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## DEVELOPMENT OF A HERBAL SUNSCREEN FORMULATION AND ITS EVALUATION

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### Abstract

Ultraviolet radiation particularly UV-A and UV-B from the sun is the major cause of sunburn, erythema and non-melanoma skin cancer in humans. The incidents of harmful effects are increasing day by day.

Photoprotective agents like sunscreens and anti-oxidants are used for protection against harmful UV rays. Both synthetic and natural sunscreens are available in the market where sunscreens from natural origin gained greater acceptance because of much safety and greater protection. The purpose of this research is to develop a polyherbal sunscreen prepared from the extracts of *Vitis vinifera* and *Calendula officinalis*. These two are selected because of their acceptable antioxidant and photoprotective activity.

The polyherbal cream was prepared by incorporating the extracts. The various physicochemical properties of the cream were determined. Using UV spectrophotometric method, the sun protection factor (SPF) of the creams and using DPPH method the invitro antioxidant activity of the extracts were determined. The formulated sunscreen cream shown to have desirable SPF and anti-oxidant activity offering skin protection against UVA/UVB rays from the sun.

**Key words:** Sunscreen, Herbal, SPF, UV

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## EVALUATION OF COUMARIN DERIVATIVES FOR ANTI COAGULANT AND ANTIBACTERIAL PROPERTIES

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### Abstract

Background: Antibiotics such as Trimethoprim/Sulfamethoxazole, Ciprofloxacin, Levofloxacin, Metronidazole, Fluconazole, Azithromycin, and Clarithromycin are considered to be high risk when administered along with warfarin. They interfere with warfarin metabolism via CYP2C9, CYP1A2+, CYP3A4 and intestinal flora that synthesis Vitamin K leading to significant bleeding events. We hypothesise that introduction of appropriate groups in coumarins (warfarin derivatives) may impart antibiotic property without affecting it's anticoagulant property.

Objective: To identify coumarin derivatives which have significant antibiotic as well as anticoagulant property.

Materials and methods: Three (2a, 2b and 2c) coumarin derivatives were synthesised by Pechmann condensation reaction and characterised. They demonstrated significant antibiotic activity when tested against gram positive bacteria *Staphylococcus aureus* and gram negative *Escherichia coli* using agar well diffusion method and Amoxicillin as standard. The anticoagulant studies were done on these compounds by PT time method and compared with Warfarin. To get an insight on the mode of action, a molecular docking study was performed, using Autodock4 program and Vitamin k epoxide reductase enzyme (PDB:3KP9) as the target protein.

Conclusion: This study identified three coumarin derivatives with significant antibacterial activity. Two compounds showed comparable anticoagulant property, to that of warfarin. Interestingly, one compound, in contrast, improved overall coagulation effect on normal blood. Our studies proved that antibiotic activity can be induced into coumarin derivatives by introducing appropriate functional groups, while retaining their anticoagulant property.

**Key words:** Coumarin, warfarin, anticoagulant, antibacterial

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