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A RESEARCH STUDY TO ANALYZE THE DIFFERENCE BETWEEN EFFICACY OF TIGECYCLINE AND METHIONINE HINDERED BY STAPHYLOCOCCUS AUREUS

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Abstract:

Objective: *The main purpose of the study was to analyze the differences between the effectiveness of tigecycline and methionine hindrance by Staphylococcus aureus.*

Material and Methods: *The research was completed at Mayo Hospital, Lahore from November 2017 to August 2018. About 100 patients of the following disorder were studied. The identification of the disease was determined by 30 microgram disc of cefoxitin. This identification method was guided by Clinical laboratory Standard Institute diffusion method. Food and Drug Administration give the idea to use Kirby Bauer disk diffusion method to determine the receptiveness of the isolates to tigecycline. E Strip of tigecycline was used to decrease the inhibitory amount of the separates. Elucidation of the data was done by using FDA guidelines.*

Results: *By disc diffusion technique all MRSA separates were susceptible to tigecycline. All the MRSA separates lies in the receptive range as determined by MICs of tigecycline.*

Conclusion: *Tigecycline has been noticed to contain better effectiveness in opposition to MRSA separates. This was recorded in the era of mounting antibiotic opposition.*

Keywords: *Antimicrobial Activity, MRSA, Tigecycline.*

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INTRODUCTION:

Bacteria can protect themselves from the damages of antibiotics. They create resistance against antibiotics. They transfer their genetic material to other bacteria. This issue was observed to enhance in the last twenty years. Some bacteria were found to oppose more than one drug [1]. Many diseases were observed to arise due to Staphylococcus aureus which opposes Methionine [2]. The ability of the bacteria to oppose more than one drug decreases their functioning in hospitals specifically in nosocomial infection [3, 4]. On the international level, the diseases caused by MRSA are increasing day by day [5]. In 1991 the infections caused by MRSA were 29%. While its rate increases to about 59% on an international level as recorded in 2003 [3].

The occurrence of the MRSA is recorded to be 2-61% in Pakistan. The elevated occurrence was found in the main cities [7]. A study showed the enhancement in the occurrence of MRSA from 39% to 51% from 1996 to 2003 [8]. To combat the problem of the resistance more antibiotics are needed to solve the issue.

A related antibiotic with minocycline was discovered which is tigecycline. Its broader spectrum was found after the undulation of the molecule. It showed less opposition to the bacteria as compared with other antibiotics. It shows a higher spectrum of positive and negative individuals. It coordinates with 30S subunit. It stops the formation of protein by checking the transmission of amino acid into the long polypeptide chain [9, 10]. In 1980s opposition was seen in all the antibiotics excluding vancomycin. The prevalence of this opposition towards staphylococci was expected. This was a true expectation. In 1996, opposition in Staphylococcus aureus was recorded when less vancomycin was present [11]. Current reports of greater level vancomycin opposition in Staphylococcus aureus was more dangerous [12].

In many areas of the world vancomycin opposing MRSA, separates have been reported. In Tehran, MRSA separates with MIC of 32 and greater than 256ml have been analyzed and studied [13]. In 2006 the same oppositions for vancomycin were analyzed in northern India [14]. In Pakistan, a study was conducted by Hakim and associated in Karachi that reports the 13 vancomycin-resistant Staphylococcus aureus [15]. The new drugs were discovered to solve the issue of multi-resistance of drugs. The main purpose of the study was to identify in vitro competence of tigecycline against MRSA isolates in our arrangements.

MATERIAL AND METHODS:

The research was completed at Mayo Hospital, Lahore from November 2017 to August 2018. About 100 patients suffering from MRSA were added in the study. The separates of Staphylococcus aureus were assessed against the opposition of methicillin. Disk diffusion technique was used for this detection. In this technique plates used in the experiment were incubated at 33-35 ◦C for about one day. The assessment of vulnerability to cefoxitin was determined by the CLSI standard. The vulnerable zone was considered as greater than 22 mm. The zone less than 21 mm was defiant. [16]

0.5 McFarland turbidity standards were formulated by the bacterial deferral. With the reference organism control strain of MRSA was used. Mueller Hinton agar was utilized for the suspension of MRSA separates. Then on the inoculated samples 15 microgram disks and E- Strips of tigecycline were placed. Then plates were again inoculated in the presence of oxygen at the temperature of 33-35◦C. The plates were remained in this form for about 16 to 20 hours. The consequences of both MIC and disk diffusion for tigecycline were assessed according to the criteria of the FDA.

RESULTS:

Microorganisms were separated from various samples of the patients. These include the patients of various wards including medical ICU, gynaecology, medical wards, nephrology, surgical wards, surgical ICU, rehabilitation medicine and paediatrics medicine. Most of the separates were from pus swabs. Remaining separates from blood, catheter tips, pleural fluids, nasobronchial lavage, urine and throat swab.

Table – I: FDA approved criteria for disc diffusion and MIC of tigecycline against MRSA.

MIC			**Zone diameter**		
S	I	R	S	I	R
≤0.5	…	…	≥19	15-18	≤14

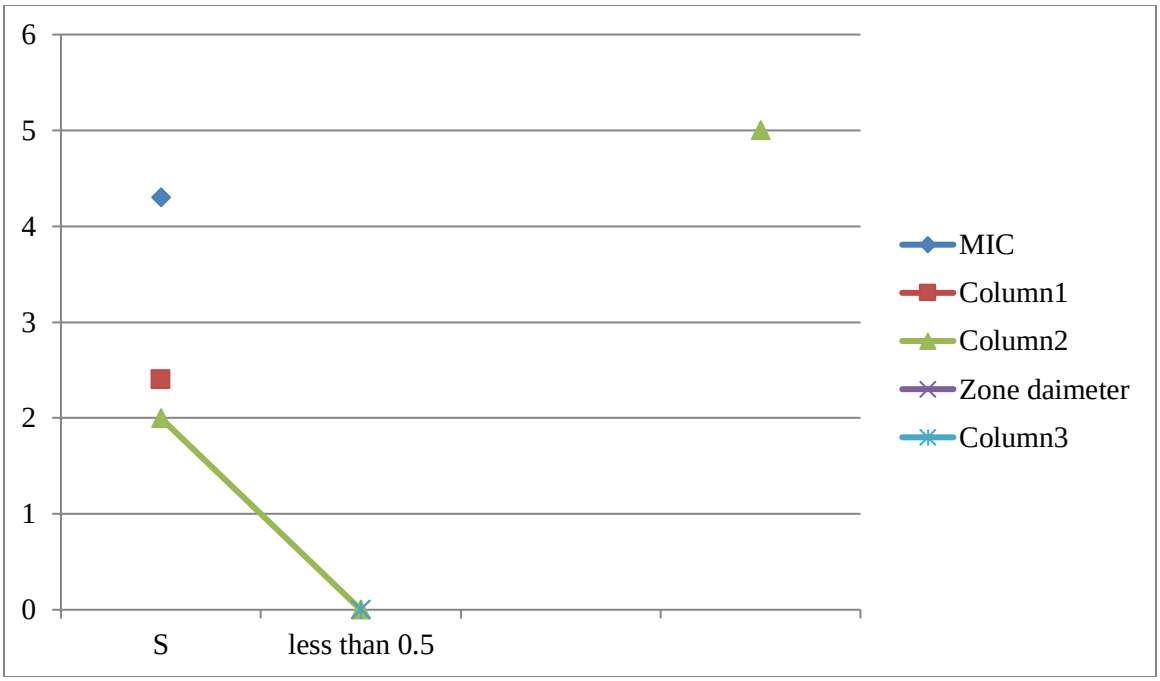
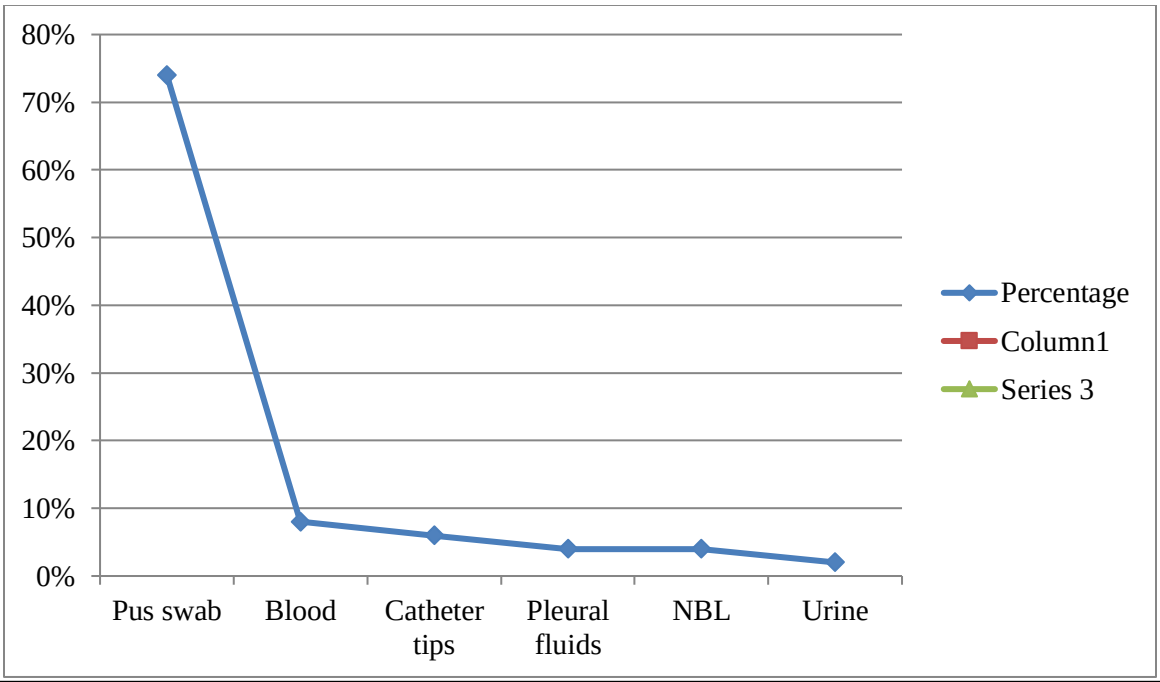


Table – II: Sources of MMRSA isolates

Sample source	Percentage
Pus swab	74%
Blood	8%
Catheter tips	6%
Pleural fluid	4%
NBL	4%
Urine	2%
Throat swab	2%



All MRSA separates were responsive to tigecycline. The diameter identified by Kirby-Bauer disc diffusion system was 21 to 31 mm. The diameter of the average zone was 25.48mm. It was identified by the MIC of the tigecycline against MRSA separates that all separates were vulnerable with MICs from 0.047 to 0.32. The average range was 0.097.

DISCUSSION:

The biggest hindrance in the treatment of many infections is the opposition shown by bacteria against many antibiotics [17]. This international issue is because of the irregular use of drugs that has resulted in the appearance of these MDR bacteria all over the world. In mounting countries, there is a deficiency of infection control follow. Ceremonial antibiotics strategies are not present which has further motivated the issue. The germs of nosocomial infections were gathered from all areas of the country [18].

Majority of the seepage scrub specimen was used to separate the MRSA isolates in our study. In western Nepal, a study was organized by Tiwari and associated showed almost the same consequences [19]. Majority of the operation theatre was used to collect the MRSA isolates. In 2005 a study organized by Husain and his companions showed similar consequences [20].

The wider response was shown by all the associates of MRSA by disc diffusion method. MIC is also in the susceptible series in our study. A study arranged by Reinsert and associated showed the same consequences. 100% receptiveness was shown by MRSA in these studies by using the microdilution method [20].

Another study was organized at the University of Pennsylvania. This study was arranged by Kazbek and his companions. They found MIC90 of 0.25 µg/ml [22]. Gales and associated organize a study in Latin America. It was expressed in the study that MIC50 is eight-fold less potent than MIC50 [23]. It was shown by Sauli and associated that by the use of tigecycline having a concentration of more than 0.5 checks the 99% of the MRSA isolates [17].

Our consequences are similar to the other studies organized currently on these issues. When the other operative methods are not available the left option is the usefulness of tigecycline against MRSA. Tigecycline may demonstrate to crumble of gold to contest infections caused by these isolates. To authenticate the consequences of in vitro adequacy of tigecycline medical explanations are needed.

CONCLUSION:

A very well in vitro action of the tigecycline was shown against MRSA. It is expected to play an important character in the upcoming treatment of nosocomial infections.

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