

ANTIMICROBIAL ACTIVITY, CHEMICAL AND MINERALOGICAL CHARACTERS OF A MICA-BASED HERBO-METALLIC DRUG

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‘Abhrak Bhasma’ (AB) is a herbo-metallic Ayurvedic preparation comprising of biotite mica as the major ingredient. AB is prescribed for skin disorders, respiratory and other chronic diseases. AB and similar drugs have not been evaluated for their antimicrobial activity. Therefore, the objective of the current study was to assess the antimicrobial activity of AB and its plant constituents, to determine the chemical and mineralogical changes of AB during drug preparation. AB was prepared with different organic and inorganic ingredients, including *Ficus benghalensis* and *Ricinus communis* leaves. Ethanolic extracts of plant constituents were obtained by vacuum infiltration followed by rotary evaporation, and water extracts were obtained by homogenization followed by freeze drying. AB and plant extracts were screened for their antimicrobial activity against *Pseudomonas aeruginosa* (ATCC-27853), *Escherichia coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923), Methicillin-resistant *S. aureus* (MRSA) and *Candida albicans* (ATCC 90028) using well diffusion assay, a modified-version of the same, agar dilution assay and by Miles and Misra method. Minimum inhibitory concentrations (MIC) for the active plant ingredients were determined using agar dilution assay. Mineral constituents of AB and alterations of mica during the drug preparation were analyzed by Fourier-Transform infrared spectroscopy, X-ray diffractometry, X-ray fluorescence spectroscopy, atomic absorption spectrometry, thermogravimetric analysis and differential scanning calorimetry. Aqueous and ethanol extracts of *F. benghalensis* and AB showed significant antimicrobial activity against *S. aureus* and MRSA, while AB, water and ethanolic plant extracts were inactive against the rest of the organisms. Both the water and ethanol extracts of *F. benghalensis* showed a MIC value of 2-3 mg/l against *S. aureus*, while MIC for water and ethanol extracts against MRSA was 5-6 mg/l and 3-4 mg/l, respectively. Mineralogical studies (XRD and FTIR) revealed that biotite mica was altered in to secondary clay minerals and iron oxides. Chemical analyses (AAS data) revealed that AB was rich in Fe, while significantly lower concentrations of trace cations (Mn, Cu, Pb and Cr) were detected. Therefore, it can be concluded that AB and extracts of *F. benghalensis* possesses antimicrobial activity, and have the potential in the treatments of skin diseases.

Financial assistance given by the HETC-Window3 programme is acknowledged.