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The Rise of New Antifungal Drugs Resistant Fungal Pathogen

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Received: May 07, 2019; **Published:** June 20, 2019

Abstract

Medical personnel and patients of all over the world must face bacterial and fungal pathogenic strains which acquired a dangerous resistant to antimicrobials and respective to antifungal. A *Candida auris* outbreak is more and more discussed in scientific journal and in popular media. The paper discusses briefly the main problems of the outbreak of these fungal strain infections.

Keywords: *Candida auris; Fungal Strain*

Introduction

We must face an era were the most dangerous pathogens do not answer any more to one or more antibiotics, and nosocomial strains are in important high level hospitals and is very hard to get rid of them. The same happens with human pathogenic fungi, which have more and more antifungal resistant strains. *Candida* species are in a top of the fungal infections diseases.

All *Candida auris* strains are haploid, in opposition with other species like *C. dubliniensis* and *C. tropicalis* which are obligate diploids [1] with a karyotype with 5 - 7 chromosomes, susceptible to undergo mutations under environment pressure (genotoxic, heat, osmotic stress) with quickly changes in pathogenicity [2].

In many scientific works this resistance is highlighted to normal *Candida* strains involved often in different infections *C. albicans, C. guilliermondii, C. krusei, C. parapsilosis* and so on. *Candida auris* has been recently described [3]. The strain becomes multi antifungal resistant in relatively short time from its discovery and becomes a global threat with the unusual rapidly evolving multidrug resistance [4] and was identified in many countries Colombia, India, Israel, Kenya, Kuwait, Pakistan, South Africa, South Korea, Venezuela, United Kingdom and United States. The *C. auris* strain were confounded and misidentified as *Candida haemulonii*, *Candida famata*, *Saccharomyces cerevisiae* and so on [5]. Strains resistant to fluconazole were discovered in some cohort studies as *C. glabrata, C. krusei, C. albicans* infections [6]. Even with many advantages of modern medicine, we assist to a rise of infection and in special of dangerous opportunistic fungal infections [7]. A study in two hospitals [8] from Romania were identified many resistant strains, and even multi antifungal resistant, but not *C. auris*. All time the scientists and pharmacists must search for new appropriate molecules to face this challenge.

Materials and Methods

Being a review study, it implied the search and study of scientific literature from 2009 until now, on this subject, and selection of the most appropriate for the present article.

Results and Discussion

C. auris is the first fungal pathogen considered an public health threat, by its ability to colonize skin and mucouses, to fix on medical equipment, efficient person to person transmission, blood infections, and escape of nosocomial control [9]. Patients with cardiovascular diseases, polytrauma and cancer, infected with *Candida auris* and diferents infected objects like patients tables, sphygnomannometers cuffs, keyboards and infusion pumps, resistants to fluconazole and with reduced answer to voriconazole [10]. Oral infections with C albicans and non-albicans strains affects elder people, with risk factors which affects the predominance of albicans and non-albicans infection [11]. Non albicans infections revealed that dectin 1 an ligand beta (1,3) glucan is on the surface of *C. krusei* and is essential for recognition for host myeloid cells and development of Th1, Th 17 cells for having a host immune responde against *C. Krusei* [12]. The identification of *Candida auris* is not easy to do, sometime, even witth Vitek system are misidentified as *C. famata* or *C.haemulonii.* Recently trials with matrixassistedlaser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS), has done the differnce between species [13].

Looks like that older cells of *C. auris* show high tolerance to antifungals-fluconazole, micafungin and amphotericin B and 5 flucitozine than new cells. The mechanisms of transient gene duplication cause fluconzol tolerance in old cells during replicative aging [14]. Hsp90 are essential for the development of *C. auris*, enabling the resistance to azoles [15].

C. auris can produce invasive infections with high mortality rates and resistant to antifungal drugs and with big efforts of prevention can be stopped and managed [16]. Fungal otomastoiditis with this strain in immunocompromised patients is responsible for high mortalities, treatments are difficult due to misdiagnosis and multi antifungal resistance [17]. In the period 2006 - 2016, were identified many invasive fungal infections with *Candida* strains including six *Candida auris* strains from nosocomial bloodstream infections and they were all fluconazole resistant [18]. An important role in stress and resistance to antifungal drugs, plays Hog1 stress-activated protein kinase (SAPK) and it promotes fungal strain virulence [19].

New antifungal medicine *Candida albicans (C. albicans)*was issue and consist in graphene oxide and Fluconazole which reduce adhesion ability to a *C. albicans* resistant strain [20], other composites materials (carbon nanotubes and polymethilmethacrylate) to reduce adhesion, can reduces complications with infections in hospital facilities [21]. Others medicines are realeased aganst pathogenic yeasts as MYC 053, effective against many strains [22]. Screening Prestwick chemical library resulted in identifiying 27 molecules with activity against *C. auris*, seven with MIC from 0.5 - 64 mg/L [23].From the celomic fluid of the worm *Dendrobaena veneta* was isolated a part which is active against pathogenic fungi producing modifications in *Candida* cel walls and can be used against skin and mucous candidiasis [24].

Conclusion

Candida auras, by its genetic profile, by its expansion and resistance to multiple antifungal drugs, becomes an important life threatening infections, in especially to immuno-compromised patients. The solution is, to find new molecules with antifungal properties, to use alternative treatments, and to apply all preventive and hygienic measures against this important nosocomial pathogen. Anyway, the fight against it and for discovery of new methods and molecules will continue.

Conflict of Interest

There is not conflict of financial interest and not any conflict of interest exists.

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Volume 15 Issue 7 July 2019