



Contemporary Advances towards Different Copper Remediation

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Abstract: *Researchers conducted a literature, technology and patent search that traced the history of understanding the “bacteriostatic and sanitizing properties of copper and copper alloy surfaces” which demonstrated that copper, in very small quantities, has the Copper alloy surfaces have intrinsic properties to destroy a wide range of microorganisms. Today copper, in the form of plumbing tube, copper or copper-alloy surfaces proved to be a significant step in decreasing the fungal and bacterial infections in hospitals. Aims and objective:*

Keywords: Ancient Technology, Bactericide

I. INTRODUCTION

We performed experiment to find bacteriostatic and sanitizing properties of copper and copper alloy surfaces” which demonstrated that copper, in very small quantities, has the Copper alloy surfaces have intrinsic properties to destroy a wide range of microorganisms. Today copper, in the form of plumbing tube, copper or copper-alloy surfaces proved to be a significant step in decreasing the fungal and bacterial infections in hospitals. To know the bactericidal and fungicidal properties of copper for its implication in various areas in prevention bacteriostatic and sanitizing properties of copper and copper alloy surfaces” which demonstrated that copper, in very small quantities, has the Copper alloy surfaces have intrinsic properties to destroy a wide range of microorganisms. Today copper, in the form of plumbing tube, copper or copper-alloy surfaces proved to be a significant step in decreasing the fungal and bacterial infections in hospitals. The main aim to perform this experiment is to know the bactericidal and fungicidal properties of copper for its implication in various areas in preventing nosocomial infection.

Mechanisms of antibacterial action of copper- The antimicrobial properties of copper are still under active investigation. Molecular mechanisms responsible for the antibacterial action of copper have been a subject of intensive research. Scientists are also actively demonstrating the intrinsic efficacies of copper alloy touch surfaces to destroy a wide range of microorganisms that threaten public health.

Some of the molecular mechanisms previously explained by researchers are; The copper altered the 3-dimensional structure of proteins and disrupt the enzyme structures resulting in inactivation of bacteria or viruses. Copper produces deleterious effects in superoxide radicals, generating OH-radicals, thereby causing “multiple hit damage” at target sites. Copper with lipids produces holes in the cell membranes damaging the integrity of cell and leaking of essential nutrients leading to cell deaths. Many recent publications also showed that microorganisms are rapidly killed on metallic



copper surfaces by 'contact killing' mechanism. The earliest medical texts refer to the use of copper compounds for wound-healing, such as sterilization of wounds

II. MATERIAL AND METHODS

This study was conducted in the Department of Microbiology, for a period of onemonth based on an Observational Study of growth of microorganisms.

2.1 Specimens and Materials Required

1. Pure growth of E.coli organisms
2. Copper wire of 5g,15g and 20g
3. 300ml distilled water
4. Whatman filter paper
5. Sterile Nutrient agar plates
6. Boiled copper water
7. Normal copper water with 24 hrs. dipped copper

2.2 Methods:

Part I (Media Preparation)

Select Seven sterile petri dishes. Put four petri dishes with boiled copper water dipped Whatman filter paper. The Three petri plates with three normal water Whatman paper. Dishes were left undisturbed until the medium was set. In the same way Whatman paper were placed on the spreader plate. Whatman paper were kept in half position so that a layer was formed and left undisturbed until the medium was set

Part II (Culture Isolation)

Two to three colonies from Pure growths of E.coli and were taken and emulsified in peptone water. This inoculum was kept for 30 minutes. After 30 minutes, the inoculum was inoculated on seven sets of plates as prepared above. All the inoculated plates were incubated at 37°C for 24 hours.

Copper used for this experiment are used at different concentrations for different times.

0.5 concentration copper dipped in water for 24 hrs	1.0 concentration copper dipped in water for 24 hrs	1.5 concentration copper dipped in water for 24 hrs
0.5 concentration copper boiled in water for 15 min	1.0 concentration copper boiled in water for 15 min	1.5 concentration copper boiled in water for 15 min

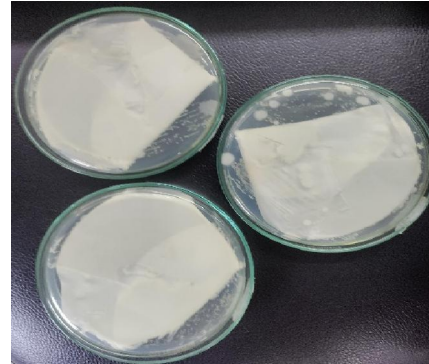


Photo plate 1: E.coli in Petri plate with Whatman filter paper

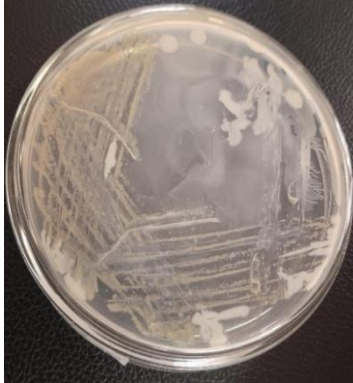


III. RESULT AND OBSERVATION

Pure growth of E.coli were cultured and screened for growth on Nutrient agar media with and without copper.

3.1 Growth of E.coli in Petri plate

Media	Without Copper discs	With Copper discs
Nutrient agar	Heavy growth	No growth

Table 1 showing growth of E. coli on Nutrient agar with and without copper discs were compared. Growth was significantly reduced on Nutrient agar plates having copper discs and was almost nil on Nutrient agar plates with High concentration copper. Figures showing inhibitory effects of copper on bacterial and fungal growth.

		
Growth of organism of E. coli	Boiled with copper of 5g,10g,15g for 15 mins.	Copper dipped in water for 24 hrs. of 5g,10g,15g.



IV. CONCLUSION

The antimicrobial properties of copper surfaces have now been firmly established. Hospital trials have shown a reduction in bacterial counts, indicating that copper surfaces are really additional tool along with other hygienic measures to decrease the number and severity of nosocomial infections. Additional studies should be done in determining the most cost-effective way for the protection of hospitals so that different sites like doorknobs, bed rails, plumbing lines, working surfaces should be made of copper. This simple experiment in the laboratory proved the bactericidal and fungicidal properties of copper. So, the copper and its alloys can be implicated in various areas in the hospital as one of the hygienic measures thus helping in prevention of nosocomial infection.

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