

Paradigm shift: focusing on plant-based natural antimicrobials

Abstract

Antimicrobial resistant bacteria are still responsible for the increasing morbidity and mortality due to infectious diseases despite the breakthrough in the discovery of better and strong antibiotics in recent time. Plant species, however, still remains a very rich source of many novel biologically active compounds. Therefore, more researches are needed in the area of plant-based natural antimicrobials.

Keywords: antimicrobials, morbidity, mortality, antibiotics, enigmatic, pharmacological

Volume 5 Issue 2 - 2017

Idris Adewale Ahmed, Maryam Abimbola Mikail

Department of Biotechnology, Lincoln University College, Malaysia

Correspondence: Idris Adewale Ahmed, Department of Biotechnology, Faculty of Science, Lincoln University College, Malaysia, Tel 60176042393, Email idsrahmed@lincoln.edu.my

Received: June 09, 2017 | **Published:** June 23, 2017

Mini review

Despite the breakthrough in the discovery of better and strong antibiotics in recent time, it is enigmatic, however, that antimicrobial resistant bacteria are still responsible for the increasing morbidity and mortality due to infectious diseases.¹ In fact, pathogens have developed resistance against every class of antibiotics, and thus making the menace of widespread antibiotic resistance a global healthcare problem.² The renewing interest in phytomedicine during last decade and nowadays such that medicinal plant species are being screened for relevant pharmacological activities, however, is due to the fact that plant species still remains a very rich source of many novel biologically active compounds and because very few plant species have been thoroughly investigated so far. Thus, the use of bioactive compounds from different medicinal plants as natural therapeutic agents would ever remain an important biomedical and natural product research area.³ Furthermore, the potentiality of higher plants in producing varieties of secondary metabolites with significant antimicrobial property is remarkably supporting the growing interest in the development of phytomedicines against drug-resistance microbes. It is also becoming an axiom that intensive use of an antibiotic is often followed by the appearance of resistant strains. In view of this, the search for new antimicrobial agents continues unabated and increasing, thus, medicinal plants are promising resources. The use of medicinal plants as screening pool for novel antibiotics has several advantages related to safety, availability, and minimizing the risk of side effects and addiction. The World Health Organization (WHO) adopted a major policy change in accepting that most developing nations would have to make use of more traditional medical practices for primary health care.

The potent antioxidant properties of plant polyphenols and other bioactive dietary compounds in plants have made them the most sustainable source of antimicrobials.⁴ These Plant-based therapies and interventions are not only applicable to infectious and communicable diseases, but also have health benefits that could reduce the risk of chronic and non-communicable diseases such as diabetes, cardiovascular disease, certain cancers, and other age-related degenerative diseases and thus serve as one of the best alternatives to synthetic antioxidant equivalents with growing public rejection. Consumers are also increasingly demanding a limit to the use of synthetic additives, as these artificial chemicals have been

established as potential health hazards in some instances, due to toxic impurities deriving from the synthetic pathways. The whole world is also experiencing an unappealing, incessant and appalling rising costs, environmental concern and scarcity of petroleum and other chemical products, thus, the new trend and paradigm shift is to develop alternative sources of raw materials for both domestic and industrial uses, these alternative sources should not only be biodegradable but should also be environmentally friendly, abundant in nature as well as sustainable.

The most common and sufficient sources of these novel biologically active compounds such as phenolic compounds and vitamins are diets which are rich in fruit, vegetables, and minimally-refined cereal⁵ in addition to medicinal and aromatic plants.^{6,3} The growing concern about bacterial resistance to antibiotics has culminated in a considerable interest in investigating the antimicrobial effects of different plant extracts and essential oils against a range of bacteria, in order to develop better classes of natural antimicrobials which are capable of controlling infection, preserving food and being used in the food and pharmaceutical industries.⁷ The increase in outbreaks of food-borne disease has also led to greater concern over pathogenic and spoilage microorganisms in foods.⁸ Synthetic antimicrobials and disinfectants have also been associated with a variety of genotoxic, mutagenic and/or carcinogenic byproducts.⁹

Conclusion

In conclusion, more researches are needed in the area of plant-based natural antimicrobials in addition to the development of nanoparticle-based antimicrobial agents through the use of different classes of antimicrobial nanoparticles and nanosized carriers for antibiotics delivery.¹ The use of membrane active antimicrobials, which act on the bacterial membrane, also offers a potential solution to the problem of antibiotic resistance because the commonly used antibiotics are rendered ineffective as a result of the fact that most antibiotics usually interfere with bacterial biosynthesis only.²

Acknowledgements

None.

Conflicts of interest

The authors declare that there is no conflict of interest.

References

1. Sportelli MC, Picca RA, Cioffi N. Recent advances in the synthesis and characterization of nano-antimicrobials. *TrAC Trends in Analytical Chemistry*. 2016;84:131–138.
2. Li J, Liu S, Koh JJ, et al. A novel fragment based strategy for membrane active antimicrobials against MRSA. *Biochimica et Biophysica Acta*. 2015;1848(4):1023–1031.
3. Mgbeahuruike EE, Yrjönen T, Vuorela H, et al. Bioactive compounds from medicinal plants: Focus on Piper species. *South African Journal of Botany*. 2017;112:54–69.
4. Ibrahim M, Mikail MA, Ahmed IA, et al. Comparison of the effects of three different *Baccaurea angulata* whole fruit juice doses on plasma, aorta and liver MDA levels, antioxidant enzymes and total antioxidant capacity. *Eur J Nutr*. 2017.
5. Ahmed IA, Mikail MA, Ibrahim M. *Baccaurea angulata* fruit juice ameliorates altered hematological and biochemical biomarkers in diet-induced hypercholesterolemic rabbits. *Nutrition Research*. 2017;42:31–42.
6. Ahmed IA, Mikail MA, Bin Ibrahim M, et al. Antioxidant activity and phenolic profile of various morphological parts of underutilised *Baccaurea angulata* fruit. *Food Chem*. 2015;172:778–787.
7. Adewale AI, Mirghani MES, Muyibi SA, et al. Anti-bacterial and cytotoxicity properties of the leaves extract of nahar (*Mesua ferrea*) plant. *Adv Nat Appl Sci*. 2012;6(5):583–587.
8. Adewale AI, Mirghani MES, Muyibi SA, et al. Extraction and antibacterial activity of nahar (*Mesua ferrea*) seed kernels' oil. *ACT-Biotechnology Research Communications*. 2010;1(1):28–32.
9. Adewale AI, Mirghani MES, Muyibi SA, et al. Disinfection studies of Nahar (*Mesua ferrea*) seed kernel oil using pour plate method. *African Journal of Biotechnology*. 2011;10(81):18749–18754.