Antifungal activity of some polyamide polymers

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ABSTRACT

A newly synthesized antifungal compound of the polymer triethylamine-, triphenyl phosphine and tributyl phosphonium salts of poly(chloroacetylated diethyl-l-tartrate-coethylene-diamine) were evaluated by cut plug and the viable cell counting methods using shake flask of ten times diluted broth medium. The effect of the synthesized polymers on fungal dry weight, proteins, lipids and total carbohydrates have been estimated. The synthesized polymers were inhibitory to the growth of the filamentous fungi (Alternaria solani, Fusarium oxysporum var.vasinfectum, Penicillium digitatum, P. italicum and Rhizopus stolonifer) and yeast (Candida albicans, C. tropicalis and Cryptococcus neoformans). Minimal inhibitory concentrations of the synthesized polymers were determined and they ranged between 1.6~3 mg/ml for Candida sp and C. neoformans. Polymer structure and the composition of the polymer active group play an important role on the fungal inhibitory effect.

Key words: *Antifungal agents, synthesized polymers.*

INTRODUCTION

Low molecular weight antimicrobial agents are commonly used for many applications such as in medicine (health care and hygiene), agriculture, water treatment and coatings in domains such as food manufacturing, hospitals, building trades or marine applications (antifouling paints) (Hazziza-Laskar *et al.*, 1993 and Shin *et al.*, 1999).

However, these low molecular weight agents have the problem of residual toxicity, even when suitable amounts of the agents are used (Nonaka *et al.*, 1997). They are also, short- lived, their preparation is limited, and this needs repeated applications of the agents (Sauvet *et al.*, 2000)

To prevent the residual toxicity and to increase the lifetime of the agents, recently polymeric antimicrobial agents were developed (Nam *et al.*, 1999 and Jung *et al.*, 1999). Insolubilized agents having positively charged groups, such as quaternary ammonium groups and phosphonium groups are reported to exhibit high antimicrobial activities (Kenawy *et al.*, 1998, Uemura *et al.*, 1999 and Ikeda *et al.*, 1999).

There is a clear need for new antifungal agents to improve the treatment of fungal infections. Polymeric biocides have a high antimicrobial activity which may be ascribed to their characteristic nature of carrying high dense active groups in the vicinity of the polymer chains (Kanazawa *et al.*, 1993 and Kawabata *et al.*, 1983). They also showed that the insoluble polymers containing quaternary ammonium salts (QAS) are efficient antimicrobial agents like water soluble polymers bearing QAS as lateral groups (Kawabata *et al.*, 1983). Water insoluble polymers with antimicrobial activity