



Research Article

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Antimicrobial finishing of first aid cotton bandage by N-N-dimethylamine N-ethylamine chitosan

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ABSTRACT

A microbial infection always threatens to human being through its development on living and nonliving materials and imposes detrimental impact on textiles and user. The present investigation aims at developing an eco friendly natural antimicrobial finish on first aid dressing based cotton bandage treated with N-N-dimethylamine N-ethylamine chitosan. The extensive study was conducted to assess the antimicrobial effectiveness of N-N-dimethylamine N-ethylamine chitosan by employing standard test methods. The finishing showed excellent potential against microorganisms under test and can be used for hygienic textile products.

Keywords: Cotton bandage, Antimicrobial property, N-N-dimethylamine N-ethylamine chitosan.

INTRODUCTION

Modern society is very conscious about hygiene and health, even for the medication of simple cut or wound on the skin; as it prevents the penetration and development of microbes and fungi on underlying tissues; if it was broken the chances of colonial development of aerobic and anaerobic bacteria increases [1]. Textile with antibacterial finishing playing a crucial role; as cotton mainly consist of cellulose and other cellulosic materials like jute and their blends are liable to be physically degraded by microbial attack leading to damage the fiber, loss of strength and failure of the product. Degradation rate depends on a wide range of factors, end use of the product and climatic conditions under which the product is used [2].

Materials used generally for dressings helps in healing by keeping the environment moist around the wound, by preventing secondary infections these materials includes range of product from synthetic to natural one and made available in numerous application to provide first aid in emergency and cotton bandage is one of them[3][4].

Chitosan is a natural, biodegradable, nontoxic biopolymer and exhibits considerable antibacterial activity against broad spectrum of bacteria's [5]. The interaction of cationic chitosan and negatively charged microbial cell wall is the key for its potential activity and can be enhanced by increasing amino groups on the polymer as versatility depends mainly on high degree of reactive amino groups[6].The current study was focused on eco friendly finishes with synthesized N-N- dimethylamine N-ethylamine chitosan[7] thus concentrated on cotton bandage which is always susceptible for microbial infections due to its composition, varied climatic conditions and environments.

EXPERIMENTAL SECTION

The cotton bandage was purchased from local medical store and N-N- dimethylamine N-ethylamine chitosan earlier reported by our group [8]. All the other materials used as received without further purification.

Assessment of antimicrobial finishing

Preparation of Muller Hinton Agar plates

Sterile muller hinton agar plates were prepared by dissolving 3.79 grams of muller hinton in 100 ml of distill water and sterilized by autoclaving at 115°C with pressure. Then it is poured on sterile Petri plates and allowed to solidify.

Preparation of Inoculation

Overnight cultures of the test organisms *E.coli* and *S. pyogenes* were prepared by 100 g full of culture onto sterile nutrient and kept overnight, 2 g of Beef extract 1 g of yeast extract, 3 g of sodium chloride, 3g Pepton and 500 ml distilled water.

The bandage was then treated with dip and dry method [9] in the diluted solution of N-N- dimethylamine N-ethylamine chitosan prepared in double distilled water.

RESULTS AND DISCUSSION

The antimicrobial activity of the N-N- dimethylamine N-ethylamine chitosan was determined using disc diffusion method and the results obtained presented in Table 1. And the effect of finishing on fiber showed in Figure1.

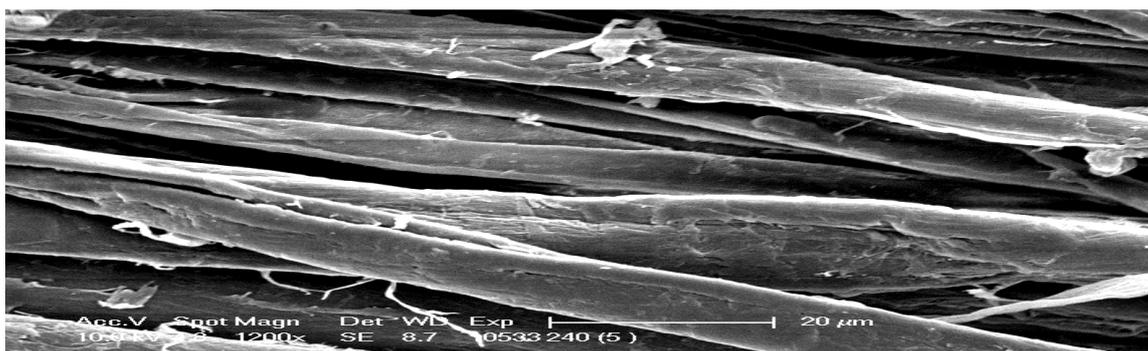


Figure 1.a) SEM image of untreated fiber before microbial test

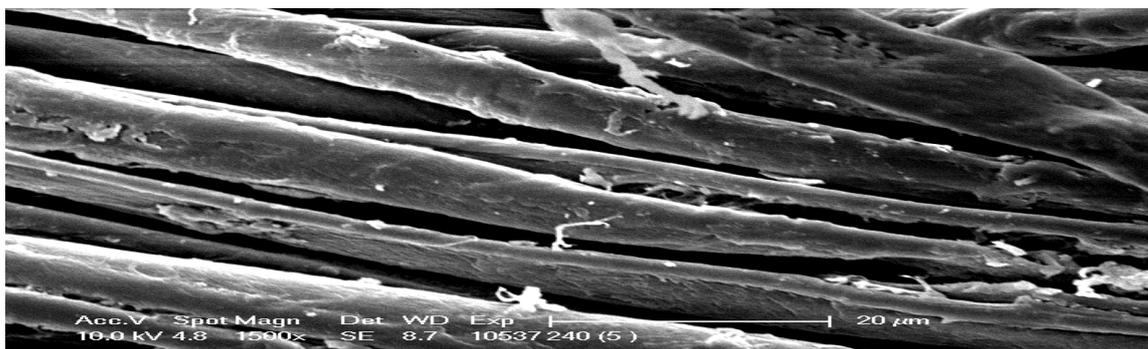
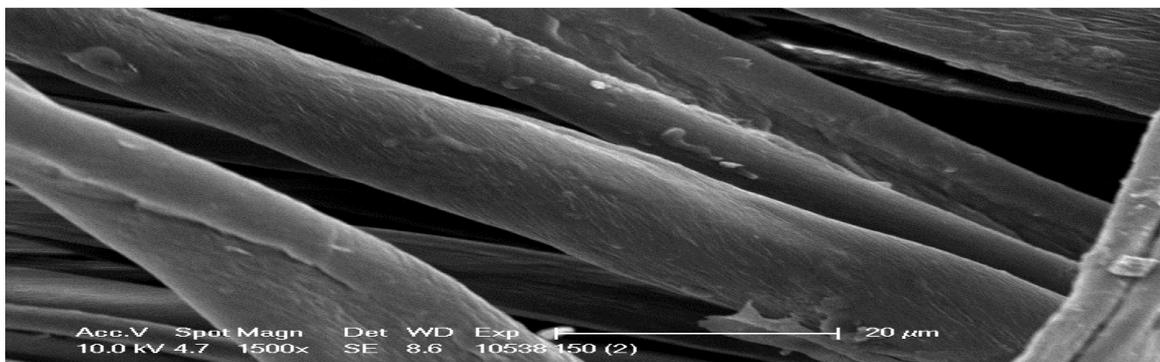
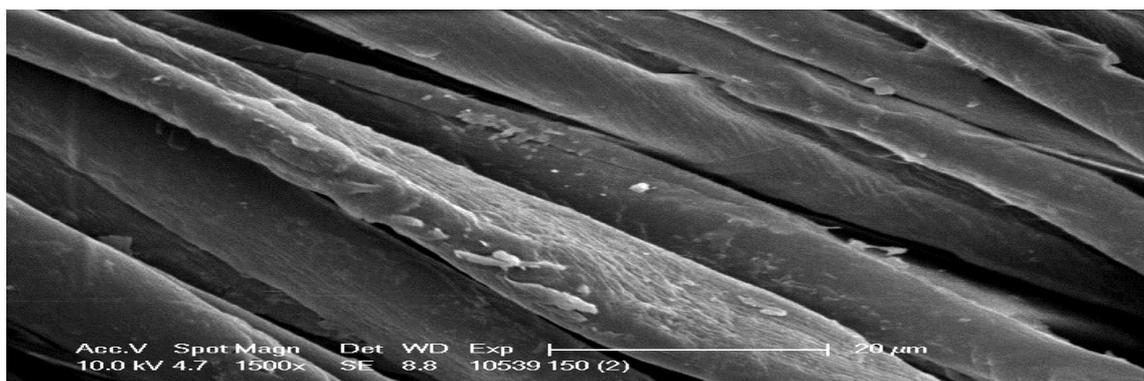


Figure 1.b) SEM image of untreated fiber after microbial test

Table 1. Anti bacterial activity of N-N- dimethylamine N-ethylamine chitosan

Bacteria	Antimicrobial Activity of N-N- dimethylamine N-ethylamine chitosan Concentration $\mu\text{g/mL}$				
	5 $\mu\text{g/mL}$	25 $\mu\text{g/mL}$	50 $\mu\text{g/mL}$	100 $\mu\text{g/mL}$	250 $\mu\text{g/MI}$
<i>E.coli</i>	√	√	x	x	x
<i>S.pyogenes</i>	√	x	x	x	x

√- growth with bacteria. x- Growth without bacteria.

**Figure 1.c) SEM image of treated fiber before microbial test****Figure 1.d) SEM image of treated fiber after microbial test**

CONCLUSION

N-N- dimethylamine N-ethylamine chitosan exhibits excellent antibacterial activities on cotton bandage. It provides an environmental friendly treatment of textile for antimicrobial finishing.

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