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## Preformulation and formulation studies of the alcoholic extract of *Punica granatum L.*, (Lythraceae) exocarp as antimicrobial ointment

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The purpose of the study is to formulate an antimicrobial ointment from extract of pomegranate exocarp. Experimental research design was used. Results revealed there was a 32.31% yield of powdered extract from maceration. Physicochemical evaluation of extract present a dark brown powder, acidic (pH 3), bulk density (0.82), freely soluble in water, 95% alcohol, 0.1N HCl, 0.1N NaOH, 0.9% NaCl, phosphate buffers and petroleum ether and melted at 117.10°C. Chromatography confirmed the presence of terpenoids, alkaloids, anthraquinones and sapogenins. Extract was most active even at lowest concentration (25%) to *Pseudomonas aeruginosa* (31 mm), followed by *Aspergillus niger* (17 mm) and *Trichophyton mentagrophytes* (17 mm); *Staphylococcus aureus* (14 mm) and inactive to *Candida albicans* (9 mm) at all concentrations (100%, 75%, 50% and 25%). Differential Scanning Calorimetry thermograph indicated that lyophilized

extract was compatible with excipients namely polypropylene glycol 4000 (water soluble base), petrolatum (oil soluble base), methyl and propyl parabens (preservatives) and stearic acid (emulsifying agent). Formulated antimicrobial ointments (60% concentration) were prepared using mechanical incorporation. They were brown in color, odourless, non-gritty, neutral (pH 6.6), average spreadability (30.55 mm), average viscosity (64,000 cP) and average sensitivity test (0) for both water and oil based 60% formulations. Accelerated stability showed they were stable until the 6th month however on the 12th month it showed instability like solidification, bleeding and crystallization. It is conclusive that extract of pomegranate can be formulated into an antimicrobial ointment however it needs further study in formulation as it manifested instability on 12th month.

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