

Original Research Article

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A Study on Biochemical Constituents and Anti-Bacterial Activity of Bark of *Polyalthia longifolia*

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Polyalthia longifolia is a tall evergreen tree belongs to the family Annonaceae. The present study includes the detailed exploration of biochemical constituents and anti-microbial activities of bark of *Polyalthia longifolia*. To study the biochemical and antibacterial activity, the Methanol extract of powdered bark of *Polyalthia longifolia* was prepared by using Soxhlet apparatus. Then the extract studied in GC-MS to know the biochemical. GC-MS results were revealed the presence of Cycloheximide, Cholesterol, Fluorescein o-acrylate, 11 Cis-Retinal, Cetyl alcohol, Tridecyltrichloroacetate, Thymol, Methyl palmitate, Cyclandelate, Dibutyl phthalate, Methyl stearate, Enoxolone or glycyrrhetic acid. Presence of these compounds shows the properties of anti-diabetic, polymer processing, additives, anti-foam, effective in the treatment of peptic ulcer, production of detergents, soaps and cosmetics such as shampoos and shaving cream products.

Introduction

Polyalthia longifolia found in tropic and tropic regions upto 1500m. This is native to India and Srilanka (1). A tall evergreen, handsome, pyramid like columnar tree; main stem straight, undivided, growing upto 12m or more. Branches slender, short about 1-2m long, glabrous and pendulous. The longest branch is seen at the base and shortest at the end of the trunk, giving an appearance of

conical crown (2). Leaves are long, alternate, enstipulate, distichour, mildly aromatic, 7.5-23cm long, 1.5-3.8cm width, shining, glabrous,narrowly lanceolat, tapering to a fine acuminate apex, margin markedly undulate, pinnately veined, lathered of subcoriaceous, shortly petiolate; petiole about 6mm long. Flowers arise from branches below the leaves nonfragrant, 2.5-3.5cm across yellowish to green, in fasciles or shortly pendunculate umbels; petals 6,2 seriate, flat, from a broad

base lanceolate, long accumulate, spreading and sepals 3, broad, short, triangular, the tips reflexed. Stamens many, coneate; connective truncately dilated beyond the cells(3).

Ovaries indeterminate; ovules 1-2; style oblong. Ripe fruits ovoid, 1.8-2 cm long, numerous, stalked, glabrous, 1 seeded; stalk 1.3cm long, short glabrous. Seeds smooth, shining. Flowering fruiting during February- June (4). It is generally propagated through seeds, but occasionally through soft wood cutting and air layering. Bark of *Polyalthia longifolia* light green in colour while drying it exhibit bitter odour. Bark of this tree has significant medicinal properties Ayurveda. Bark of this tree having Javarashaka (reducing fever) action. Bark is useful in fever. The bark is bitter, acrid, cooling, febrifuge and anthelmintic. It is useful in fever, skin disease, diabetes, hypertension, helminthiasis, and vitiating conditions of vata and pitta.(5)

Materials and Methods

A well grown, healthy, plus tree was selected for bark collection from Forest College and Research Institute, Mettupalayam, Coimbatore, Tamilnadu. Bark of *Polyalthia longifolia* was collected.

Solvent extraction

The tree bark collected were washed under tap water and dried under shade for about two weeks. Then the dried one was powdered using mechanical grinder (6).

Powdered bark of *Polyalthia longifolia* (5 grams) was taken into the Soxhlet extractor. 25 ml of extraction solvent (Methanol) was taken in to the round bottomed flask and was placed on the mantle, temperature was set at 55°C. The extraction was continued for 1 hour. Finally the extract collected in the round bottom flask was concentrated and kept under

cold condition for preventing further evaporation of the extract. Then the extract was given for GC-MS to find out the constituents.

GC-MS studies: principle of gas chromatography –mass spectrometry

Gas Chromatography is used to separate volatile compounds in a mixture. The extracted solvent was analysed for its biochemical constituents through Gas Chromatography Mass Spectrometer (GC-MS). The GC-MS analysis was carried out using a Thermo GC - Trace Ultra ver: 5.0, Thermo MS DSQ II with 30m×0.25mm×0.25μm of capillary standard non-popular column.

The instrument was set to an initial temperature of 70°C, and maintained at this temperature for 3 min. At the end of this period the oven temperature was rose up to 260°C, at the rate of an increase of 6°C/min, and maintained for 2 min.

Injection port temperature was ensured at 250°C and Helium flow rate at 1.0ml/min. The ionization voltage was 70 eV. The samples were injected in split mode as 10:1. Mass spectral scan range was set at 40-700 (m/z).

The ion source temperature was maintained at 220°C and Interface temperature was at 240°C. The MS start time was 0.00 min, and end time was 40.51 min. Interpretation on mass spectrum of GC-MS was done using the database of the South India Textile Research Association (SITRA).

The mass spectrum of the unknown component was compared with the spectrum of the known components stored in the SITRA library. The name, molecular weight and structure of the components of the test materials were confirmed.

Results and Discussion

The results of GC-MS shows the presence of Cycloheximide, Cholestrol, Fluorescein o-acrylate, 11 Cis-Retinal, Cetyl alcohol, Tridecyl trichloroacetate, Thymol, Methyl palmitate, Cyclandelate, Dibutyl phthalate, Methyl stearate, Enoxolone or glycyrrhetic acid.

Cycloheximide have the properties of anti-diabetic and anti-dione.

Cholesterol is a precursor molecule for several biochemical pathways and synthesis of vitamin D and all steroid hormones, including the adrenalgland hormones cortisol and aldosterone, as well as the sex hormones progesterone, estrogens, and testosterone, and their derivatives.

11-cis Retinal is an isomer of retinal. The 11-cis Retinal forms half of the rhodopsin (type of visual pigment) molecule (the other half of rhodopsin is composed of opsin) which is an essential endogenous chemical for the function of visual perception.

Cetyl alcohol is used in metal working fluids/rolling oils, cleaning agents, road and construction applications (binders and release agents), polymer processing (plastics and rubbers) and mining chemicals.

Thymol has antimicrobial activity because of its phenolic structure, and has shown antibacterial activity against bacterial strains including *Aeromonas hydrophila* and *Staphylococcus aureus*. It is also used as a preservative in halothane, an anaesthetic, and as an antiseptic in mouthwash. Thymol is also used as a rapidly degrading, non-

persisting pesticide. Methyl palmitate is Used as solvent in perfume materials and used in flea and tick products for pets. And also used as pesticide free treatment against head lice which works by dissolving the wax that covers the exoskeleton of head lice, killing them by dehydration.

Pristanic acid or Isopropyl palmitate can be Used in production of detergents, soaps and cosmetics such as shampoos and shaving cream products. And also used as a negative plate additive in the manufacture of lead-acid batteries.

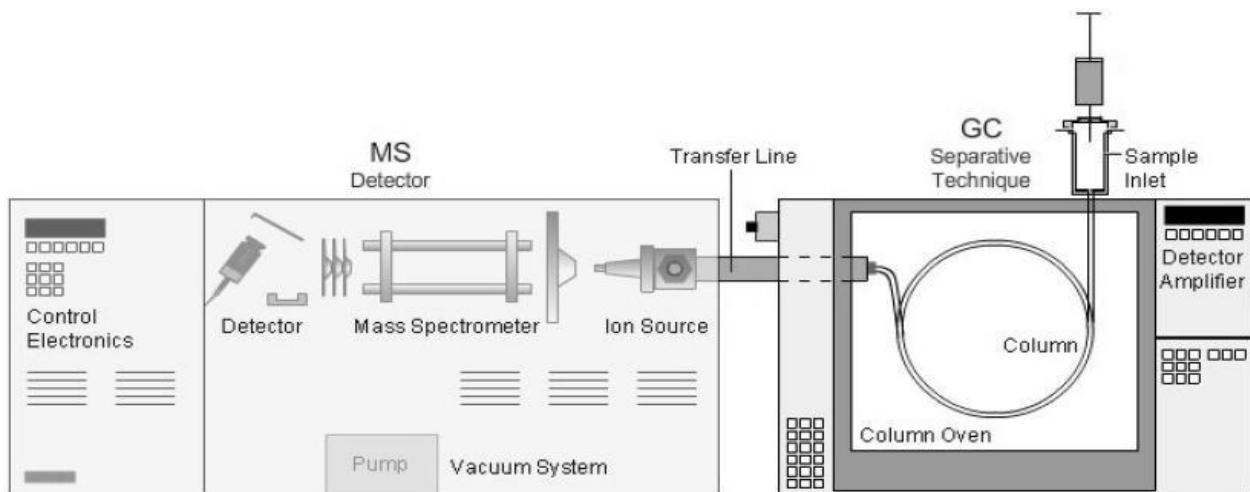
Enoxolone or glycyrrhetic acid is used as used in flavoring and it masks the bitter taste of drugs like aloe and quinine. It is effective in the treatment of peptic ulcer and also has expectorant properties. Dibutyl phthalate is used as Polymers, paints, ink, additives, anti-foam and ecto-parasiticide.

The result of GC-MS analysis revealed that the following eleven constituents are having the peak point at different retention time.

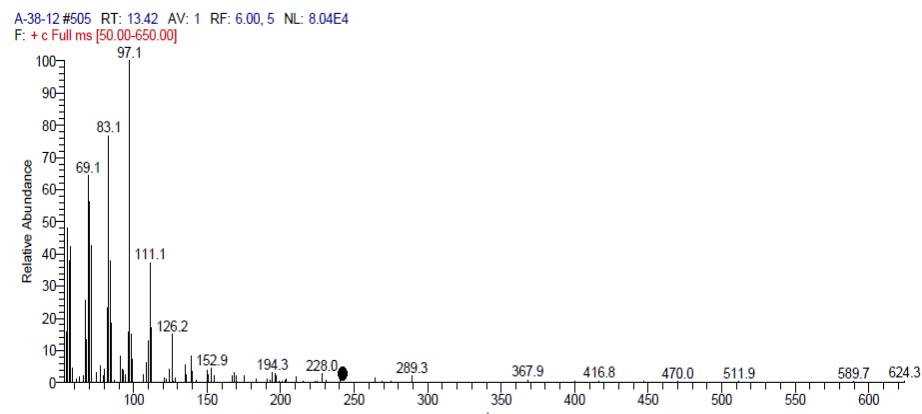
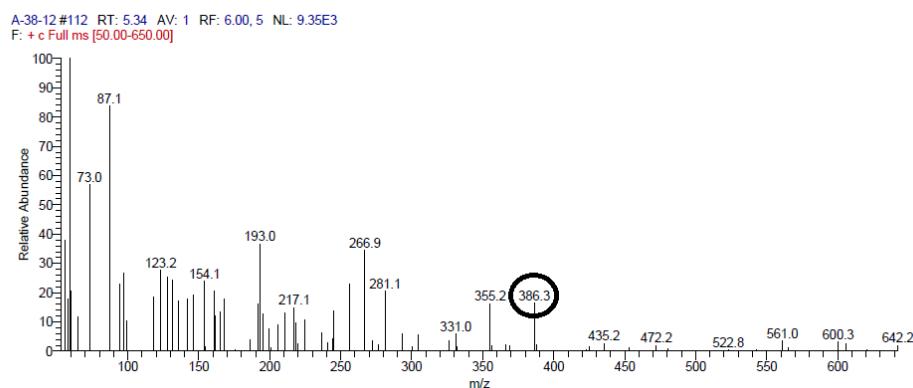
The identified constituents are Cycloheximide, Cholestrol, Fluorescein o-acrylate, 11 Cis-Retinal, Cetyl alcohol, Tridecyl trichloroacetate, Thymol, Methyl palmitate, Cyclandelate, Dibutyl phthalate, Methyl stearate, Enoxolone or glycyrrhetic acid. These compounds are found to possess the properties of anticancers, anti-inflammatory, antidepressant and these compounds places their application in soaps, perfumes, inks, polymers and pesticides. From the investigation of antibacterial activity of bark extract of *Polyalthia longifolia*, the positive result was obtained by the presence of inhibition zone in the petri plates around the filter paper loaded with the bark extract.

Table.1 Biochemical compounds in the bark extract

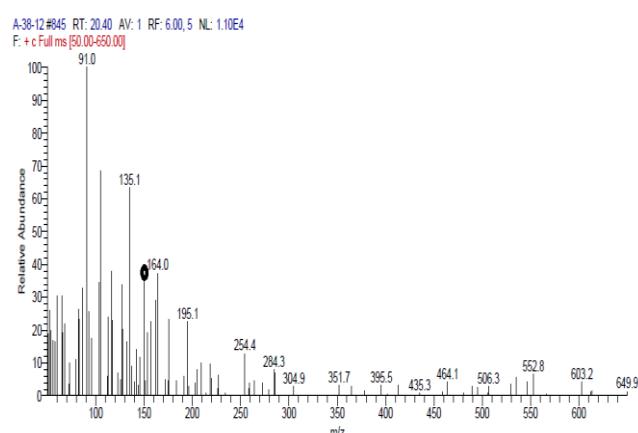
S. n o	Compound name	Molecula r formulae	Common name	Retention time	Molecula r Weight	Uses
1	5-tert-butyl-2-methyl-4-(4-morpholinylmethyl)-3-furoic acid	C ₁₅ H ₂₃ NO ₄	Cycloheximide	3.07	281	Anti-diabetic anti-dione
2	Cholest-2-en-19-ol, (5 α)-(CAS)	C ₂₇ H ₄₆ O	Cholestrol	5.34	386	synthesis of vitamin D
3	Oxo - eicosa - hexa – diene	C ₂₀ H ₂₈ O	11 Cis-Retinal	8.27	284	visual perception
4	1-Hexadecanol (CAS)	C ₁₆ H ₃₄ O	Cetyl alcohol	13.42	242	metal working fluids
5	Phenol, 5-methyl-2-(1-methylethyl)- (CAS)	C ₁₀ H ₁₄ O	Thymol	20.40	150	antimicrobial activity
6	Hexadecanoic acid, methyl ester (CAS)	C ₁₇ H ₃₄ O ₂	Methyl palmitate	21.73	270	Pesticide
7	1,2-Benzenedicarboxylic acid, dibutyl ester (CAS)	C ₁₆ H ₂₂ O ₄	Dibutyl phthalate	24.98	278	Polymers, paints, ink, additives, anti-foam and ecto-parasiticide
8	Octadecanoic acid, methyl ester (CAS)	C ₁₉ H ₃₈ O ₂	Methyl stearate	25.53	298	production of detergents, soaps and cosmetics
9	Holothurinogenin-4	C ₃₀ H ₄₆ O ₄	Enoxolone or glycyrrhetic acid	32.13	470	masks the bitter taste of drugs



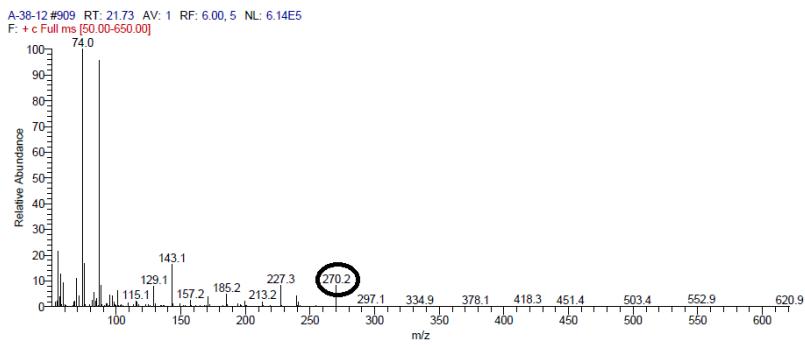
CHOLESTROL



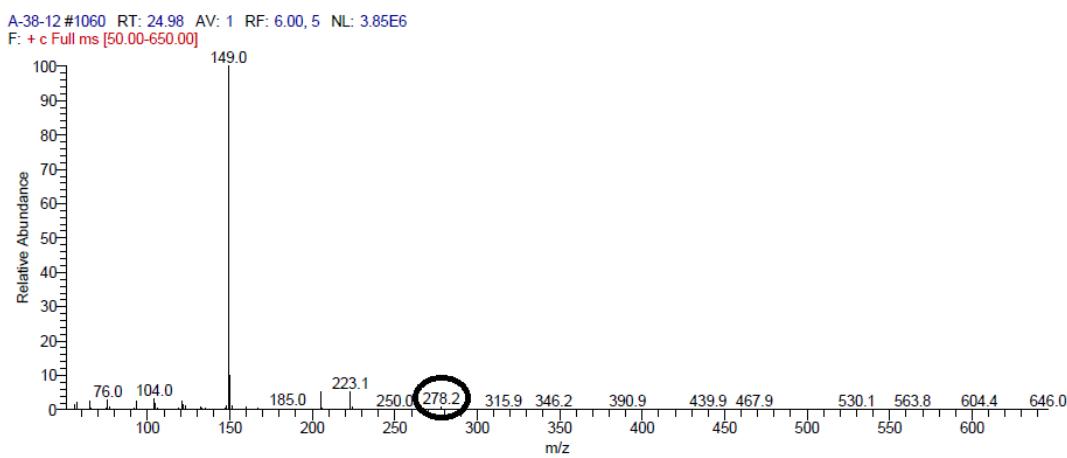
CETAL



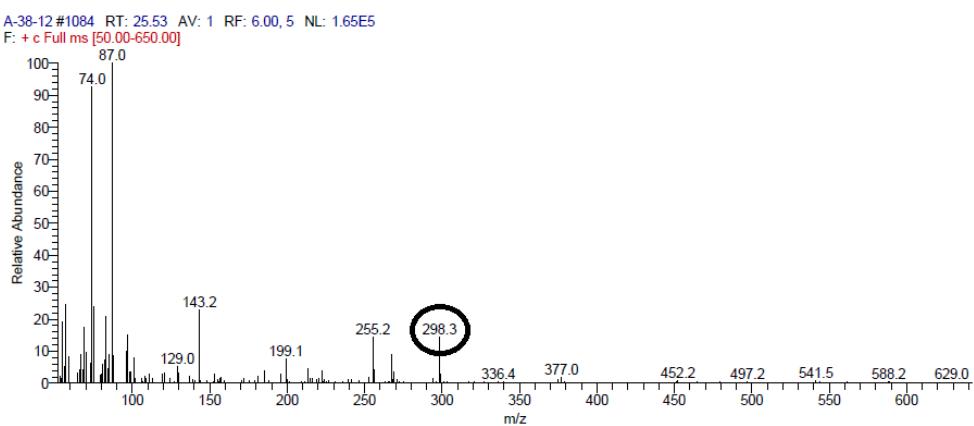
THYMOL



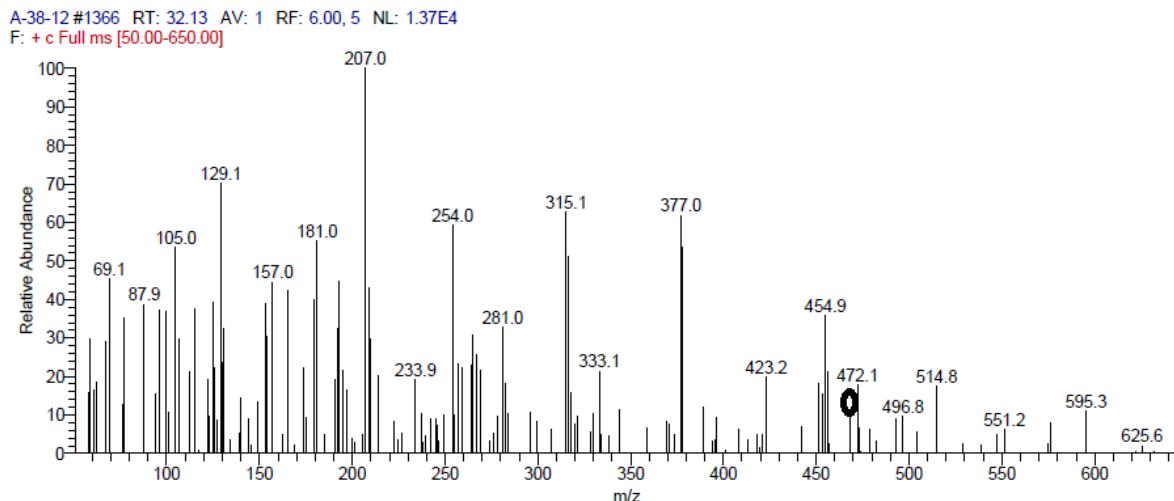
METHYL PALMITATE



BUTYL PHTHALATE



METHYL STEARATE



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