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The GC MS Analysis of One Medicinal Plant, *Premna Tomentosa*

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Abstract

Premna tomentosa is a plant with various medicinal roles. The present study deals with the Gas Chromatography Mass Spectroscopy analysis of *Premna tomentosa*. This plant is reported to have medicinal activities such as anti-inflammatory, anti-nociceptive, hypnotic, cytoprotective, immunomodulatory, hepatoprotective, antibacterial, antiulcer, antibiotic and anti oxidant etc. The GC MS results indicated the presence of some important bio molecules like Copaen, alpha-Amyrin, beta-Sitosterol, Pentacosane, Acetic acid, 3-hydroxy-4,4,10,13-tetramethyl-7-oxo-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phe, Hentriacontane, Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester and Caryophyllene which have known medicinal values similar to the medicinal roles as found in the plant. The results are one step further in understanding the molecular mechanism of action of this medicinal plant.

Key words-*Premna tomentosa*, GC MS, Anti-inflammatory, Anti-nociceptive, Copaen, Alpha-Amyrin

INTRODUCTION

Plants are utilized as therapeutic agents since time immemorial in both organized (Ayurveda, Sidhha and Unani) and unorganized (folk, tribal, native) forms of traditional medicine. With the increasing acceptance of herbal medicine as an alternative form of health care, the screening of medicinal plants for active compounds has become very interesting to understand the novel mechanism of action [1, 2, 3]. Investigations of plants used in traditional and modern medicine is a source of inspiration and as models for the synthesis of new drugs with better therapeutic, chemical or physical properties than the original compounds [4].

There are numerous reports on the GC MS analysis studies on many plants and plant parts. These studies were undertaken to ascertain the presence of active bio molecules which have therapeutic activities [5, 6].

The present study deals with the GC MS analysis of a medicinal plant *Premna tomentosa* which is known as an important medicinal plant. The Plant was collected and identified by a reputed botanist in Chennai. Jamel *et al*, 2015, have elaborately discussed about the medicinal aspects of *Premna* in their review [7]. The bark of this plant is used for diarrhea. The dried plant paste is uses to skin protection. Leaves are good medicine for dropsy and also used to treat sores. The decoction of roots and leaves are used as tonic after childbirth. The anti-inflammatory activity of *Premna* leaves was reported by Alam *et al*, 1993 [8]. The leaves are reported to be anti-nociceptive, hypnotic, immune-modulatory (Devi *et al*, 2003), hepatoprotective (Devi *et al*, 2004), antimicrobial and antioxidant (Devi *et al*, 1998; Rathi and Gopalakrishnan, 2006) [9, 10, 11, 12]. The stem bark is reported to be anti ulcer (Hymavathi *et al*, 2009) [13]. The root of *Premna* is shown to have anti-diabetic properties (Reddy *et al*, 2012) [14]. Whole plant has antioxidant properties (Rao, 2013) [15]. There are reports of this plant having anti-inflammatory properties (Devi *et al*, 2013) [16].

MATERIALS AND METHODS

The leaves of the plant, *Premna tomentosa* were collected locally and the ethanolic extract was processed for GC MS analysis, which was carried out by standard procedures. The plant was identified by Dr. S. Sankaranarayana, Asst. Professor and Head, Dept of Medicinal Botany, Govt. Sidha Medical College, Arumbakkam, Chennai-600106 with identification voucher no. GSMS/MB- Voucher Specimen No. 23/2017.

RESULTS AND DISCUSSION

The results of GC MS analysis of *Premna tomentosa* are indicated in Figures 1. The names of the probable bio molecules present with their RT, Retention Time, Values and peak areas are indicated in Table 1.

There are a number of reports on the phytochemical constituents of *Premna tomentosa*. Suriyavathana *et al* (2010) have reported the presence of alkaloids, flavanoids, steroids,

tannins and phenols [17]. Some more reports indicate the presence of compounds such as dl-limonene, b-caryophyllene, 5, 30-dihydroxy-3, 7, 40, 50-tetramethoxyflavone, myricetin-7,30,40-trimethyl ether, and a di-C-glycosyl flavone, vicenin 3 [18, 19, 20].

Some more work reported the presence of b-caryophyllene, cadalenetype sesquiterpene, sesquiterpene tertiary alcohol, aditerpene, 5,3-dihydroxy-3,7,4',5'-tetramethoxy flavone, myricetin-7,3',4'-trimethyl ether, di-C-glycosyl flavone, vicenin 3, three clerodane diterpenoids,

premnones A–C, coniferaldehyde, syringaldehyde, lupeol, betulin, and 2-(4-methoxyphenyl)-2-butanone [21]. Hymavathi *et al*, (2009) carried out a bioassay guided fractionation and chemical investigation of the stem bark of *Premna tomentosa* and reported the presence of four icetexane diterpenes (icetexatriene-10,11,12,16-tetrol, 8,11,13 icetexatriene-10,11,16-triol, 8,11,13 icetexatriene-7,10,11,16-tetrol and 7,10-epoxy-8,11,13 icetexatriene-11,12,16-triol) and other known compounds such as coniferaldehyde, syringaldehyde, lupeol, betulin, and 2-(4-methoxyphenyl)- 2-butanone. Similar work was also carried out by Aslam *et al*, 2015 on *Clinacanthus nutan* and Arunachalam *et al*, 2015 have reported the HPTLC and GC MS analysis results on *Morinda tinctoria.* [22, 23]

Among the various probable compounds that are indicated to be present in the GC MS report the following are known for their medicinal roles as mentioned hereunder.

Copaen: Oligosaccharide provider, 5-alpha Reductase inhibitor, alpha egnositc, HIF1 alpha inhibitor, TNF alpha inhibitor, 1-kappaB alpha Phosphorylation inhibitor, increase alpha mannosidase activity, Interleucin 1 alpha inhibitor, TNF alpha inhibitor.

(Z)-3-Phenyl-2-propenoic acid also known as cis-Cinnamic acid: Cinnamic acid is a key intermediate in shikimate and phenyl propanoid pathway which is a precursor of many aromatic amino acid, alkaloids and indole derivates. The biological activities of cinnamic acid derivatives are reported be anti TB, Antidiabetic, antioxidant. antimicrobial, as a fragrance material, hepatoprotective, CNS depressant, anticholesteromic, antigungal, fungitoxic, antihyperglycemic, antimalarial, antiviral, anxiolytic, cytotoxic, anti-inflammatory [24, 25, 26]. It is also a U-V ray absorbent [27]. The derivatives of Cinnamaic acid are reported to have strong antioxidant effects [28, 29].

The p- hydrooxy and methoxy groups in Cinnamic acid derivatives also showed good insulin releasing activity [30, 31]. Due to the presence of Esters, amides and substituted derivatives of cinnamic acid it also shows anti microbial activity [32]. The role of hepato-protective property and CNS depressant activity is due to the presence of Hydroxy cinnamic acid and halogenated cinnamic acid and 3- phenyl propionyl moiety will result in anti malarial activity (Fernandez-Martinez *et al*, 2007) [33]. The lipid lowering efficacy by the derivates of cinnamic acid showed anticholesterolemicactivity [34]. The derivates of cinnamic acid also possess to have anti viral and antifungal property. Morronside cinnamic acid also showed the anti-inflammatory activity of on E- selectin mediated cell-cell adhesion and the derivative of cinnamic acid also shows anti anxiety action.

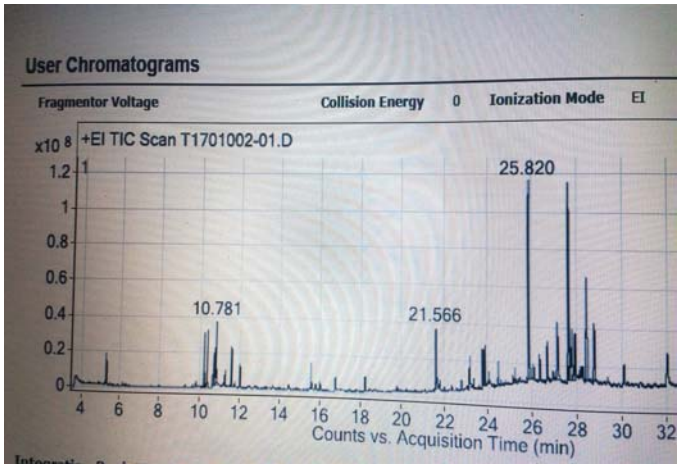

Figure 1. Indicates the GC MS graph patterns of *Premna tomentosa*.

Table 1. Indicates the GC MS results of *Premna tomentosa.* The Retention time, name of the probable compound and percentage peak values of each peack.

Sl No.	Retention Time(Min)	Compound	Peak %
1	10.189	Copaene 1H-Cyclopenta[1,3]cyclopropa[1,2]benzene, octahydro-7-methyl-3-methylene-4-(1-methylethyl)-, [3aS-(3a.alpha.,3b.beta.,4.b	11.85
2	10.34	(Z)-3-Phenyl-2-propenoic acid	13.47
3	10.781	Caryophyllene1H-Cyclopenta[1,3]cyclopropa[1,2]benzene, octahydro-7-methyl-3-methylene-4-(1-methylethyl)-, [3aS-(3a.alpha.,3b.beta.,4.beta.,Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester6,10,14,18,22-Tetracosapentaen-2-ol, 3-bromo-2,6,10,15,19,23-hexamethyl-, (all-E)-	16.84
4	21.566	6,10,14,18,22-Tetracosapentaen-2-ol, 3-bromo-2,6,10,15,19,23-hexamethyl-, (all-E)-	15.03
5	25.82	Hentriacontane	71.91
6	27.092	Acetic acid, 3-hydroxy-4,4,10,13-tetramethyl-7-oxo-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phe	28.80
7	27.583	Pentacosanebeta-Sitosterol	83.13
8	28.373	alpha-Amyrin	44.28
9	28.708	2-[4-methyl-6-(2,6,6-trimethylcyclohex-1-enyl)hexa-1,3,5-trienyl]cyclohex-1-en-1-carboxaldehyde	27.28

Caryophyllene: It is a smart drug, ionotropic, bactericidal, 5-alpha reductase inhibitor, 5 HT-inhibitor Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester: 17-beta-hydroxysteroid-inhibiotor, testosterone hydroxylase inducer, Arachidonic acid inhibitor, inhibit uric acid production, urinary acidulant.

6,10,14,18,22-Tetracosapentaen-2-ol, 3-bromo-2,6,10,15,19,23-hexamethyl-, (all-E)- (Squalene): A natural triterpene that plays an important role in the synthesis of cholesterol, steroid hormones, and vitamin D in the human body. Squalene is commonly used as a biochemical precursor i n the preparation of steroids. Squalene is also a natural moisturizer with low acute toxicity and is not significant human skin irritants or sensitizers. It is a skin protective compound used in cosmetics.

Hentriacontane: This is reported to have Antiinflammatory Acetic acid, 3-hydroxy-4,4,10,13-tetramethyl-7-oxo-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phe: A metabolite of Dehydroepiandrosterone. This mammalian pro-hormone promotes brain and immune function

Pentacosane: 5-alpha Reductase inhibitor, alpha agnositc, HIF1 alpha inhibitor, TNF alpha inhibitor, 1-kappaB alpha Phosphorylation inhibitor, increase alpha mannosidase activity, Interleucin 1 alpha inhibitor, TNF alpha inhibitor.

Beta-Sitosterol: Beta- sitosterol is used for heart disease and high cholesterol. It is also used for boosting the immune system and for preventing colon cancer, as well as for gallstones, the common cold and flu (influenza), HIV/AIDS, rheumatoid

arthritis, tuberculosis, psoriasis, allergies, cervical cancer, fibromyalgia, systemic lupus erythematosus (SLE), asthma, hair loss, bronchitis, migraine headache, and chronic fatigue syndrome alpha.-Amyrin: anti-microbial, anti-inflammatory and other interesting biological activities.

The biological activities of 1H-Cyclopenta[1,3]cyclopropa[1,2]benzene, octahydro-7-methyl-3-methylene-4-(1-methylethyl)-, [3aS-(3a.alpha.,3b.beta.,4.b) and 2-[4-methyl-6-(2,6,6-trimethylcyclohex-1-enyl)hexa-1,3,5-trienyl]cyclohex-1-en-1-carboxaldehyde are not known.

CONCLUSIONS

The present GC MS results of *Premna tomentosa* indicated the presence of some bio molecules which have important medicinal activities which correspond well with the reports of the medicinal activities of this plant. Further work is required to confirm the efficacy of this plant.

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