LETTER TO THE EDITOR

Paraherquamide J: A Novel Prenylated Indole Alkaloid from *Penicillium janthinellum* HK1-6 as a Potential Therapeutic Agent Against ESKAPE Pathogens

Dear Editor,

Paraherquamide J, a prenylated indole alkaloid derived from the marine fungus *Penicillium janthinellum* HK1-6 (Zheng et al., 2020), holds significant promise as a novel antimicrobial agent against ESKAPE pathogens (Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Enterobacter species). These multidrug-resistant (MDR) pathogens are responsible for severe nosocomial infections and pose a major challenge to global healthcare due to their ability to evade conventional antibiotics (Sousa et al., 2021). Paraherquamide J's unique structural features, including its indole alkaloid core and prenyl modifications, suggest potential interactions with bacterial membranes, efflux pumps, and essential enzymatic pathways, making it a strong candidate for combating antimicrobial resistance (AMR).

The primary mechanism of Paraherquamide J against ESKAPE pathogens may involve disruption of bacterial cell membrane integrity, leading to leakage of intracellular components and cell death (Figure 1). Additionally, it could inhibit essential bacterial enzymes, such as DNA gyrase and topoisomerase IV, which are crucial for DNA replication and bacterial survival. Paraherquamide J may also function as a quorum-sensing inhibitor, preventing biofilm formation, a key defense mechanism of ESKAPE bacteria that enhances antibiotic resistance. Its ability to bypass traditional antibiotic resistance mechanisms, such as β-lactamase production and efflux pump overexpression, further enhances its therapeutic potential.

Future applications of Paraherquamide J could include its development as a standalone antimicrobial agent or in combination with existing antibiotics to restore their efficacy against resistant strains. Its integration into nanoparticle-based drug delivery systems may improve its stability and targeted delivery, reducing toxicity and enhancing therapeutic outcomes. Moreover, structural modifications through medicinal chemistry approaches could optimize its potency, pharmacokinetics, and spectrum of activity. Clinical trials will be essential to assess its safety, efficacy, and potential resistance development. If successfully developed, Paraherquamide J could serve as a groundbreaking marine-derived antibiotic, offering a much-needed solution against MDR ESKAPE pathogens and helping to curb the rising global threat of antibiotic resistance.

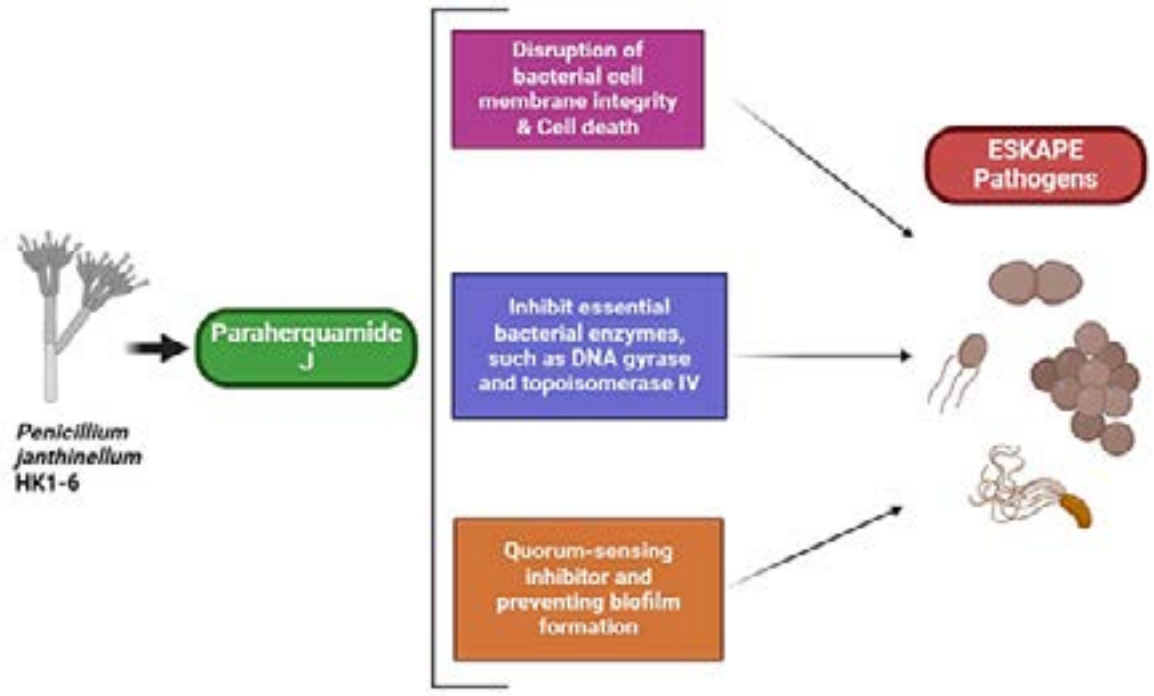

Figure 1: Different ways of Paraherquamide J on targeting ESKAPE Pathogens.

Declarations

Ethics approval statement

No ethical approval was required for the current study as it did not deal with any human or animal samples.

Consent to participate

Not applicable

Consent to publish

Not applicable

Data Availability Statement

The data are available from the corresponding author upon reasonable request

Competing Interests

The authors declare that they have no conflict of interest

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Author contribution

S.B: Conceptualization, Writing and Reviewing draft, Investigation, Project administration, and Supervision

Reference

1. Sousa, S.A., Feliciano, J.R., Pita, T., Soeiro, C.F., Mendes, B.L., Alves, L.G., Leitão, J.H., 2021. Bacterial Nosocomial Infections: Multidrug Resistance as a Trigger for the Development of Novel Antimicrobials. Antibiotics 10, 942. https://doi.org/10.3390/antibiotics10080942
2. Zheng, Y.-Y., Shen, N.-X., Liang, Z.-Y., Shen, L., Chen, M., Wang, C.-Y., 2020. Paraherquamide J, a new prenylated indole alkaloid from the marine-derived fungus Penicillium janthinellum HK1-6. Nat. Prod. Res. 34, 378–384. https://doi.org/10.1080/14786419.2018.1534105

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