaker containing 10ml of 70% aqueous acetone. The content solution was uniformly mixed and gently boiled in a water bath for 30 minutes. The solution was centrifuged at 3000 rpm for 10 minutes at 4^0C and supernatants were collected and stored in freezing condition. The pallet were dissolved in 10ml of 70% aqueous acetone and recentrifuged at 3000rpm for 10 minutes at 4^0C. The supernatants were collected and mixed with freezing stored supernatants. To this supernatants 1 ml of Folin-denis reagent, 3ml of Sodium carbonate solution was added and solution was diluted to 20 ml by using distilled water. The solution was mixed well and incubated at room temperature for 30 minutes. The absorbance was measured in a spectrophotometer at 700nm.

Extraction of reducing sugar

Extraction of sugars from the sample was usually followed method of Souza et al., (2010), by weigh 100mg of the sample and sugar was extract with the hot 80% ethanol twice (5mL each time). The supernatant was collected and evaporated by keeping it on a water bath at 80°C. Then 10mL of water was added to dissolve the sugars and from that 0.2mL of aliquots sample was pipetted to separate test tubes. Meanwhile the working standard solution (100µg of glucose/1000ml) was prepared by pipetting out 0.2, 0.4, 0.6, 0.8 and 1mL of the working standard solution respectively into a series of test tubes. The volume was

made to 2ml with distilled water in both working standard and sample tubes. The blank was prepared by pipette out 2mL distilled water in a separate tube. A 1mL of alkaline copper tartrate reagent was added to each tube and mixed by gentle shaking. After that the tubes was placed in boiling water for 10minutes. After cooling the tubes 1mL of arsenomolybolic acid reagent was added to all the tubes and volume was made 10ml by using distilled water in each test tube. The absorbance of blue colour was read out at 620nm after 10 minutes from the graph drawn the amount of reducing sugar present sample calculate the by formula

Absorbance corresponds to 0.1mL of test = 'x' mg of glucose

10mL contains = X/NX X10mg glucose

10mL contains = % of reducing sugars

Identification of amino acid, phenolic and aromatic compounds by using TLC method

A sample of 300mg/ml concentration of plant extracts was prepared by followed method of Kiyota (2006) and from this solution, 4µl of the sample prepared was taken and spotted on the silica coated TLC plate. It was then kept at solvent position with the solvent to run under capillary pressure. Here acetic acid, ethanol and methanol and acetic acid (100µl, 5ml and 5ml,) were used as a solvent. The spots were then identified in the iodine chamber for phenolic compounds, ferric chloride for aromatic compounds and ninhydrin for amino acids.

Column chromatography

The crude aqueous methanol extract of *Terminalia chebula* was subjected to column chromatography by followed method of Praveen et al., (2010) over silica gel 100-200 mesh. The column was eluted with solvents of increasing order of polarity. The fractions were collected in 10ml each and allowed to evaporate to get the residue. Each fraction was tested for the presence of various constituents by Thin Layer Chromatography.

Results and Discussion

Terminalia chebula

Kingdom - Plantae, Sub kingdom- Tracheobionta, Super division- Spermatophyta, Division- Magnoliophyta, Class - Magnoliopsida, Subclass -Rosidae, Order- Myrtales, Family - Combretaceae, Genus - Terminalia, Species- *Terminalia chebula*

Phytochemical activity:

Flavonids

The yellow colour was formed in the test tubes after treating with 5% Sodium hydroxide and diluted hydrochloride acid thus indicated the presence of flavonoids.

Terpenoid

The Terpenoid was present in the plant extract as there was reddish brown colour formation in the test tubes after treating with chloroform and concentrated Sulphuric acid.

Alkaloid

There was a reddish brown colour formation in the test tubes after treating with Potassium Bismuth iodide solution thus indicates the presence of alkaloid in the plant extract.

Quantity of Tannic acids

The phenol content was found maximum in root followed by seed, stem, fruits and leaves are represented in the Table 1.

Reducing sugar

The maximum content of sugar was in leaves followed by fruit, stem, root and seed are represented in the Table 2.

Thin layer Chromatography

In thin layer chromatography the amino acids showed pink colour spots were observed after treating with ninhydrin. The sugars showed the purple and black spots after treating with ferric chloride. The phenolic compounds showed blue spots after treating with iodine solution

Column chromatography

Higher content of protein was observed in fruits of *T. Chebula* followed by seed, roots, leaves and stem. The Purification of compounds in various extracts was performed by using column chromatography was presented in (Table 3).

The use of medicinal plants as a medicine was practiced by our ancestors, a process which might have started by trail or error. In India traditional healers are reported to use 2500 species in which 100 species of plants are found to be serve as source of medicine (Mahapatra and Panda, 2002). The traditional medicinal knowledge of plants and their use by indigenous culture are not only use full for the conversation of cultural traditions but also for the healthcare and drug development in the present and ahead (Ayyanar and Ignacimuthu, 2005). Herbal drugs obtained from the plants are to be safer and has been proved in the treatment of various aliments by the local specialists in the region of Atlantic Forest in the state of Pernambuco of Brazil (Gazzaneo and Laucena, 2005). The ethanomedico importance of the herbal plants in the Karla Western Ghats were studied in the past that made is valid to find out the medicinal importance of Ayurvedic medicine (Pushpangandan and Atal, 1984). In current therapeutic treatments, the leaf extracts and callus extracts are being used to develop delivery systems that are suitable and active for tackling problems in disease managements (Shariff et al., 2006). *Terminalia chebula* showed effective antibacterial activity against the *Escherichia coli* which were responsible to cause urinary tract infection by keeping this in the mind a study was conducted on the Sathyamangalam wildlife sanctuary (Tariq and Reyaz, 2012). A part from this, the protein hydrolytes from various sources are reported to possess antioxidant activity (Natarajan et al., 2000). Plant phenols are groups of natural products with variable structure that are well known for their beneficial effects on health possess significant anti-inflammatory and anti-arthritic agents (Shah et al., 2006). *Terminalia chebula* have been noted to possess antifungal activity were used to treat skin diseases in Karnataka (Harsha et al., 2003). Medico-ethanoboticanal surveys were conducted among the kanikar tribals of Mundanthurai sanctuary to find the role of the medicinal plant Terminalia (Ignacimuthu et al., 1998). It is also found that various commercial plant extracts possessed the antimicrobial activity (Ates and Erdourul, 2003). The precursors for bioactive compounds used as therapeutic drugs to treat the wounds in the Eastern Cape South Africa (Grieson and Atolayan, 1999). The study was

focused in the forest of the Tirunelveli North division and traced out the economic importance of the medicinal plants serve as lead compounds in drug discovery and design (Rajasingh, 1971). This made road to understand the value of herbal plants of the Gwalior forest division in the Madhya Pradesh (Anis et al., 2000). The medicinal plants which were used by the tribal people of the Rajasthan were showed antimicrobial activities and protected them against various diseases (Tripathi, 2008).

Our study on the *Terminal chebula* which was isolated from the Sathyamangalam Wildlife Sanctuary were found contains the Flavonids, Terpenoid, Alkaloids as there was colour change in the solution after treating with respective chemicals. The highest quantity of tannic acid was found the roots followed by seed, stem, fruit and leaves. The maximum content of sugar was found in the leaves followed by fruits, stem, root and seed. Higher content of protein was found in the fruits followed seed, root, leaves and stem. The phytochemicals analysis made it clear that *Terminal chebula* have potential activity because of those compounds. It is to be suggested a further studies will be carried out to go the root of the knowledge about the medicinal plant.

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