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Original Research Article

**Antimicrobial activity of “Triclosan” coated sutures *in vitro***Prachi Saban<sup>\*1</sup> and R Gopal<sup>2</sup><sup>1</sup>Department of Microbiology, Sri Aurobindo Medical College and PG Institute, Indore, India<sup>2</sup>Department of Microbiology, Sri Manakula Vinayagar Medical College, Puducherry, India

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**\*Article History:****Received:** 28/08/2017**Revised:** 11/09/2017**Accepted:** 11/09/2017**DOI:** <https://doi.org/10.7439/ijbr.v8i9.4359>**Abstract****Introduction:** Surgical site infections (S.S.I.) are most often due to the organisms present as indigenous flora and are a common problem in most of the hospitals. One of the risk factor is the presence of foreign material which includes ‘suture.’ The use of antimicrobial coated sutures with the sustained action can be a useful supplement to the aseptic technique.**Materials and methods:** Randomly selected strains of MRSA, MRSE, *Enterococcus*, *E.coli*, *Klebsiella* & *Pseudomonas* species isolated from clinical samples in our laboratory were tested against the Triclosan coated and non-coated sutures commercially available.**Result:** Zone of inhibition was found with Triclosan coated suture and no zone of inhibition found with non coated sutures. Conclusion- Usage of sutures coated with antimicrobial agents like Triclosan can reduce the rates of surgical site infection.**Keywords:** Surgical site infection, Triclosan, Sutures.**1. Introduction**

Post operative wound infections are a common problem in most of the hospitals. One of the risk factor is the presence of foreign material which includes ‘suture’ material. Surgical Site Infection (SSI) is one of the most frequently reported nosocomial infection leading to high mortality and morbidity. Its morbidities range from delayed healing to systemic sepsis. It has impact on the economy and health care resources.[1] An SSI is defined as an infection occurring within 30 days of surgery that meets the following criteria: (i) the diagnosis consists of the infection of an anatomic plane by one of the following manifestations: collection, inflammatory signs (pain, edema, tenderness, redness), dehiscence, or positive culture; and (ii) classification according to the anatomic plane as follows: superficial incisional SSI, infection of the skin and subcutaneous tissue; deep incisional SSI, infection of the deep soft tissue (fascia and muscles); and organ/space SSI, infection of the organ/space. In this study, SSIs were categorized by the above classifications. [2] Various studies have reported high SSI incidence rate in India [3]. The most

common organisms responsible include *S.aureus*, *S. epidermidis*, *E. coli*, *Klebsiella pneumoniae*, *Enterococcus* and *Pseudomonas* species.

Post-operative wound infections lead to delayed wound healing prolonged hospitalization and increase in the rate of complications and the necessity to use oral or parenteral antimicrobial agents of higher order against the resistant pathogens.

The use of antimicrobial coated sutures with the sustained action can be a useful supplement to the aseptic technique. One of such compound having antimicrobial activity is ‘Triclosan’ having antimicrobial activity against Gram positive bacteria and Gram negative bacteria but less so against *P. aeruginosa*. Triclosan (2,2,4'-trichloro-2'-hydroxyphenyl ether) commercially known as Irgasan DP300. At bacteriostatic concentrations, it prevents the uptake of essential amino acids; at bactericidal concentration, it causes disorganization of cytoplasmic membrane leading to leakage of the cell contents. Use of triclosan in health care industry started in 1972, in surgical

scrubs. [4] It has also been used in other medical products such as hand subs, skin antiseptics, ointments, impregnated/coated, deodorants and germicidal soaps catheters and sutures. [5] The aim of this study was to assess the antimicrobial activity of Triclosan coated suture against the common pathogens associated with S.S.I *in vitro*.

## 2. Materials & methods

The study was carried out at Department of Microbiology, Sri ManakulaVinayagar Medical College & Hospital randomly selected strains of MRSA, MRSE, *Enterococcus*, *E.coli*, *Klebsiella* & *Pseudomonas* species isolated from clinical samples in our laboratory were tested against the Triclosan coated and non coated sutures commercially available as ETHICON PDS Plus.

The organisms were inoculated on M.H.A plates and about 2 inch long suture material with and without Triclosan coating were placed on one half of the inoculated plates each. The plates were incubated at 37°C and observed for zone of inhibition around the suture material after 48hrs and 7days.

## 3. Results

A wide zone of inhibition of the growth around the Triclosan coated suture was noticed on plates inoculated with MRSA (Fig 1) and MRSE (Fig 2) and moderate zone with *E. coli* (Fig 3) & *Klebsiella pneumonia* (Fig: 4) No zone of inhibition was noticed around the Non-Triclosan coated suture and also on the plates with growth of *Pseudomonas* (Fig 5). The size of zones of inhibition was the same at the end of 48 hrs and 7 days.



MRSA (Fig:1)



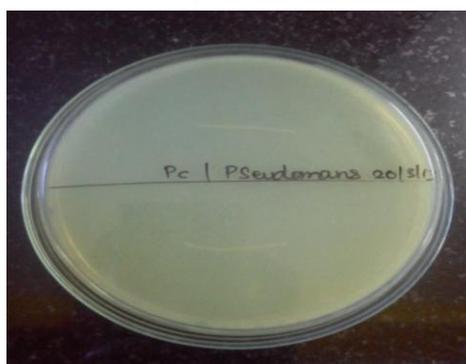
MRSE (Fig:2)



*E.coli* (Fig:3)



*Klebsiella pneumonia* (Fig:4)



*Pseudomonas* (Fig:5)

## 4. Discussion

Sarkar *et al* have conducted in-vitro zone of inhibition studies for triclosan coated and uncoated suture against the bacteria isolated from SSI such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Methicillin resistant Staphylococcus aureus (MRSA)*, *Methicillin resistant Staphylococcus epidermidis (MRSE)*, *E.coli*, *Klebsiella pneumoniae*, *Acinetobacter*, *Coagulase negative staphylococcus*, *Proteus* and *Pseudomonas*. Zone of inhibition was observed in all bacterial plate except for *Pseudomonas* and *Acinetobacter*[6] In another study done by Edmiston CE *et al* has showed substantial reduction in both gram-positive and gram-negative bacterial adherence to triclosan coated polyglactin 910 (braided) suture compared with non triclosan coated suture. [7] A similar study done by Ming X *et al* where they demonstrated Polydioxanone suture with triclosan activity against all test organisms like *Staphylococcus aureus*, *methicillin-resistant S. aureus (MRSA)*, *S. epidermidis*, *methicillin-resistant S. epidermidis (MRSE)*, *Klebsiella pneumoniae*, and *Escherichia coli* by a zone of inhibition assay. The antibacterial activity was maintained until the sutures

dissolved after 17 to 23 days when tested against *E. coli* and *S. aureus*, respectively.[8] Justinger *et al* has published large retrospective study of 2088 patients in mid laparotomy. The results showed the decrease in number of SSIs (TCS: 4.9%, NTCS: 10.8%, P <0.001) for abdominal wall closure. [9]

## 5. Conclusion

Triclosan sutures were found to be effective in vitro inhibiting the growth of MRSA, MRSE, *E.coli* & *Klebsiella*, the common pathogens associated with S.S.I. The sustained release of Triclosan into the surrounding tissues may inhibit the colonization with these potential pathogens during the post-operative period thus reducing the chances of post operative ward infections.

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