Área: INO

Antimicrobial activity analysis of coordination compounds containing Schiff Bases

Ronan F. F. Souza (PQ),[1,2*] Wladimir P. D. Badaró (PG),[3] Andressa A. Lima (PG),[3] Isabella O. Nogueira (IC),[3] Adelino V. G. Netto (PQ),[3] Cleide V. Buzanello (PQ)[1,2*]

ronffs.rf@gmail.com; cvbuzanello@gmail.com

[1]Centro de Ciências da Saúde, Unioeste – Francisco Beltrão; [2]Centro de Engenharias e Ciências Exatas, Unioeste – Toledo; [3]Instituto de Química, Unesp - Araraquara

Palavras Chave: *Compostos de coordenação, Bases de Schiff, Tiossemicarbazonas, Atividade antimicrobiana, Concentração inibitória mínima*

Highlights

Antibacterial evaluation of Pd/Ag-thiosemicarbazone coordination compounds. Pd-complex W2 showed dual antibacterial activity. Pd-complex W5 was active against *S. aureus* (MIC=16µg/mL). Metal complexes outperformed free ligands.

Abstract

The emergence of multidrug-resistant bacteria is a critical global health challenge, motivating the search for new antimicrobial agents [1]. Schiff base coordination compounds have garnered significant interest in this field due to their diverse biological activities [2]. This study evaluated a series of 12 coordination compounds (10 palladium and 2 silver complexes) and 9 thiosemicarbazone ligands (TSC), organized into five distinct groups based on their composition and molecular structure, with general formulae [PdCl(*N,S*-TSC)PPh_3]Cl, [PdCl(*N,N',C*-TSC)], [Pd(*N,S,C*-TSC)PPh_3], [Pd(*N,S,O*-TSC)PPh_3], and [AgCl(*S*-TSC)$(PPh_3)_2$], where PPh_3 = triphenylphosphine and *N,S,O,C* represent the donor atoms from the thiosemicarbazone ligand (TSC). The antibacterial potential was assessed against *Gram*-negative (*Escherichia coli*, *Pseudomonas aeruginosa*) and *Gram*-positive (*Staphylococcus aureus*) bacteria. The Minimum Inhibitory Concentration (MIC) was determined using the broth microdilution method, following CLSI guidelines [3]. While most compounds and ligands exhibited modest activity (MIC ≥ 256 µg/mL), significant efficacy was observed in specific metal complexes. Pd-complex W2 exhibited promising dual activity against both *E. coli* and *S. aureus* (MIC = 32 µg/mL), while Pd-complex W5 displayed notable performance against *S. aureus* (MIC = 16 µg/mL). Crucially, the metal complexes significantly outperformed their corresponding free ligands (MIC > 256 µg/mL), underscoring the essential role of metal coordination in enhancing antibacterial properties. Subculture assays revealed a bactericidal mode of action for Pd-complex W2 and Ag-complex I3, while Pd-complexes A2 and W4 were bacteriostatic. These findings identify specific Pd(II)/Ag(I) thiosemicarbazone complexes as promising candidates for the development of new antibacterial therapies against relevant pathogens.

[1] BOUCHER, H. W. et al. Clin. Infect. Dis., v. 48, n. 1, p. 1-12, 2009.
[2] PATIL, S. A. et. al. Future Med. Chem., v. 7, p. 1305-1333, 2015.
[3] CLSI. Methods for Dilution Antimicrobial Susceptibility Tests, M07, 2018.

Acknowledgments

The authors thank Araucária Foundation and CNPq/CAPES for financial support. We also acknowledge the Laboratory of Microbiology at Unioeste and the Graduate Program in Applied Health Sciences for the infrastructure provided.