LETTER TO THE EDITOR

Prevalence of Methicillin Resistance *Staphylococcus aureus* in Clinical Isolates

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Dear Editor,

A gram-positive bacteria known as *staphylococcus aureus (S. aureus)* is a highly pathogenic pathogen that can produce a wide range of clinical symptoms.[1,2] Compared to methicillin-susceptible *S. aureus* (MSSA), methicillin-resistant *S. aureus* (MRSA) can produce more severe infections.[3,4]

In 1969, phosphonomycin, the original name for fosfomycin, was discovered in Spain. It is effective against a variety of *gram-positive* and *gram-negative bacteria* across a broad range. It is extremely effective against both *gram-positive* and *gram-negative bacteria*, including *Pseudomonas aeruginosa* and *Klebsiella pneumonia*, as well as pathogens like *S. aureus* and *Enterococcus*.[5]

The main application for the antibacterial drug nitrofurantoin is the treatment of urinary tract infections brought on by bacteria that are sensitive. The mechanism of action of nitrofurantoin involves multiple steps. Nitrofurantoin is converted by bacterial enzymes into reactive intermediates that damage bacterial DNA and other cellular components. These intermediates react with bacterial proteins, DNA, and ribosomes, leading to the inhibition of bacterial cell growth and division. Additionally, it may interfere with bacterial enzymes involved in the synthesis of bacterial cell wall and cell membrane components, further contributing to its antibacterial effects.[6,7]

In the current study, a total of 36 *S. aureus* isolated from different sites such as urine and wound samples were collected from patients in Al-Shomali General Hospital, Babylon, Iraq. All these samples were inoculated on culture media aerobically at 37°C overnight. The disc diffusion method used for an antibiotic sensitivity test. After streaking the muller Hinton agar plate with an inoculum of the tested organism adjusted to standard turbidity (0.5 McFarland). Fosfomycin, nitrofurantoin, ceftazidime, and amoxiclav discs were used for antibiotic sensitivity against all isolates. Methicillin was applied to identify MRSA.

In the current study, from a total of 36 *S. aureus* isolates, 14 (39%) were MRSA while the others were MSSA 22 (61%) (Fig. 1).

Fosfomycin revealed 100% activity against all isolates followed by amoxyclav which yield 67% activity. Isolates showed 33 and 28% sensitivity to both nitrofurantoin and ceftazidime respectively (Fig. 2).

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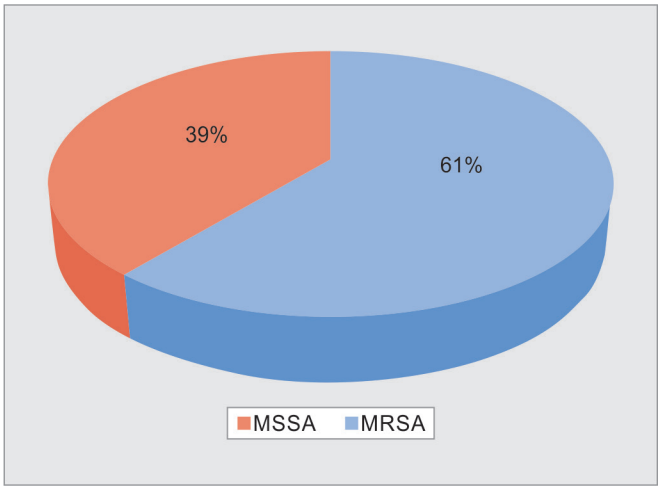

Fig. 1: Prevalence of methicillin resistance in this study

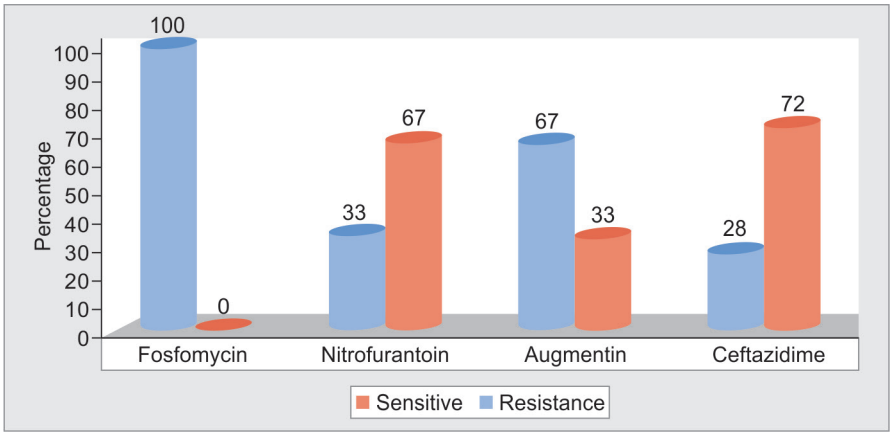

Fig. 2: Percentage of antibiotics resistance for all isolates

Table 1: Comparison antibiotic sensitivity between MRSA and MSSA

	Methicillin sensitivity		
Antibiotics	*MSSA (22)*	*MRSA (14)*	*p-value*
Ceftazidime			
Sensitive			
Count	10	0	0.003
%	45.5%	0.0%	
Resistance			
Count	12	14	
%	54.5%	100.0%	
Fosfomycin			
Sensitive			
Count	22	14	0.001
%	100%	100%	
Resistance			
Count	0	0	
%	0%	0%	
Nitrofurantoin			
Sensitive			
Count	4	8	0.020
%	18.2%	57.1%	
Resistance			
Count	18	6	
%	81.8%	42.9%	

To conclude, the prevalence of MRSA was 39%. Fosfomycin was very effective against all isolates

Fosfomycin is very effective against both MRSA and MSSA strains. ceftazidime was ineffective against MRSA strains compared to MSSA significantly ($p = 0.003$). Nitrofurantoin showed good activity against MRSA (57.1%) compared to MSSA (18.2%) significantly ($p = 0.02$) (Table 1).

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