

The Prevalence Methicillin Resistant Staphylococcus aureus (MRSA)

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Abstract:

Background

Staphylococcus aureus is a common pathogenic commensal bacterium. It is estimated that one in three healthy people carry this type of bacteria on their skin, nose, or mouth as normal flora. However, within the hospital environment this, colonization with this microorganisms can lead to serious consequences as in a potentially patients, visitors and staff whose they can act as a reservoir and source for spreading of infection to the susceptible individuals. Most Staphylococcus aureus bacteria can be treated with methicillin- type antibiotics. However, certain type of this bacteria are resistant to this antibiotics. This group of microorganism is called **MRSA** bacteria

Aim of the Study; To determine the prevalence of methicillin resistant *Staphylococcus aureus* **MRSA** and their antimicrobial susceptibility patterns among clinical samples. **Materials and Methods;** Out of sixty three participants subjected to this study, a total of twenty clinical samples were identified as infected with *S. aureus*. The sensitivity patterns of these isolates samples were determined by using the Kirby-Bauer disk diffusion method. **Results :** The prevalence of **MRSA** among the group studied was 15%. Nine **MRSA** were isolated from ear specimens (22.2%), and eight wereisolates from pus specimens (12.5%).**Conclusion;** The prevalence of **MRSA** in this study was highly, emphasizing the need for local or country-based surveillance to

characterize and monitor **MRSA** and to develop strategies that will improve **MRSA** treatment and control.

INTRODUCTION

Staphylococcus aureus can be found as normal flora of the nose and skin in healthy people, causing no clinical symptoms. They can be transiently carried on the hands and survive well in the environment on skin scales and in dust ⁽¹⁾ Staphylococcus aureus strains, which are resistant to the antibiotic Methicillin (Recently this is Flucloxacillin), are referred to as Methicillin Resistant Staphylococcus aureus **MRSA**. Whilst, Methicillin is the antibiotic that are measured against **MRSA**, they also have the potential to be resistant to many other, but not all antibiotics. Although **MRSA** are no more virulent or harmful than those of usual Staphylococcus aureus which are sensitive to Methicillin, they are more difficult to treat and can spread more easily ⁽²⁾ **MRSA** was discovered in 1961 in the UK, they are sometimes sub-categorized as community-acquired **MRSA** (CA-**MRSA**) or health care-associated **MRSA** (HA-**MRSA**).⁽³⁾ (**MRSA**) can cause problems when it gets the opportunity to enter the body. It can cause local infections such as abscesses, boils, wound infections, respiratory and urinary tract infections. It may then spread into the other part of our body and cause serious infections such as bacteremia ⁽²⁾ (**MRSA**) does not pose a problem to a fit healthy individuals but it may cause harmful effects to vulnerable individuals, including IV drug users, hospitalized patients (particularly patients with surgical or other types of wounds, or cannulas and catheters) and immunocompromised patients. Approximately 25% to 30% of the population is colonized with Staphylococcus aureus, while approximately 1% is colonized with **MRSA**.⁽⁴⁾

Aim of the study

The aim of this study is to determine the prevalence of **MRSA** among clinical samples.

Material and Methods

A total of 63 clinical samples were collected from the participants of different age groups and referred to the laboratory of AL-GAMHORY hospital. Steril cotton swabs and steril urine containers were used for collecting samples from pus, ear, and midstream urine(M.S.U). The obtained swabs were placed in to a sterile test tube containing normal saline to prevent drying of the swab. ⁽⁵⁾

Each specimen was labeled with participant name, age, date and time of collection. The laboratory tests on obtained clinical specimens were carried out by normal bacterial investigation and culture media technique using blood agar, MacConkey agar, CLED agar, Mueller–Hinton agar, and Mannitol Salt agar (HiMedia Labs Pvt. Ltd., 23 vadhan Ind. Est. LBS Marg./Mumbai - 400 086, Maharashtra, India).The identified *S. aureus* were subjected to antibiotic susceptibility test by adopting Kirby-Bauer disc diffusion method(on the Mueller Hinton Agar) with standard antibiotic discs of methicillin (5 mg). ^(5,12) The isolated *S. aureus* which showed resistance to methicillin were tested for antibiotic sensitivity pattern with Penicillin, Oxacilline, Clindamycine, Tobramycin, Vancomycin, Cefaclor, Cefotetan, Tetracycline, Ofloxacin, Ceftriaxone, Cloramphenicol, Gentamycin, Nalidixic acid and Erythromycine. All antibiotic discs were obtained from Oxoid, UK.

Results

Of the 63 clinical samples enrolled, 20 (31.7%) participant had *Staphylococcus aureus* and out from these participant, 3 (15%) were **MRSA**. (Table 2),(Figure 3).Two (22.2%) of **MRSA** case were present

in ear specimens, and one of **MRSA** case (12.5%) was present in pus specimens. *Staphylococcus aureus* was present in 39.13% of participant sputum specimens, 40% of participant pus, and 15% of participant urine. (Table 2), (Figure 2). Screening for Methicillin sensitivity test against isolated *Staphylococcus aureus* was as following: sensitive 85%, moderate 5%, and resistance 10%. (Table 3), (Figure 4), but **MRSA** had as resistant to methicillin of 100%, penicillin 100%, oxacillin 100%, and tetracycline 66.66%, but it is sensitivity to vancomycin was 100%, gentamicin 100%, tetracycline 33.33%. (Table 4), (Figure 5).

Discussion

Staphylococcus aureus, is an important pathogen implicated in a wide variety of human infections, from mild skin infections to more serious and invasive infections, including septicemia, pneumonia, endocarditis, deep-seated abscesses, and toxinoses including food poisoning, and toxic shock syndrome.^(6,7) The prevalence of *Staphylococcus aureus* which observed in this study was the highest 31.7% as compared with that found in Uganda 28.7%, (10), and the one found in India 11.2%.^(8,9) The 31.7% *Staphylococcus aureus* reported in the present study may: depict the level of *Staphylococcus aureus* carriage in this locality, by attributed to the level of contamination arising from the habit of some of the persons to treat their wound aseptically before seeking appropriate medical attention and may also be due to low personal hygiene and poor health education which still persists in Yemen, compared to Uganda, and India. The prevalence rate of **MRSA** in European countries were found to be 28% in the UK, 0.8% in Denmark, 17.5% in Germany, and in Saudi Arabia ranged from 7.5%-33%.⁽¹⁰⁾ In this study the prevalence of **MRSA** among *Staphylococcus aureus* in clinical samples was found to be 15%. This rate of resistance of *Staphylococcus aureus* is high and may be occurred due to several

reasons, these include : misuse of antibiotics, prescription of most antibiotics without minimal diagnostic procedures, prescription of antibiotics without restriction guidelines, and lack of or inadequate knowledge of infectious diseases, and proper antimicrobial usage. In this study the prevalence of **MRSA** in ear specimens, and pus specimens were found : 22.2%, and 12.5% respectively. The rate of prevalence of **MRSA** among ear specimens 22.2% is higher than the prevalence of (MRSA) among ear specimens in Tobago 3.2%,⁽¹¹⁾ and in Saudi Arabia 4.5%.⁽¹⁰⁾ This rate 22.2% is very high and may be due to poor educational health, low hygiene, and low personal cleaning. The rate of pus specimens 12.5% is nearly similar to 17.1% in Tobago.⁽¹⁰⁾ and it is lesser than in Saudi Arabia 35.5%.

Conclusion

The rate of **MRSA** in this study was increased, so this rate emphasizing the need for local or country-based surveillance to characterize and monitor **MRSA** and to develop strategies that will improve **MRSA** treatment and control.

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Table (1): Distribution of **MRSA** among clinical samples.

Clinical samples.	<i>Staphylococcus aureus</i> .		MRSA .	
	Number .	Ratio .(%)	Number .	Ratio .(%)
Ear specimen.	23	36.50	2	22.2
Pus.	20	31.75	1	12.5
Urine.	20	31.75	0	0
Total.	63	—	3	4.8

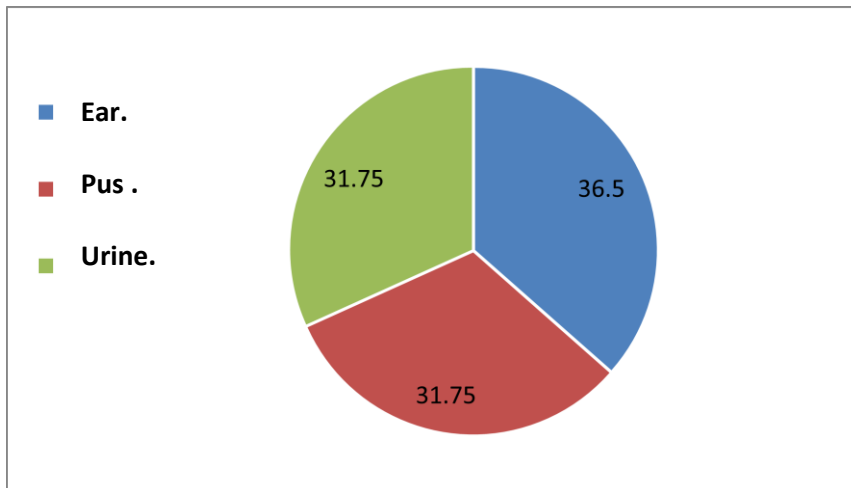


Table (2): Distribution of **MRSA** among *S. aureus* .

Clinical samples.	<i>Staphylococcus aureus</i> .		MRSA .	
	Number .	Ratio(%) .	Number .	Ratio(%) .
Ear specimen.	9	39.13	2	22.2
Pus.	8	40	1	12.5
Urine.	3	15	0	0
Total.	20	31.7	3	15

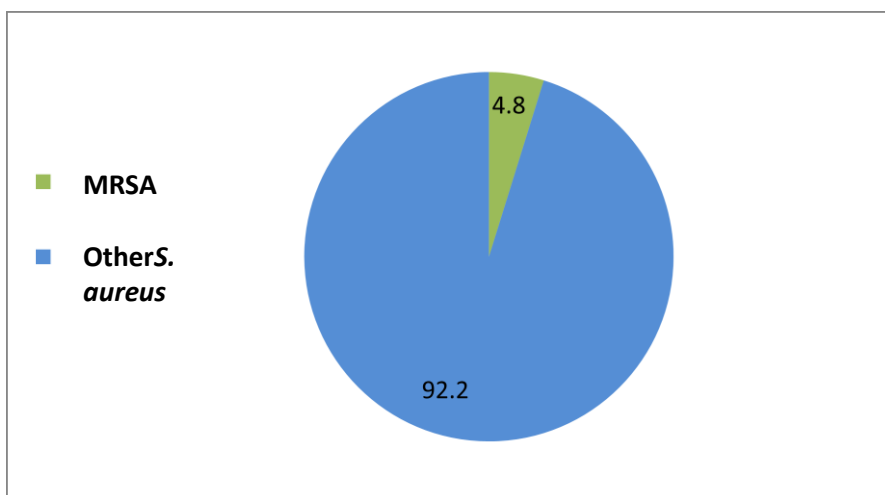


Figure 2 : Percentage of **MRSA** among clinical samples.

Figure 3: percentage of **MRSA** among *S. aureus*.

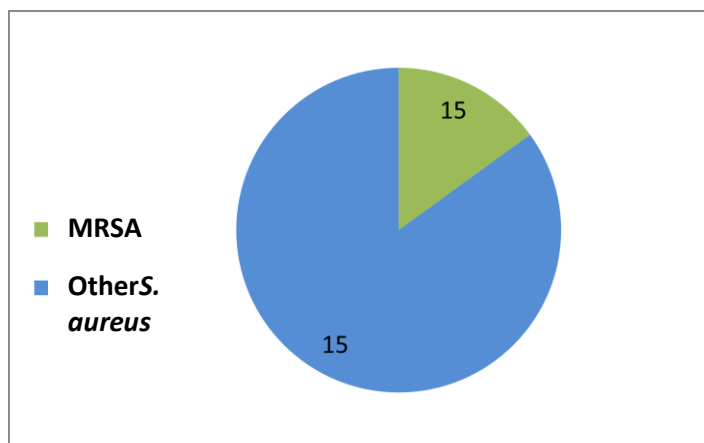


Table (3): Antimicrobial susceptibility rate of *S. aureus* isolated by disk diffusion method.

Antimicrobial Discs.	Susceptibility rate.					
	Sensitive.		Moderate.		Resistance.	
	Number.	%	Number.	%	Number.	%
METHICILLINE	16	80	1	5	3	15
PENICILLINE	17	85	0	0	3	15
OXACILLINE	17	85	0	0	3	15
CLINDAMYCINE	20	100	0	0	0	0
TOBRAMYCINE	20	100	0	0	0	0
VANCOMYCINE	20	100	0	0	0	0
AZTHREOHAM	20	100	0	0	0	0
CEFACTOR	17	85	3	15	0	0
CEFOTETAN	19	95	0	0	1	5
TETRACYCLINE	17	85	1	5	2	10
OFLOXACINE	20	100	0	0	0	0
CEFTRIAZONE	19	95	1	5	0	0
CLORAMPHINICOL	19	95	1	5	0	0
GENTAMYCINE	20	100	0	0	0	0
NALIDIXIC ACID	8	40	2	10	10	50
ERYTHROMYCINE	20	100	0	0	0	0

Figure 4: Antimicrobial susceptibility rate of *Staphylococcus aureus* isolated by disk diffusion method.

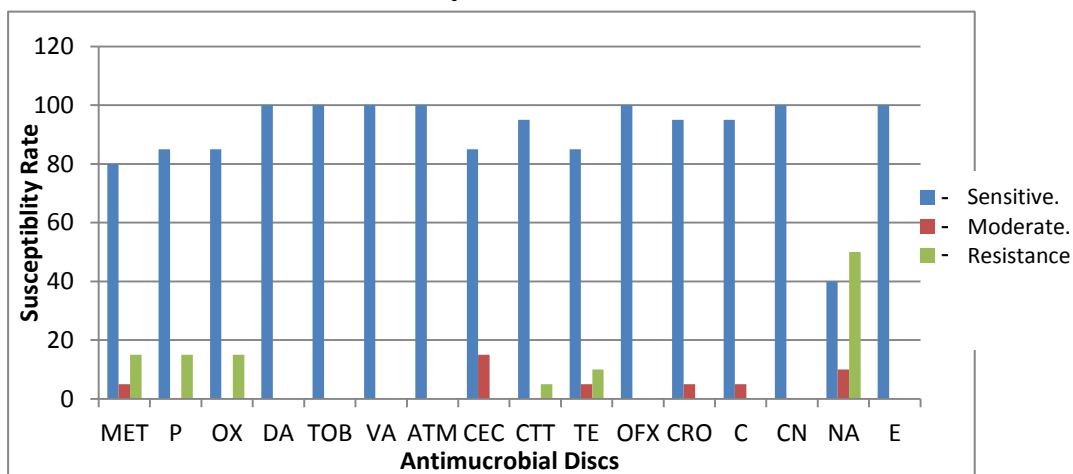


Table (4) : Antimicrobial susceptibility rate of **MRSA** isolated by disk diffusion method.

Antimicrobial Discs.	Susceptibility rate.					
	Sensitive.		Moderate.		Resistance.	
	Number.	%	Number.	%	Number.	%
METHICILLINE	0	0	0	0	3	100
PENICILLINE	0	0	0	0	3	100
OXACILLINE	0	0	0	0	3	100
CLINDAMYCINE	3	100	0	0	0	0
TOBRAMYCINE	3	100	0	0	0	0
VANCOMYCINE	3	100	0	0	0	0
AZTHREOHAM	3	100	0	0	0	0
CEFACLOR	0	0	3	100	0	0
CEFOTETAN	3	100	0	0	0	0
TETRACYCLINE	0	0	1	33.3	2	66.6
OFLOXACINE	3	100	0	0	0	0
CEFTRIAZONE	3	100	0	0	0	0
CLORAMPHINICOL	3	100	0	0	0	0
GENTAMYCINE	3	100	0	0	0	0
NALIDIXIC ACID	0	0	0	0	3	100
ERYTHROMYCINE	3	100	0	0	0	0

Figure 5: Antimicrobial susceptibility rate of **MRSA** isolated by disk diffusion method.

