Dermatophytosis and the Role of Enzymes in Pathogenesis

Skin infections due to dermatophytes are distributed worldwide and there is no population can be cleared from infection with dermatophytosis. Dermatophytes have the ability to cause a cutaneous skin disease called dermatophytosis. This disease considers a common fungal infection in different parts of the human body, which are enrichment with keratin, especial hair, skin, and nail. Dermatophyte revolutions appeared strongly as significant rising trend of this infection, especially in the last years,[1] with emerging of antimicrobial resistance like most other pathogens.[2-6]

Skin tissue infection involves several phases, i.e., adhesion to the skin surface, invasion of the sublayers by penetration of fungal elements, and secretion of enzymes, which degrade the skin components. Proteinase hydrolysis of keratin is an essential feature of fungal pathogenesis, offering a source of nutrients on the outer layer of the skin, which would usually be a deterrent to pathogens.[7]

The ability of dermatophytes to use keratin protein, the main protein constituent of the hair, nails, and skin, is related to its production of a proteolytic keratinase.[8] However, more than twenty types of protease can be produced by dermatophytes that play a role in the invasion of keratinized structure and cause infection, but the role of them as a virulence factor is not specific.[9] Other enzymes may be used by dermatophytes for skin destruction processes such as alkaline phosphatase and N acetyl beta glucosaminidase.[10]

For parasitic growth of dermatophytes, alkaline phosphatase, esterases, and leucine arylamidase may be significant. Full dermatophyte enzymatic function tends to be associated with the severity of cutaneous inflammation.[11]
The ability of dermatophytes to produce various proteins or enzymes plays an important role to invade keratinous skin layers. Keratinases, adhesins, lipases, phosphatases, DNases, and nonspecifi proteases are important enzymes give the fungi the ability to attach and penetrate the stratum corneum of the skin.[12] Keratinase, gelatinase, and elastase found to be produced by 96%, 14%, and 23% respectively of clinical dermatophytes isolates.[13] The acidic nature of the skin stimulates dermatophyte to produce sensing transcription factors to raise fungi adapting to this acidic pH and give them time to increase pH value after keratin degradation for elevating protease enzyme activity.[12]

In addition to their capacity to induce cutaneous inflammation, exoenzymes produced by specific dermatophytes are thought to contribute to fungal spread[11] worldwide distribution like some other diseases.[14-19]

The usage of animal model will consider a fundamental step for in vivo evaluation the pathogenesis of enzymes produced by dermatophytes.[20-22]

Conclusion

Enzymes play an important role in dermatophyte pathogenesis that may be used as diagnostic tests to differentiate different species of dermatophytes, also understanding the action of these enzymes give us crucial data to fight these fungi as well as preventing and control dermatophyte infection spreading.

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Conflicts of interest

There are no conflicts of interest.

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