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Formulation and characterization of polyherbal gel against acne causing microorganisms

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Background: Acne vulgaris is a multifactorial skin disorder commonly affecting nearly 80% of adolescents and young adults globally. Even though antibiotics could be used in treating acne, it contributes to adverse effects and development of antibiotics resistance. Thus, an effective alternative to combat acne could be polyherbal formulations, which exerts synergistic anti-microbial activity due to phytochemical interactions. Pomegranate peel, Green tea, and Manuka honey showed good antimicrobial activity in several studies.

Objective: To formulate and characterize a polyherbal gel for treating and managing acne using Pomegranate (*Punica granatum L.*), Green tea (*Camellia sinensis*) and Manuka honey.

Methods & Materials: It is a laboratory-based experimental study. Four different gel formulations were prepared using 4% w/w pomegranate peel methanolic extract (Formulation A), 2% w/w green tea methanolic extract (Formulation B) and 20% w/w Manuka honey (Formulation C), individually and as a combination in the same percentages (Formulation D) in carbopol gel base. *In-vitro* antibacterial activity and physicochemical parameters of the prepared formulations were evaluated to characterize the gel. The minimum inhibitory concentrations (MIC) were found using the microbroth dilution method. *In-vitro* antibacterial activity of the prepared herbal gels was compared with marketed products using agar-well diffusion method against acne causing bacterial strains such as *S. epidermidis and S. aureus*. The statistical analyses were done using paired sample t-test and ANOVA in SPSS software. The p-value less than 0.05 was considered statistically significant.

Results: Among the four formulations, Formulation D showed the highest anti-bacterial activity, and it was comparable to clindamycin 1% w/w gel. Anti-bacterial activity increased as Formulation B < Formulation A< Formulation D < clindamycin 1% w/w. Further, the marketed polyherbal anti-acne formulation, used as a positive control, did not show any inhibition zones.

Conclusion: The polyherbal gel (Formulation D), was found to be effective against acne-causing microorganisms.

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