Abstract

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Nanoemulsion of Capsicum fruit extract as an eco-friendly antimicrobial agent for production of medical bandages

The utilization of natural resources for cotton fabrics treatments is very necesitrous in order to reduce the chemicals that are used and also have a very great harm to humans and the environment. The literature studies describe the utilization of pepper horns in many different applications such as drugs and agricultural fields, etc... However, there is no information about the utilization of pepper horn extracts in its nanoemulsion form to be used as antimicrobial finishing agent for textile fabrics. Thus, the current research work aimed to compare the antimicrobial properties of pepper horns extract in two different forms micro- and nanoemulsion. The powder was extracted with absolute ethyl alcohol and a reddish colored oily extract has been produced after evaporation using rotary evaporator. It has been found that the major constituents of the Capsicum extract are 9,12-octadecadienal (29.99%), linalyl acetate (18.38%), Z, Z-10,12-hexadecadien-1-ol acetate (14.65%), and 2-methyl-1,5-hexadiene-3-ol (3.75%). Different concentrations from this extract was directly loaded to cotton fabric discs to evaluate its antimicrobial activity and it was found that by decreasing the concentration the activity increased. The extract exhibited better antimicrobial activity against G + ve bacteria and Yeast and lower activity against G -ve bacteria. Different concentrations of nanoemulsion for this extract have been created using tween 80 and tetraethyl orthosilicste as precursors and tested for their antimicrobial activities directly using cup plate method. Antimicrobial activity by disc agar diffusion and cytotoxicity assay were used to evaluate the biological activity of Capsicum ethanolic extract and its nanoemulsion. The resultant data proves that the cotton fabric treated with low Capsicum-based nanoemulsion (2.5%) has super antimicrobial properties event after 10 washing cycles with no effect on the human cell lines. Based on the aforementioned data, it is expected that utilization of nanoemulsion based on pepper horns extract for efficient antimicrobial cotton fabrics will contribute to dramatically reduce the utilization of expensive hazard chemicals.