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ANTIMICROBIAL ACTIVITY AND MINERAL CONSTITUENTS OF FOUR HERBO-METALLIC DRUGS

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“Arogyawardhana Vati” (AV), “Manikya Rasa” (MR), “Abhrak Bhasma” (AB) and “Abhraka Chendhuram” (AC) are four herbo-metallic drugs - medicinal preparations comprising minerallic and herbal components known as Rasashastra drugs in Ayurveda. AV and MR are extensively used in the treatment of skin diseases and wounds while AB and AC are prescribed for skin disorders, respiratory and other chronic diseases. However, these drugs have not been evaluated for bioactivity. The antimicrobial activity and mineral constituents of the four drugs mentioned above were examined in the current study.

Each drug was sequentially extracted into hexane, dichloromethane and methanol to furnish the solvent extracts and the inorganic residue, and removal of solvents gave the organic extracts. The four drugs, their organic extracts and the respective inorganic residues were screened for antimicrobial activity against *Pseudomonas aeruginosa* (ATCC-27853), *Escherichia coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923), methicillin-resistant *S. aureus* (wild species) and *Candida albicans* (ATCC 90028) using the well diffusion assay, a modified version of the same and the agar dilution assay. AB and AC drugs and their inorganic residues were separately incubated with inoculated broth cultures of each of the above microorganisms at 37 °C for 18-24 h, and the turbidity and viability of the microbial suspensions were measured by UV-Visible spectrophotometry and Miles and Misra method, respectively. The mineral constituents of the four drugs were analyzed by Fourier-Transform infrared spectroscopy, X-ray diffractometry, X-ray fluorescence spectroscopy, atomic absorption spectrometry, loss of ignition method, thermogravimetric analysis and differential scanning calorimetry.

AV and MR drugs, their residues and organic extracts showed significant antimicrobial activity against at least two or more microorganisms tested while AB and AC were inactive against all the organisms. The highest activity of AV and MR was observed against *S. aureus*, while neither the drugs nor their organic extracts or residues showed significant activity against *C. albicans*. MR showed higher antimicrobial activity than AV. The residue and drug of MR exhibited the strongest antimicrobial activity, while the methanol extract (2500 ppm) showed the strongest antibacterial activity among the extracts. There were significant reductions of viable counts between the control and the treated samples of both AV and MR drugs, which tallied with the relevant spectrophotometer readings. Mineralogical studies revealed a number of minerals including mica, cinnabar, chalcopyrite, sphalarite, arsenolite as mineral constituents in AV and MR. Further, MR was composed of 70% organic and 30% inorganic (Hg, As, Zn, Cu, Fe) matter, while ‘AV’ was composed of 85% organic and 15% inorganic (Hg, Cu, Fe, Ca, K) matter. AB and AC mainly consisted of mica.

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