



# Anti-*Acinetobacter baumannii* Effect of Steroid Derivatives Isolated from Marine Coral, *Sarcophyton tenuispiculatum* Thomson & Dean

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## ABSTRACT

**Introduction:** Marine organisms comprise more than half of the total global diversity. Among them, soft corals constitute a significant group of marine invertebrates widely distributed in the coral reefs. *Sarcophyton* genus, as an essential genus, contains valuable compounds such as macrocyclic diterpenes (cembrene and especially norcembrene derivatives), sesquiterpenes, and triterpenes (steroids) with various biological activities. Several studies demonstrated which macrocyclic diterpenoids and steroids have anti-inflammatory, anti-neoplastic, anti-tumor, anti-cancer, and antibacterial effects.

**Methods and Materials:** Using the maceration method, *Sarcophyton tenuispiculatum* was dried and extracted with acetone and then methanol. The extract was partitioned with hexane, methanol, ethyl acetate, butanol, and water solvents. The hexane fraction and methanol fraction were attempted by flash column chromatography with dichloromethane: ethyl acetate (from 100:0 to 80:20) and hexane: ethyl acetate solvents (from 97:3 to 55:45), respectively. After several steps, compounds 1, 2, and 3 were isolated and characterized by <sup>1</sup>H-NMR. After identifying these compounds, the minimum inhibitory concentration and efflux pump activity of isolated steroids were determined by serial dilution, carbonyl cyanide chlorophenylhydrazine, and agar ethidium-bromide cartwheel methods, respectively.

**Results:** Three steroids were identified based on spectra analysis of <sup>1</sup>H-NMR and GC-MS. Compound 1: ergosterol, compound 2: ergost-5-en-3 $\beta$ -ol, and compound 3: 5,8-epitaxy-5 $\alpha$ ,8 $\alpha$ -ergosta-6, 22E-dien-3 $\beta$ -ol) were identified. The results of the *Acinetobacter baumannii* test of these compounds demonstrated a phenomenal effect on this microorganism through efflux pump inhibition.

**Conclusion and Discussion:** *A. baumannii* is a broad-spectrum, antibiotic-resistant bacterium. Inhibition of the efflux pump is a crucial mechanism for combating bacterial resistance. *A. baumannii* is known to cause nosocomial infections, particularly in the intensive care units. The efflux pump inhibitory effects of gorgostane and ergosterol derivatives have been demonstrated. The *Sarcophyton* genus, especially *S. tenuispiculatum*, is a valuable coral found in the Persian Gulf. Since the medicinal properties of marine corals are not yet well understood, they may represent a promising new source of antibacterial agents to address antibiotic resistance and nosocomial infections.

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