

Abstract

Candida albicans is an opportunistic pathogen causing an increasing number of nosocomial infections, and the pharmaceuticals used are often insufficiently effective. The source for the search for new drugs is often traditional Asian medicine based on natural products derived from plant or animal organisms. In the countries of the Far East, earthworms occupy a high position among the numerous organisms used in treatment. Studies of preparations obtained from earthworms have shown their multidirectional effects, namely anti-inflammatory, antimicrobial, anticancer, immunostimulating, and neuroregenerative.

The aim of this doctoral dissertation was to analyze the effect of the protein-polysaccharide fraction obtained from the coelomic fluid of *Dendrobaena veneta* earthworms on *C. albicans* cells by means of optical microscopy, scanning and transmission electron microscopy, atomic force microscopy as well as spectroscopic, proteomic and flow cytometry methods, and to analyze the characteristics of the active factor.

The analyses carried out showed a decrease in the viability of cells treated with the fraction as well as their death by apoptosis and necrosis. The studies revealed changes in the cell wall, exposing of the inner layer of the cell wall, and loss of its continuity. The active fraction also caused disturbances in fungal cell division and incomplete division of genetic material between dividing cells, as well as binding of mitochondrial DNA with nuclear DNA. Cells treated with the fraction also showed visible changes in mitochondrial morphology, loss of mitochondrial activity, and an increase in reactive oxygen species (ROS) levels. Microscopic analyses also revealed enlarged vacuoles occupying most of the lumen of the cell as well as presence of autophagosomes and autophagic bodies. Proteomic studies of cells after their incubation with the fraction showed changes in the level of proteins involved in the regulation of ROS levels, heat shock proteins, and proteins controlling the functions of mitochondria and ribosomes. Chemical analyses of the protein-polysaccharide fraction made it possible to characterize its composition. It has been shown that the main protein components are proteins of the lysenin type.

The research results presented in this paper suggest that the protein-polysaccharide fraction is effective against *C. albicans* cells, which predisposes it to further research as a potential antifungal drug.

Key words: earthworms, *Candida albicans*, protein-polysaccharide fraction, coelomic fluid, antifungal activity

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