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THE EFFECT OF ULTRA VIOLET RADIATION ON BACTERIA (*STAPHYLOCOCCUS AUREUS* AND *KLEBSIELLA PNEUMONIAE*)

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ABSTRACT

The present study was aimed at understanding the effect of ultra violet-radiations against bacteria *Klebsiella pneumoniae* and *Staphylococcus aureus*. These bacteria were isolated in the laboratory and subsequently sub cultured on NAM media Bacteria *Staphylococcus aureus* and *Klebsiealla pneumoniae* were exposed to ultra violet radiations for 5 hours and the effect of ultra violet radiation on bacteria was studied. It was found that ultra violet. – radiated recombinant bacteria when tested with Cefixime (200mg), Oflaxacin (200mg), Ornidazole (200mg), Amoxicillin (200mg), Moxifloxacina (200mg), Ciprofloxacin (200mg). for drug sensitivity showed different levels of resistance against different antibiotic used.

KEYWORDS: Radiation, Antibiotics, Recombinant, Bacteria.

INTRODUCTION

The effect of ultra violet radiation on bacteria has received attention in recent times by many researchers.[1,2,3] Michelle et al.,[4] attributed this increasing interest to be as a result of the intractable problem caused by microbial antibiotic resistance. Ritter, et al.,[5] were of the

view that the problem of multi-drug resistant bacteria pathogens persists in the 21st century. Schrier, et al.,[6] investigated antimicrobial efficacy of riboflavin and ultraviolet light on *Staphylococcus aureus*, MRSA, and *Pseudomonas aeruginosa* and reported that riboflavin in combination with Ultra Viloet light is an effective modality to eradicate MRSA and *Pseudomonas aeruginosa*. they were of the view that Ultra Violet light as a monotherapy was not effective in bacteria inhibition. A review by Dai, et al.,[7] mentioned that with appropriate doses, UVC may selectively inactivate microorganisms while preserving viability of mammalian cells and promote wound healings. UVC is also found in animal studies to be less damaging to tissue than UVB. even though UVC may produce DNA damage in mammalian cells, it can be rapidly repaired by DNA repair enzymes.

MATERIALS AND METHODS

Strains of bacteria *Staphylococcus aureus* and *Klebsiella pneumoniae* were obtained from microbiology laboratory of College of Applied Education and Health Sciences, Meerut. They had been isolated through basic microbiological techniques and confirmed through biochemical techniques.

Biochemical test were done to confirm that the culture medium was free from contamination. Two sets were made namely Test and Standard.

A total of eight plates of each bacteria were prepared from each of the isolates, In Control bacteria were not exposed to Ultra violet radiation, while in test, the bacteria were exposed to Ultra violet radiation for 5 hours with the lid on dish and both Control and Test bacteria were incubated aerobically at 37^0C for 24 hours. The same experiment was repeated in triplicates.

Determination of Bacterial Survival time

The bacteria survival rate was monitored by colony count of both the controls and the experiments. the number of colonies on the control plates was used to compare those of the experimental treatment.

Antibiotic Sensitivity Test

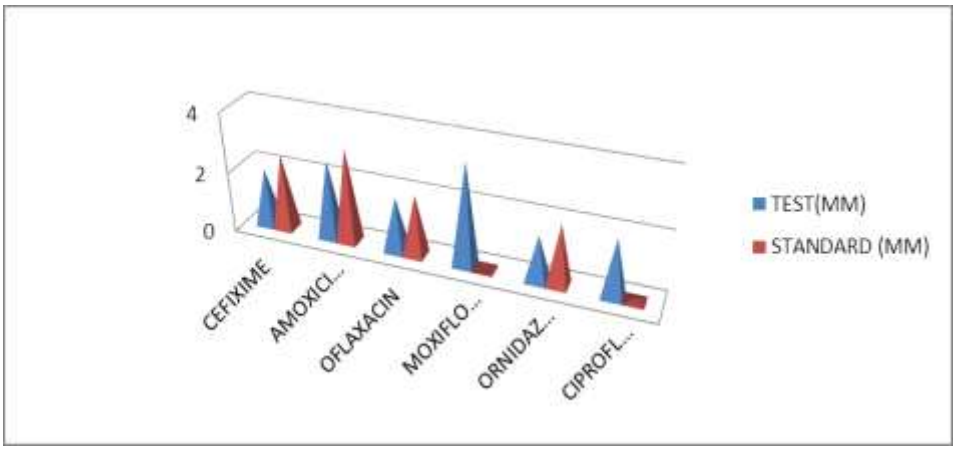
Isolates that survived the exposures to Ultra Violet radiations were subjected to antibiogram test by planting them on nutrient agar and exposing them to the antibiotics of which they had been previously tested and showed resistance. Antimicrobial susceptibility testing was

performed using the disk diffusion method. Antibiotics were selected to represent some major classes of antibiotics. Antibiotics used in study include Cefixime (200mg), Oflaxacin (200mg), Ornidazole (200mg), Amoxicillin (200mg), Moxifloxacina (200mg), Ciprofloxacin (200mg).

RESULT AND DISCUSSION

Table 1. The result of Ultra Violet exposed bacteria effect against different antibiotics

BACTERIA (*Staphylococcus aureus)*			
NAME OF ANTIBIOTICS	**ZONE OF INHIBITION (TEST) UV EXPOSED**	**ZONE OF INHIBITION (STANDARD)**	**EFFECT**
Cefixime	**1.9mm**	**2.5mm**	⇩
Amoxicillin	**2.6mm**	**3.1mm**	⇩
Oflaxacin	**1.8mm**	**2.0mm**	⇩
Moxifloxacina	**3.4mm**	**0.0mm**	⇧
Ornidazole	**1.5mm**	**2.0mm**	⇩
Ciprofloxacin	**1.9**	**0.1mm**	⇧

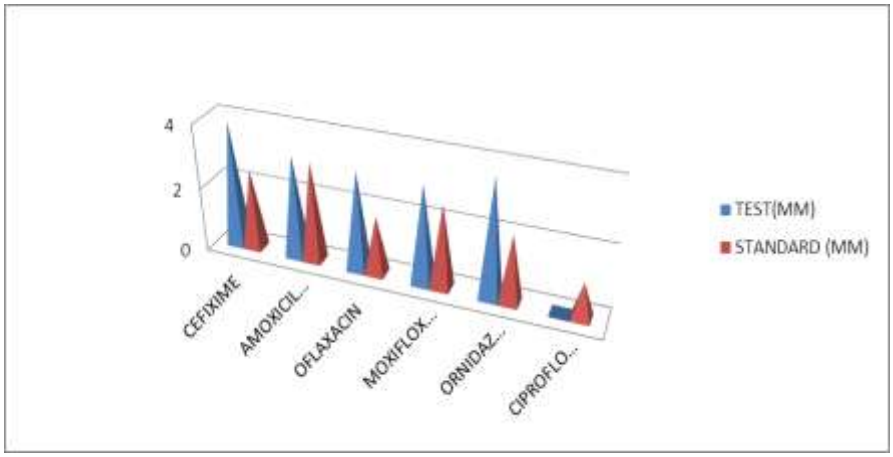


Graph 1. Showing effect of Ultra Violet radiation on bacteria (*Staphylococcus aureus)*

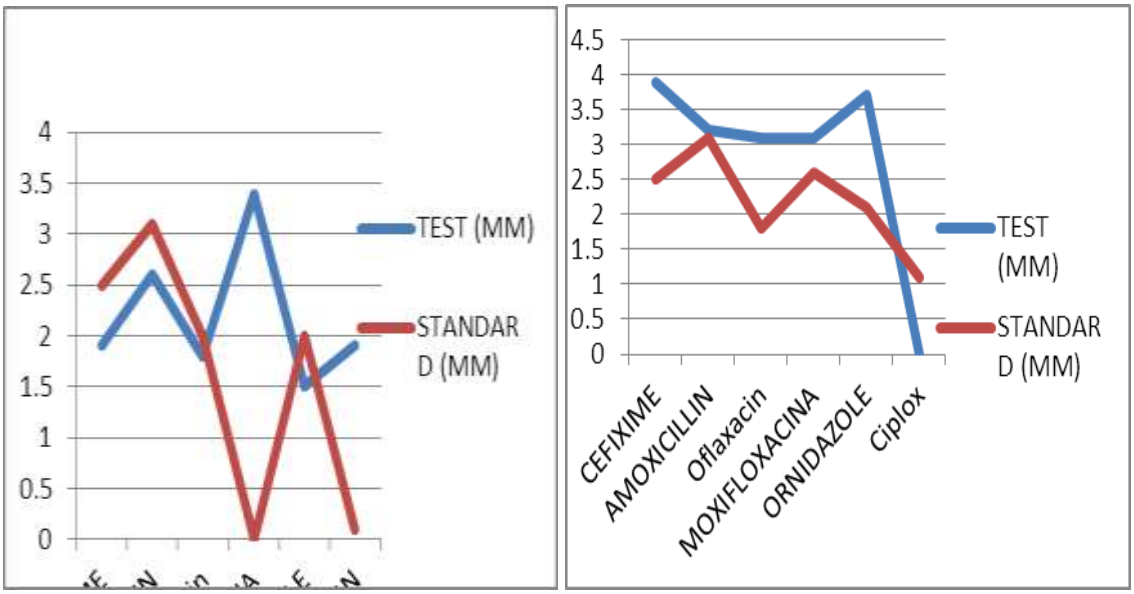
Table 2. The result of Ultra Violet exposed bacteria effect on against different antibiotics

BACTERIA (*Klebsiella pneumoniae)*			
NAME OF ANTIBIOTIC	**ZONE OF INHIBITION(TEST) UV EXPOSED**	**ZONE OF INHIBITION (STANDARD)**	**EFFECT**
1.Cefixime	**3.9mm**	**2.5mm**	⇧
2.Amoxicillin	**3.2mm**	**3.1mm**	⇧

3.Oflaxacin	**3.1mm**	**1.8mm**	⇧
4.Moxifloxacina	**3.1mm**	**2.6mm**	⇧
5.Ornidazole	**3.7mm**	**2.1mm**	⇧
6.Ciprofloxacin	**0.0mm**	**1.1mm**	⇩



Graph 2. Effect of Ultra violet radiation on bacteria *Klebsiella pneumoniae*



Graph 3. Comparative study of Ultra Violet exposed bacteria (*Staphylococcus aureus)* and (*Klebsiella pneumoniae)*

The result of observation for both the standard (bacteria with no UV exposure) and test (bacteria with exposure of ultra violet radiation) has been tabulated in terms of zone of inhibitions (mm) observed against both the strains.

Table 1: shows the result of UV exposed bacteria have an effect on its efficacy against different antibiotics. Recombinant bacteria *Staphylococcus aureus* show decrease in zone of inhibition against diffferent antibiotics used but Moxifloxacina (200mg) appear to showed increase zone of inhibition against recombinant *Staphylococcus aureus*.

Table 2. shows the result of UV exposed bacteria have an effect on its efficacy against different antibiotics. Recombinant bacteria *Klebsiella pneumoniae* show increase in zone of inhibition against diffferent antibiotics used but Ciprofloxacin (200mg) appear to showed decrease zone of inhibition against recombinant *Staphylococcus aureus*.

DISCUSSION

The altered zone of inhibition (ref graph 1 and graph 2) suggest that exposure to Ultra Violet radiation certainly effect the efficacy of antibiotics against bacteria (exposed to UV).

However, more studies are required to check the role of UV radiation in altering the strain of bacteria making it more resistant /responsive with respect to antibiotics that are used to inhibit their growth.

With respect to graph 3 it is also clear that different organism will show different alteration with UV exposure and therefore would have different potency when tested with antibiotics. In some cases, they become latent and in someothers, they become more invasive. So we certainly are at a stage where more work needs to be done to study the role of UV radiation in understanding efficacy of some antibiotics against some pathogen organism.

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