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Determining the Effects of Sulphide Derivatives towards the Efficiency of Clindamycin against *Propionibacterium acnes*

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Structured Abstract

Background: Acne vulgaris is a common skin condition characterised by chronic inflammation of sebaceous follicles that causes itchiness and pain. A key contributor to the pathogenesis of acne is the anaerobic bacterium *Propionibacterium acnes*, which is most abundant within the lipid-rich sebaceous follicles, especially on the face, back, and chest. Antibacterial drugs, like clindamycin, are commonly used to treat acne due to their anti-inflammatory and antimicrobial properties targeting bacteria like *P. acnes*. However, overusing these antibiotics can lead to bacterial resistance, making them less effective over time. A recent study suggested that reactive sulphur species (RSS) may decrease antimicrobial potency against various bacteria. Despite this, it is still unclear whether these sulphide compounds could impair the therapeutic effectiveness of topical antimicrobial drugs. Therefore, this study aims to investigate the potential impact of sulphide derivatives on drug efficacy in treating *P. acnes* strain ATCC®-6919.

Methods: The samples were cultivated in a sulphide-rich environment by adding sulphide donours such as CysSH, GSH, and NaHS with different concentrations before exposure to the antimicrobial drug clindamycin and their viability was evaluated by determining the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of the tested compounds. Then High-Performance Liquid Chromatography (HPLC) analysis was conducted to quantify the concentration of clindamycin residue in the samples.

Results: The study reveals that supplemented sulphide species can affect the clindamycin efficiency against *P. acnes.* No toxicity properties was observed in the *P. acnes* treated with sulphide donours. However, the *P. acnes* supplemented with the RSS exhibited a protective effect against clindamycin.

Conclusion: In conclusion, these findings highlight the complex nature of using sulphur-containing compounds with antibiotics to treat *P. acnes* infections. Therefore, further research on the mechanistic action of the RSS and clindamycin interaction is highly sought. This knowledge potentially contributes to the development of targeted strategies for acne management.

Keywords: Acne Vulgaris, *Propionibacterium acnes*, Reactive Sulphur Species (RSS), Antibacterial Resistance, Clindamycin.

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