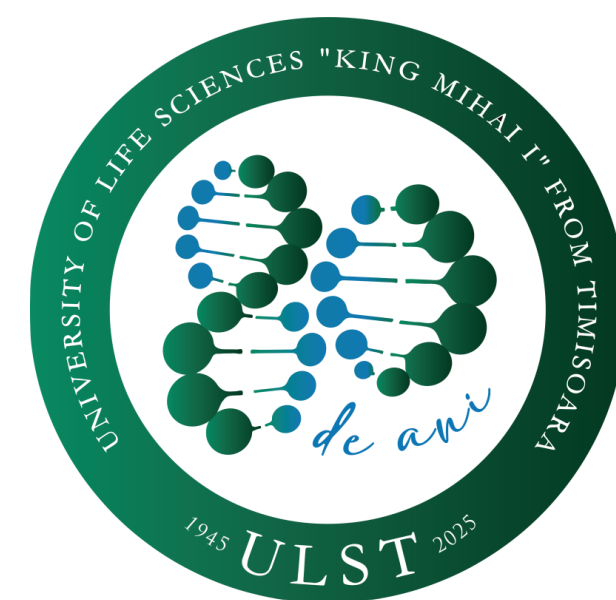




UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM
TIMISOARA
"YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH
IN APPLIED LIFE SCIENCES"

13-14 November, 2025



"Young people and multidisciplinary
research in applied life sciences"

NATURAL AND SYNTHETIC COMPOUNDS WITH ANTIMICROBIAL POTENTIAL: A REVIEW

Marioara Nicoleta CARABA^{1,2,3}, Dainela PUSCASIU^{2,3*}, Mihai MITULETU^{2,3}, Isabella Ionela STOIAN^{2,3}, Ion Valeriu CARABA^{3,4*}, Gabi DUMITRESCU^{3,4}, Roxana POPESCU^{2,3}, Adelina CHEVERESAN⁵

¹ Doctoral School, Faculty of Medicine, "Victor Babeș" University of Medicine and Pharmacy, 2nd Eftimie Murgu Square, 300041 Timisoara, Romania; e-mail: nicoleta.caraba@umft.ro

² Department of Cellular and Molecular Biology, Faculty of Medicine, "Victor Babeș" University of Medicine and Pharmacy of Timisoara, E. Murgu, 2, Timisoara, 300041 Romania, e-mail: nicoleta.caraba@umft.ro, puscasIU.daniela@umft.ro, mihai.mituletu@umft.ro, isabella.stoian@umft.ro, popescu.roxana@umft.ro,

³ ANAPATMOL Research Center, "Victor Babeș" University of Medicine and Pharmacy of Timisoara, E. Murgu, 2, Timisoara, 300041 Romania,

⁴ Faculty of Bioengineering of Animal Resources, Banat University of Agricultural Sciences and Veterinary Medicine "King Mihai I of Romania" from Timisoara, Calea Aradului 119, RO 300645, Timisoara, Romania, e-mail: valeriucaraba@usvt.ro, gabidumitrescu@usvt.ro,

⁵ Department of Biochemistry and Pharmacology, Faculty of Medicine, "Victor Babeș" University of Medicine and Pharmacy, 2nd Eftimie Murgu Square, 300041 Timisoara, Romania e-mail: adelina.cheveresan@umft.ro

Antimicrobial resistance has recently become a global challenge, as bacterial pathogens are becoming increasingly resistant to traditional antibiotics. Because use of classical antibiotics as standard treatment for bacterial infections has led to an alarming situation of microbial resistance development, increasing antimicrobial treatment failures, and increasing mortality rates. Studies in recent years have aimed to identify new molecules with properties comparable to those of classical antibiotics, which would act effectively on microorganisms and improve health. New molecules with therapeutic effects can be obtained from natural sources or by chemical synthesis or can be components derived from natural resources.

The most important natural sources used due to their antimicrobial potential are plants and bee products. Synthetic products are obtained chemically and have in their composition biologically active compounds such as various ions or molecules that have the ability to interact with the microbial cell. With the increasing importance and prevalence of herbal medicines, but also of a wide range of synthetic compounds, it is necessary to carry out appropriate assessments to allow their use.

The insufficient pharmacological evaluation, the small number of in vitro studies, but especially in vivo studies of herbal or synthetic drugs, hinder their use in contemporary medical practice. Complex in vivo and in vitro studies are needed to address aspects of: cellular cytotoxicity, prokaryotic cell-eukaryotic cell interactions, intracellular activity, prokaryotic cell-environment interaction, gene expression studies and metabolomic aspects of natural or synthetic drugs with antimicrobial potential.

Conclusions

As a result, natural resources or components derived from natural resources, respectively synthetic products, will have an important role in the development of adequate medication with an important role in solving public health problems.