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Interdisciplinary studies on Ayurvedic herbal formulation showing antibacterial effect on methicillin resistant *Staphylococcus aureus*

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Statement of the Problem: Emerging bacterial resistance in response to antimicrobial therapy is a world-wide problem nowadays, stimulating the search for new antimicrobial compounds. Combinatory therapy including antibacterial agents and herbal extracts, is able to combat bacterial resistance, is the promising perspective. The object of present study is a polyherbal formulation, *Jathyadi Thailam*, based on 13 herb infusion in coconut oil, used in Ayurvedic medicine for chronic wound (e.g. Diabetic foot ulcers) and burns healing.

Methodology & Theoretical Orientation: The antimicrobial activity of this formulation for biofilm forming and drug resistant bacteria such as methicillin resistant staphylococci, or extended spectrum beta-lactamase producing bacilli has been studied. The antibacterial efficacy of the herbal oil and its polar and nonpolar crude extracts was tested by agar dilution method and by broth microdilution method for mostly common isolates from diabetic wounds. Reference strains and clinical isolates from diabetic foot ulcers isolated in Latvian hospital were analyzed.

Findings: Interestingly, the bacteriostatic effect was shown by *Jathyadi Thailam* by the agar dilution method for methicillin resistant *Staphylococcus aureus* ATCC 38592, drug susceptible *S.aureus* ATCC 2848 and clinical *S.aureus* strain, *Pseudomonas aeruginosa* ATCC 2843, *Enterococcus faecalis* ATCC 29212 and biofilm producing *S.epidermidis* reference strains. No inhibition was observed for *Klebsiella pnemoniae* ATCC 2558, *Proteus mirabilis* ATCC 432351, *Escherichia coli* ATCC 25922 and for clinical *Prowidencia* spp. and ESBL producing *K.pneumoniae* strain. Minimal bactericidal concentration (MBC) was determined for the crude herbal polar and nonpolar extracts by the broth microdilution method. The MBC was determined as 15.6 mg/ml and 31.2 mg/ml by polar and nonpolar extracts, respectively, for MRSA ATCC 38592, 7.8 mg/ml by both extracts for *S.aureus* ATCC 2848, 1.95 mg/ml by both extracts for biofilm producing *S.epidermidis* and 62.5mg/ml by nonpolar extract for *P. aeruginosa*.

Conclusion & Significance: To conclude, both herbal crude extracts and the final herbal oil were found to be more effective for Gram positive bacteria, when for Gram negative. The formulation was effective against *Staphyloccus aureus*, the bacteria predominant in chronic diabetic wounds. Further studies will be focused on development of herbal suspension with better skin penetrating properties and aimed to inhibit the growth of Gram negative bacteria.

Biography

Tatyana Tracevska is an Associate Professor of University of Latvia, Faculty of Medicine. She has her expertise in Molecular Microbiology, focusing on drug resistance mechanisms, persistent infections and epidemiological studies of pathogens such as *Mycobacterium tuberculosis, Staphylococcus aureus Chlamydia trachomatis*. In 2009, she received ESCMID (European Society of Clinical Microbiology and Infectious Diseases) and *bioMérieux* Award for Advances in Clinical Microbiology in East Central or Central Europe, and for the project entitled, *luxS* gene as a novel diagnostics for invasive CoNs. From 2010 to 2012, she was involved as a Head Scientist in European Social Fund co-founded project "Capacity building for interdisciplinary biosafety research" by University of Latvia. From 2016, she is a Head of effective collaboration project between University of Latvia and Arya Vaidya Pharmacy Baltics "Development of a novel herbal product for wound healing using the method of lamellar gel phase emulsion".

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