Natural Products: An Indian Journal

Commentary | Vol 15 Iss 1

The Use of Brazilian Cerrado Plants in the Control of Microbial Infections

Daniela Reis Joaquim de Freitas[1*] and Antônio Rosa de Sousa Neto[2]

[1]Department of Parasitology and Microbiology, Federal University of Piauí, State of Piauí, Brazil

[2]Department of Nursing, Federal University of Piauí, State of Piauí, Brazil

[*]**Corresponding author:** Daniela Reis Joaquim de Freitas, Department of Parasitology and Microbiology, Federal University of Piauí, Brazil, Tel: +5508632156558; E-Mail: freitas.drj@gmail.com

Received: June 03, 2019; **Accepted:** June 23, 2019; **Published:** July 01, 2019

Abstract

This article exposes the importance using the vegetal biodiversity of Brazil´s cerrado biome in order to obtain products used in the control of microbial infections, as well as the need for its preservation and study.

Keywords: Cerrado plants; Antimicrobian activity; Biodiversity; Animal and human health; Eco-sustainability

Commentary

The Cerrado biome is the second largest biome in South America. It occupies a vast area of 2,036,448 km^2 and represents about 22% of the Brazilian territory. Within this territorial area, the springs of the three largest hydrographic basins in South America can be found-the Amazon Basin and the Tocantins, the São Francisco River Basin and the Prata Basin-and as a result, there is high biodiversity in this biome. The cerrado is considered one of the main biodiversity hotspots worldwide, and presents an extreme abundance of endemic species; however, it has suffered a great loss of habitat lately. The Brazilian Cerrado is recognized as the richest savannah in the world, sheltering 11,627 species of native plants already described, widely used in traditional folk medicine [1]. Because of this, it has been the focus of several research papers.

It´s known medicinal plants are traditionally used in many parts of the world as alternative medicine. Many extracts and essential oils isolated from plants have revealed a great diversity of biological activity, justifying the investigation of their potential antimicrobial activity. Thus, it can be concluded that in places of great biodiversities, such as the aforementioned Cerrado, there may be many plant species with antimicrobial activity, and much has been studied about this.

The demand for new natural products that have antimicrobial activity is particularly interesting since the current

Citation: Freitas DRJ, Neto ARSl. The Use of Brazilian Cerrado Plants in the Control of Microbial Infections. Nat Prod Ind J. 2019;15(1):126.

antimicrobial agents (formulated synthetically in the majority by the big pharmaceutical industries) that are in the market are no longer often efficient for human and animal treatment since the micro pathogens quickly acquire resistance to them. For example, the reduced number of antifungal drugs currently available for the treatment of fungal infections, high drug resistance, and their relative toxicity demonstrate this need to evaluate new treatment strategies that are more effective and less toxic due to the progressive increase of infections by species of non-*Candida albicans*. In addition, the selective pressure of *Candida* species due to continuous exposure of the infectious agent to azoles appears to be the main cause of the development of resistance to fluconazole, the main drug in the treatment of candidiasis. Also, prolonged use is not advisable since there are side effects, hence the increased demand for natural resource agents, since they could act better on the host. Some studies show that several extracts and essential oils from Cerrado herbs may present anti-candidiasis activity [2]. The chemical study of extracts of species *Eugenia dysenterica* and *Pouteria ramiflora* with antifungal activity revealed catechin derivatives and flavonoids as main components. It has also demonstrated that ethanolic extracts of *Banisteriopsis argyrophylla* leaves have strong antifungal activity against *C. glabrata, C. albicans* and *C. tropicalis* [3].

The roots of *Cochlospermum regium*, known by the local communities as cerrado cotton are been used in the treatment of genitourinary infections. A study carried out showing that there is antimicrobial activity in the ethanolic extract of *C. regium* leaves, and no mutagenic activity. This makes this plant a viable option for the treatment of genitourinary infections [4]. Trees of the Myrtaceae family are widely used in folk medicine for the treatment of gastrointestinal disorders, hemorrhagic and infectious diseases, and *Myrcia bellae* and *M. fallax* have shown to have antimicrobial activity against *Escherichia coli* [5]. Another Myrtaceae, *Campomanesia adamantium*, popularly known as guabiroba has antidiarrheal properties and antimicrobial action [6]. Still speaking of antimicrobial activity, there are several scientific studies that show activity against *Staphylococcus aureus* and other microorganisms responsible for community and hospital infections. Some studies show the isolation of substances obtained from microorganisms present in Cerrado soil, such as Oliveira et al. [3], who isolated and characterized molecules with antimicrobial activity derived from the fungus *Penicillium citrinum* found in that soil and showed the antibacterial potential of these molecules when isolated or in combination with commercial antimicrobial agents. Their results showed excellent results against *S. aureus* methicillin resistance and *Enterococcus faecium* vancomycin resistance.

In another study, the phytochemical identification of several compounds of *Aristolochia cordigera* (commonly known as cipo-de-coração or guaco bravo) was performed by mass spectroscopy, including lignans, neolignans, aristolochic acids, indole-β-carboline and indole alkaloids. *In vitro* susceptibility of intracellular amastigote and promastigote forms of *Leishmania amazonensis* to alkaloids and eupomatenoid-7, a neolignan, exhibited some activity against promastigotes (Inhibitory Concentration (IC) 50=46 μM). The new alkaloid 6-O-(β-glucopyranosyl) hyrtiosulawesine exhibited low activity against *Plasmodium falciparum*, with an IC 50 value of 5 μM and a selectivity index greater than 50 [7]. However, diterpene compounds of *Aldama discolor* (Asteraceae) have strong anti-protozoal activity: the ent-kaurane 1 compound against *P. falciparum* (IC 50=3.5 μM) and *L. donovani* (IC 50=2.5 μM); and the sesquiterpene lactone budlein A against *Trypanosoma brucei rhodeiense* (100% inhibition of

growth at 2 μg/ml) [8]. These are promising data because commercially used antiprotozoal drugs are relatively scarce, and generally, have large side effects.

It is important to emphasize that it is a necessity of man's survival to find natural products with strong antimicrobial activity, that are eco-sustainable, have low toxicity to animals and humans and low economic costs. After all, microorganisms tend to multiply and resist on a scale almost impossible to follow, and the production of synthetic molecules for drug production by the pharmaceutical industry has its limitations; besides, there are enormous side effects in the users of these medications. Finally, there is still the question of the residual effect of these antimicrobials on the environment, contaminating it. Choosing to pollute less the environment and lessen resistance to synthetic chemicals is a matter of intelligence.

Despite the recognition of its biological importance, of all the world hotspots, the Cerrado is the one that has the lowest percentage of areas on integral protection. This biome presents only 8.21% of its territory legally protected by conservation units [1]. Researching the fauna and flora of these areas is a way of highlighting the importance of this biodiversity to the world, obtaining new ways of controlling resistant pathogenic microorganisms and preserving this great patrimony of humanity.

Acknowledgment

We would like to thank the Federal University of Piauí for the financial support of our researches regarding plant extract use on vector control of diseases, parasites and microbial agents.

REFERENCES

1. http://www.mma.gov.br/biomas/cerrado.
2. Correia AF, Silveira D, Fonseca-Bazzo YM, et al. Activity of crude extracts from Brazilian cerrado plants against clinically relevant Candida species. BMC Complement Altern Med. 2016;16:203.
3. Oliveira DM, Silva TFR, Martins MM, et al. Antifungal and cytotoxicity activities of Banisteriopsis argyrophylla leaves. J Pharm Pharmacol. 2018;70(11):1541-52.
4. Leme DEM, Rodrigues AB, de Almeida-Apolonio AA, et al. *In vitro* control of uropathogenic microorganisms with the ethanolic extract from the leaves of *Cochlospermum regium* (schrank) pilger. Evid Based Complement Alternat Med. 2017.
5. Dos Santos C, Galaverna RS, Angolini CFF, et al. Antioxidative, antiproliferative and antimicrobial activities of phenolic compounds from three myrcia species. Molecules. 2018;23(5):E986.
6. Lescano CH, de Oliveira IP, Zaminelli T, et al. Campomanesia adamantium peel extract in antidiarrheal activity: the ability of inhibition of heat-stable enterotoxin by polyphenols. PLoS One. 2016;11(10):e0165208.
7. Pereira MDP, da Silva T, Aguiar ACC, et al. Chemical composition, antiprotozoal and cytotoxic activities of indole alkaloids and benzofuran neolignan of aristolochia cordigera. Planta Med. 2017; 83(11):912-20.
8. Nogueira MS, Da Costa FB, Brun R, et al. ent-pimarane and ent-kaurane diterpenes from aldama discolor (asteraceae) and their antiprotozoal activity. Molecules. 2016;21(9):1237.