

## Short Communication

### **Survival of *Staphylococcus aureus* and *Escherichia coli* on Cotton Fabrics Treated with Extracts of Garad (*Acacia nilotica*)**

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The transfer of pathogenic bacteria and other microorganisms among patients in hospitals is a growing concern. One of the critical aspects of bacterial transmission from a person (patient or a health care worker) to the environment and then to another person is the ability of the microorganism to survive on various common hospital materials, such as fabrics (Neely and Maley, 2000). Lee *et al.* (1969) found that *Salmonella typhimurium*, can remain viable and infectious on different fabrics, for relatively long periods of time. However, garments of health care workers are considered an important aspect of the environment that can easily become contaminated (Johnson, 1977). Fabrics treated with antimicrobial agents (antibiotics), are therefore, gaining popularity as a new promising area of research (Lee et al, 1969). However, antibiotic resistant strains of some bacteria such as the multi-resistant *Staphylococcus aureus* and vancomycin-resistant enterococci, have already been reported (Kim *et al.*, 1998; Neely and Maley, 2000). Plant extracts were suggested by many authors as an alternative to antibiotics. However, plant extracts were found effective against microorganisms since the beginning of the human civilization (Gilliver, 1947; Dix, 1974 and Zainal *et al.*, 1988).

For inoculation, bacterial isolates of *Escherichia coli* and *Staphylococcus aureus*, which were obtained from the Food Microbiology Lab, University of Gezira, were grown in a nutrient agar medium (NA).

Seeds of Garad (*Acacia nilotica*) purchased from local markets in Wad Medani city, were allowed to dry and then crushed into a powder. Samples of 10 grams each were

removed from the powdered materials, added to 100 ml solution of caustic soda (40 grams of caustic soda in 360 ml distilled water) then mixed well with steering and left to cool at room temperature (28 – 30<sup>0</sup> C). The solution was filtered through a Watsman No 1 filter paper and the filtrate was kept in the refrigerator (4<sup>0</sup>C), before being used for impregnation of the fabrics.

To study the effect of the Garad extracts on the growth of both bacteria, the inhibition zone method, described by Zainal et al. (1988), was used. After inoculation, the zone of inhibition was measured after 48 h.

Grey cotton fabrics were purchased from local market, washed with a solution of caustic soda and a detergent at 90 <sup>0</sup>C for one hour, then rinsed thoroughly with water and left to dry at room temperature. The fabrics were then cut into equal pieces (20 X 20 cm). Impregnation of the fabric pieces was made by being immersed in the bacterial suspension prepared as above and allowed to stand there, for 6 hours. Inoculated fabrics were then removed and allowed to dry without squeezing, or any other treatment. After dryness the survival of the bacterial cells in those fabrics was assessed every 2 weeks, for a period of 12 weeks. Three replicates were used for each treatment.

Results (Table, 1), showed that the aqueous extracts of Garad were inhibited growth of the Gram–positive bacterium *Staph. Aureus*. However, the inhibition zones in these cases are absolutely clear. On the other hand, extracts of the Garad seeds are less effective against the growth of the Gram-negative bacterium, *E. coli* (Table, 1). Zainal et al. (1988), has already indicated that plant extracts are more effective against the Gram – positive bacteria. It was also reported that the leaf litter extracts of many plants contained anti-microbial substances (Harrison, 1971; Dix, 1974 and Stephen *et al.*, 2004).

Table 1. Inhabitation zone (mm) of Growth of both Bacteria (*Staph.aureas* and *E. coli*) grown on the Garad extracts.

Extract Concentration mg/l	Inhibition Zone (mm)	Inhibition Zone (mm)
	<i>Staph.aureus</i>	<i>E.coli</i>

5.0	5.6	5.0
1.0	5.0	4.8
0.5	4.5	4.2
0.1	2.5	2.0
.01	0.00	0.00
Control (0.00)	0.00	0.00

The present study also investigated the effect of the extracts of Garad Seeds on the survival of the two bacteria on cotton fabrics. Results Fig. (1 A) showed that the Gram positive bacterium, *Saph. Aureus* was able to survive for 12 weeks although its numbers were greatly reduced. On the other hand cells of the Gram negative bacterium *E. coli* were less affected and able to persist for 12 weeks and its numbers were still large (Fig., 1 B). This was in agreement with our results mentioned above. It was also agreed with the results obtained by Zainal *et al.* (1988). According to Sattar *et al.* (2001), the critical aspect of a bacterium transmission, from one person to another, in a hospital, is its ability to survive on various common hospital materials such as fabrics.

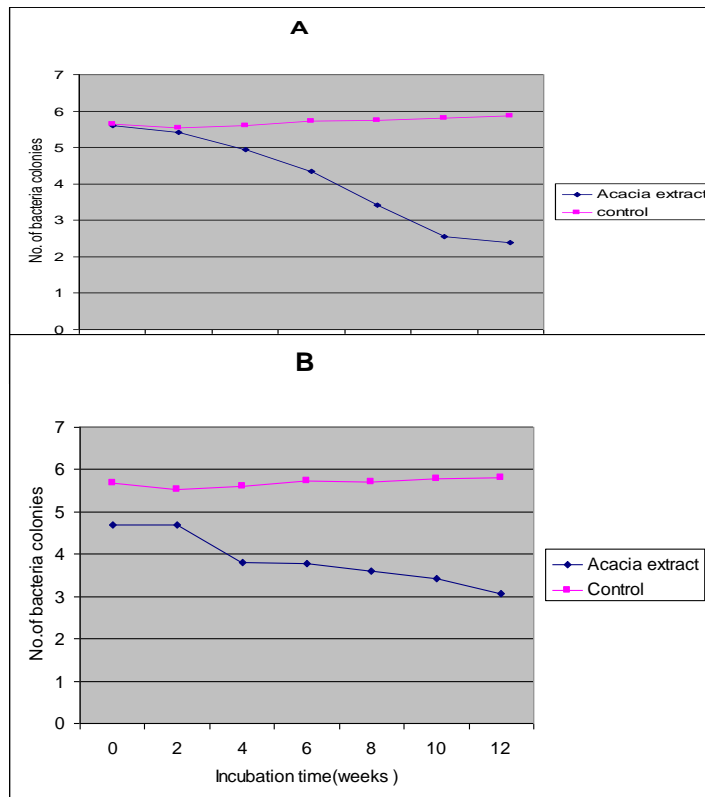


Fig. 1. Survival of *Staph. aureus* (A) and *E. coli* (B) on cotton fabrics treated with Garad aqueous extracts.

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نمو وبقاء البكتيريا (*S. aureus* و *E. coli*) على المنسوجات القطنية المعاملة بمستخلصات بذور  
القرض (*Acacia nilotica*)

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الخلاصة

أظهرت نتائج هذه الدراسة أن المستخلص المائي لبذور القرض كان فعالاً في تثبيط البكتيريا *S. aureus* الموجبة لصيغة جرام، في حين أنه كان أقل فعالية في تثبيط البكتيريا (*E. coli*) السالبة لصيغة جرام، كما أظهرت النتائج أن تعداد البكتيريا (*S. aureus*) على الأنسجة القطنية المعاملة بمستخلص القرض، كان أقل مقارنة بتعداد البكتيريا (*E. coli*) خلال فترة التخزين، التي امتدت إلى 12 اسبوعاً.