

**CHARACTERIZATION AND EVALUATION OF
ANTIBACTERIAL ACTIVITY OF
PHYTOCONSTITUENTS ISOLATED FROM
SELECTED MYANMAR MEDICINAL PLANTS**

Ph.D. DISSERTATION

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Title : Characterization and Evaluation of Antibacterial Activity of
Phytoconstituents Isolated from Selected Myanmar Medicinal Plants

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Abstract : Myanmar medicinal plants; namely *Piper nigrum* (Nga-yoke-kaung),
Azadirachta indica (Tamar), *Alstonia scholaris* (Taung-me-oke) and
Andrographis paniculata (Se-ga-gyi) used for the treatment of dysentery and
diarrhoea have been analyzed and their active phytoconstituents have been isolated.
Thus, polar and non-polar solvent extracts of the above mentioned plants were
screened for antibacterial activity by employing agar disk diffusion technique and
serial dilution method utilizing 21 pathogenic bacteria. Consequently, ethanol and
methanol extracts of *Piper nigrum* exhibited inhibitory activity against *Proteus*
morganii, *Escherichia coli* EHEC, *Shigella dysenteriae*, *Shigella sonnei*, *Bacillus*
subtilis, *Vibrio cholerae* Inaba, *Plesiomonas shigelloides* and *Staphylococcus aureus*.
Ethanol extract of *Azadirachta indica* showed inhibitory activity against five types of
microorganisms. Similarly, ethanol and methanol extracts of *Alstonia scholaris*
indicated inhibitory activity against ten types of microorganisms. However, ethanol
extract of *Andrographis paniculata* exhibited inhibitory activity against, *Escherichia*
coli LT, and *Staphylococcus aureus* only. Minimum inhibitory concentration (MIC) of
active extracts from four plants on ten organisms ranged from 0.12 mg/cm³ to 1.00
mg/cm³ concentration. The least minimum inhibitory concentration was found to be
0.12 mg/cm³ and it was found in ethanolic extract of *Alstonia scholaris*. Ethanolic

extracts of *Piper nigrum*, *Andrographis paniculata* and *Azadirachta indica* showed higher MIC value and therefore, possessed low antibacterial activity. The crude ethanolic extract of *Alstonia scholaris* has an antimicrobial activity on *Escherichia coli*, *Bacillus subtilis*, *Salmonella typhi*, *Shigella sonnei*, *Proteus morgani* and *Staphylococcus aureus*, where the MIC value ranged between 0.12-0.25 mg/cm³. The active phytoconstituents from active plant extracts; namely piperine (M.p.125°C, 1.05% yield) from *Piper nigrum*, nimbolide (M.p.242°C, 0.31% yield) from *Azadirachta indica*, echitamine (M.p.288°C, 0.06% yield) from *Alstonia scholaris* and andrographolide (M.p. 223°C, 0.83% yield) from *Andrographis paniculata* were respectively isolated by percolation, Soxhlet extraction and column chromatographic methods and identified and characterized by melting point determination, thin layer chromatographic method and UV, FTIR, ¹H NMR, ¹³C NMR and Mass Spectroscopic methods. Then, the isolated phytoconstituents were screened for antibacterial activity by employing agar disk diffusion technique utilizing some pathogenic bacteria such as *Staphylococcus aureus*, *Escherichia coli* and *Bacillus subtilis*.