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Project Report

Testing the antimicrobial activity of treated curtain material when exposed to selected bacterial species with a 30 min contact period.

By:

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Aims :

To evaluate the antimicrobial activity of polypropylene curtain material supplied by Endurocide Africa against common bacterial strains representing gram negative and gram positive bacterial strains with a 30 min. contact time.

Methods :

All techniques were conducted under conditions of Good Laboratory Practice.

A sample of 100 gm polypropylene curtain material was supplied by Endurocide Africa.

The bacterial strains were obtained from the bacterial culture collection of the Department of Microbial, Biochemical and Food Biotechnology. The bacteria were inoculated into 10 ml of Brain Heart infusion broth (BHI) and was incubated at 37C for 24 hours. The bacterial strains used in this experiment were in-house reference strains of *Escherichia coli, Staphylococcus aureus* and *Pseudomonas aeruginosa*.

In order to perform the tests, sections of the curtain material were cut to fit into a sterile petri dish. A total of 15 petri dishes were prepared with curtain material. Another 15 sterile petri dishes without any curtain material, were used as control samples.

After the bacterial cultures had been incubated overnight, equal volumes were mixed into a sterile test tube. Thereafter a ten-fold serial dilution was made of the mixed culture using standard protocols.

After the dilution series was made, 1 ml samples from the undiluted tube, the 10^{-3}, 10^{-5}, 10^{-7} and 10^{-10} dilutions was added, in triplicate, to the perti dishes with and without the curtain material. This was incubated at room temperature for 30 mins.

After this incubation time, impressions were made in each of the petri dishes using radac plates containing nutrient agar. The contact plates were incubated for 24 hours at 37C after which time the bacterial colonies on each plate were counted. A maximum of 300 colonies were counted per plate. If there were more than 300 colonies, the counts were recorded as too many to count.

Results

Table 1: Bacterial counts obtained on contact plates collected from the curtain material after a 30 min contact time.

Dilution	**Mean bacterial count**	**Colony forming units per plate**		
		1	2	3
Undiluted	92.6	102	137	39
10^{-3}	2	6	0	0
10^{-5}	1	0	3	0
10^{-7}	0.3	0	1	0
10^{-10}	0	0	0	0

Table 2: Bacterial counts obtained on contact plates collected from the empty petri dishes without any curtain material after a 30 min contact time.

Dilution	**Mean bacterial count**	**Colony forming units per plate**		
		1	2	3
Undiluted	TMTC	TMTC	TMTC	TMTC
10^{-3}	TMTC	TMTC	TMTC	TMTC
10^{-5}	TMTC	TMTC	TMTC	TMTC
10^{-7}	TMTC	TMTC	TMTC	TMTC
10^{-10}	286.3	271	295	293

Discussion

From this preliminary screening test, it has been established that there is substantial antibacterial activity on the curtain material used. The bacteria used in this experiment are the standard bacterial strains used in evaluation of antibacterial activity. There are two gram negative bacteria (*E. coli* and *P. aeruginosa*) and a gram positive bacterium (*S. aureus*). A cocktail of these bacteria were used to experimental infect the curtains and five different contamination levels ranging from very high to very low were tested. Some surviving bacteria were found when a very high inoculum of bacteria was used to infect the curtain. This level of bacterial contamination is exceptionally high and is much higher than would be expected under normal everyday conditions. The bacterial counts on the control petri dishes were in most cases so high that they could not be counted.

It can be seen from the above data that there is substantial antibacterial activity on the curtain against the cocktail of bacteria used.

It was also established from this experimental procedure, that the techniques decided on to evaluate the antimicrobial activity of the curtains was successful. However, a refinement of the protocol where non-treated curtain material is used in the control group would enhance the quality of the experimental design and should be used in all future experiments.

A contact time of 30 mins was selected in order to give the bacterial samples sufficient time to dry. Different contact times can be tested in future, and it would be suggested to try and establish the minimum contact time needed to inactivate microbial contamination.

Conclusion

Substantial antimicrobial activity was found on the curtain material against a cocktail of the three standard bacterial species used in these types of test. It was also established that the techniques used were successful and would allow for further testing on the efficacy of the curtain material to inactivate a variety of microbial contaminates.
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Signed this 24th day of March 2021

Prof. R.R. Bragg