



ANTIBACTERIAL ACTIVITY AND UV PROPERTY OF SHIKONIN ON SILK SUBSTRATE

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ABSTRACT

Shikonin, a naphthoquinone found in the herb Lithospermum erythrorhizon has been used as a red dye for centuries and is reported to possess medicinal properties. In the current study, shikonin was evaluated as a multi-functional antibacterial and UV protective agent on a silk fabric. Antibacterial activity against Staphylococcus aureus and Escherichia coli was analyzed qualitatively in terms of zone of inhibition and quantitatively in terms of percentage reduction in bacteria. Effectiveness of shikonin against ultraviolet radiation was evaluated in terms of Ultraviolet Protection Factor values. Durability of shikonin to laundering and exposure to light were also studied. Results showed significant antibacterial activity against the two bacteria. In addition, the UV protective property of treated silk substrate was considerably enhanced. Shikonin is also shown to retain its protective properties on laundering and light exposure. Natural agents such as shikonin are viable additions to the arsenal of multi-functional agents for textile substrates.

Keywords: Shikonin; Naphtoquinone; Antibacterial activity; Staphylococcus aureus; Escherichia coli; UPF

1. Introduction

According to the Centers for Disease Control and Prevention, Department of Health and Human Services, USA about two million people contact infections in hospitals each year. The infections are spread via person-to-person contact and also via surface contact with hands, clothes, and hospital devices such as surgeon gowns and bedclothes [1]. Among the disease causing bacteria in hospitals, *Escherichia coli* and *Staphylococcus aureus* were identified to be the two most common bacterial isolates responsible for cross infecting large number

of patients [2]. Compounding the problem is the fact that the diseases caused by these bacteria are increasingly not treatable as the bacteria have developed resistance to currently available therapies.

A degree of protection from the infection causing bacteria can be obtained by using appropriate protective clothing such as face masks and gloves but clothing by itself has been found to be inadequate in preventing transmission of disease [3]. In addition, bacteria can survive on textiles for many days and contribute in transmission of disease [4]. A better level of protection is