ISOLATION, CHARACTERISATION OF BIOACTIVE COMPONENTS OF ACACIA SALICINA

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Abstract— Plants are rich source of natural products used for centuries to cure various diseases. In the present study we investigated the extracts of Acacia salicina leaves to explore and comprehensively highlight the photochemical and pharmacological study.

Keywords— Acacia salicina, Stigmasterol, β-Sitosterol, Lapachol, Dehydro-α-lapachone, Taraxasteryl acetate. Spectral study:IR, 1H NMR, MS, UV

I. INTRODUCTION

Plants are rich source of natural products used for centuries to cure various diseases. Acacia is a large genus comprising more than 700 species. The genus Acacia is frequently used for the treatment of various illnesses because of their reputed pharmacological effects. Acacia has been shown to possess multifarious medicinal properties such hypoglycaemic, anti-bacterial, anti-inflammatory, cestocidal, anti-diarrhoeal, antimicrobial, antioxidant, antipyretic, anticancer, anti-ulcer, antisecretory, hepatoprotective, spasmodogenic and vasoconstrictor, antihypertensive and antispasmodic activities, anti-inflammatory disease as "febrifuge" to treat cancer, and as a fertility enhancer. The present work is an attempt to explore and comprehensively highlight the photochemical and pharmacological study of Acacia salicina.

II. EXPERIMENT AND DISCUSSION

Air dried and coarsely powdered aerial parts 2.5kg were extracted with methanol for 6 hours on a water bath. After the complete extraction of plant material the methanol extract was filtered by the use of whatman paper no. 42. The filtered extract was then concentrated under reduced pressure and finally dried and kept at 5°C.

The concentrate mass obtained after extraction was subjected to the column chromatography and collected fraction. These fractions, on repeated preparative TLC. The components were identified by using spectral studies like, IR, H¹NMR and mass study.

In traditional medicine, the use of Acacia differs according to the species and according to the region. Based on information gathered from traditional healers, Acacia salicina has frequently been used as a treatment for several diseases, such as the treatment of inflammatory diseases as "febrifuge" to treat cancer, and as a fertility enhancer. The present work is an attempt to explore and comprehensively highlight the phytochemical study of Acacia salicina.

The following compounds have been identified as:- Stigmasterol, β-Sitosterol, Lapachol, Dhydro-α-lapachone, Taraxasteryl acetate

2.1. Stigmasterol

It was isolated as colourless shining needles, m.p. 166-167°C. It gave positive Liebermann-Buchard and Noller’s tests for sterols.

In IR spectrum a broad absorption band at 3400 cm⁻¹ indicates hydroxyl group. It was characterized on the basis of this spectral information:

IR Vmax(KBr) (cm⁻¹) : 3400(OH) 1600,1460,1380,1260,1050.

1H NMR[300MHz,  Δ (ppm), J=16,10 Hz, H-6 protons], 5.05dd(J=16,10 Hz, H-22), 5.15dd(J=16,10 Hz, H-23), 3.50 m (H-3), 1.00d (J=7Hz, H-21),0.84t (H-29), 1.56 s (-OH), 1.16 s (H-27), 0.93 s (H-19) and 0.70s (H-18) (Me-group).

MS (m/z): molecular ion peak at 412[M⁺],(C₂₉H₄₀O)⁺, along with the fragments at (41,40), 397[M-Me]⁺, (8.90), 328(5.10), 314(9.0), 302(12.8),300(6.0) etc.

2.2. β-Sitosterol

It was obtained as colourless needles from the same fraction, m.p. 136-137°C. It gave positive Liebermann-Buchard and Noller’s tests indicating it to be sterol.

Its spectral details were observed as:

IR(KBr) ν (cm⁻¹):3400(OH stretching), 1640(C=C stretching), 1065(C-O stretching), 1025, 930, 820 and 800.

1H NMR[300MHz,  δ (ppm)], 5.30 tbr(H-23), 0.90 and 0.93 s (H-21 and 22), 5.15dd(J=7Hz, H-22), 5.05dd(J=16,10 Hz, H-22), 5.15dd(J=16,10 Hz, H-23), 3.50 m (H-3), 1.00d (J=7Hz, H-21),0.84t (H-29), 1.56 s (-OH), 1.16 s (H-27), 0.93 s (H-19) and 0.70s (H-18) (Me-group).

An abundant molecular ion peak was observed in the mass spectrum at 414[M⁺] corresponding to its molecular formula, (C_{30}H_{30}O)⁺. The other prominent peaks were at 396[M-H2O]⁺, 381[396-Me]⁺, 324,303,273,255 etc.

2.3. Lapachol

It was separated as yellow needles, m.p. 139-140 °C. It gave a violet red colour with ferric chloride and red colour with methanolic magnesium acetate. It produced a deep red solution on addition of sodium dithionite and the red colour was restored on shaking the mixture solution for some time in air. This change is due to reversible reduction with sodium dithionite which indicates it to be a hydroxyl quinonoid compound. Its UV spectrum showed characteristic absorptions at ʎ <sub>max</sub> (EtOH) 251,278 and 333 nm for hydroxyl naphthoquinones. The IR spectrum displayed hydroxyl (3360 cm<sup>-1</sup>) and chelated and unchelated carbonyl (1660 and 1637 cm<sup>-1</sup>) absorption bands in the molecule.

It was further conformed as lapachol<sup>64</sup>, on the basis of its spectral analysis and by the preparation of its methyl ether, m. p.54-55°C.

2.4. Dehydro-α-lapachone

It was obtained as orange red needles, m.p.142-43°C. Its IR spectrum showed the presence of two prominent peaks at 1680 and 1640 cm<sup>-1</sup> typical for 1,4-quinonoid compounds.

Its ¹H NMR spectrum was compound of a pair of downfield AB doublets centered at 5.76 and 6.73 ppm assigned to H-3 and H-4 olefinic protons, respectively with coupling constant of 11Hz each indicating their cis geometry. A singlet at 1.54 ppm was attributing to a gem-dimethyl group near to an electronegative oxygen atom.

Spectral and chemical analysis of this fraction was in a close resemblance to that of dehydro-α-lapachone.

2.5. Taraxasteryl acetate

It was isolated as colourless needles (50mg),m.p: 290°C. It gave positive Liebermann-Buchard and Noller’s tests indicating it to be sterol.

MS(m/z): An abundant molecular ion peak was observed in the mass spectrum at 414[M⁺] corresponding to its molecular formula, (C_{30}H_{30}O)⁺. The other prominent peaks were at 396[M-H2O]⁺, 381[396-Me]⁺, 324,303,273,255 etc.

IR study confirms 1750(OAc), 1470, 1660 etc.cm<sup>-1</sup>. MS(m/z)468M⁺ corresponded to its molecular formula C_{32}H_{52}O_2.

CONCLUSION

The present study confirms that the leaves extracts of Acacia slicina is the significant source of Stigmasterol, β-Sitosterol, Lapachol, Dehydro-α-lapachone, Taraxasteryl acetate. These compounds shows ethnomedicine and pharmacological uses.

REFERENCES