TITLE: ANTIOXIDANT AND ANTIMICROBIAL POTENTIAL OF SULFONATED LASIODIPLODAN - AN EXOCELLULAR FUNGAL (1→6)-β-D-GLUCAN PRODUCED BY *LASIODIPLODIA THEOBROMAE*

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ABSTRACT:
Lasiodiplodan is an exocellular (1→6)-β-D-glucan produced by the fungus *Lasiodiplodia theobromae* MMPI when cultured by submerged fermentation on medium containing glucose, fructose or sucrose. β-Glucans have attracted much attention in the scientific literature lately because of their different biological activities that can include cancer cell antiproliferation, antioxidant and antimicrobial properties. Chemical modifications of hydroxyl groups in the primary structure of these polysaccharides have shown efficacy to improve their rheological and biological functions. Among the chemical modifications employed, sulfonylation where sulfonate groups are inserted into the macromolecule structure, has changed the properties of these polysaccharides such as reduced viscosity, and they exhibited new bioactivities such as anticoagulation and antithrombosis. In this context, the aim of the present study was to evaluate the antioxidant and antimicrobial capacity of native and sulfonated lasiodiplodans. Sulfonylation was performed using chlorosulfonic acid as the derivatizing agent. The antioxidant capacity of the samples was evaluated by hydroxyl-radical scavenging ability, reducing power and hydrogen peroxide removal ability. Antimicrobial potential was assessed against clinical important bacterial and yeast strains by the broth-microdilution method. The protocol employed in the derivatization process led to the production of a derivatized polysaccharide with a low degree of substitution of sulfonyl groups (DS: 0.15). Sulfonation promoted an increase in the hydroxyl-radical removal capacity (74.4%), which was higher campared to the unsulfonated parent lasiodiplodan (44.32%). The reducing power evaluated by the electron-donation ability of potassium ferricyanide was also more effective following sulfonation of lasiodiplodan. On the otherhand, in relation the H_2O_2-removal capacity, both native (6.13%) and sulfonated (4.9%) lasiodiplodan samples exhibited low antioxidant potential. Sulfonated lasiodiplodan presented fungicidal activity against the yeasts, *C. albicans* and *C. tropicalis*, and bacteriostatic effects against *E. coli* and *S. enterica* Typhimurium. Native lasiodiplodan showed no inhibitory effect against the microorganisms evaluated for antimicrobiocidal activity. The results demonstrated the importance of studies focusing on the chemical modifications of exopolysaccharides in order to improve the biological functions and properties of these biomacromolecules.

Keywords: biological activity, chemical derivatization, fungal exopolysaccharide, β-glucans.

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