ORIGINAL ARTICLE

METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS: ANTIBIOTIC RESISTANT TREND IN HAYATABAD MEDICAL COMPLEX PESHAWAR

Aman Ullah[1], Muhammad Asif Zeb[2], Ahsan Saidal[3] , Abdul Malik[4] , Tanveer Ahmad[5]

Authors' Affiliation
[1, 2 ,3] Lecturer, Institute of Paramedical Sciences, Khyber Medical University, Peshawar.
[4] Student, Institute of Paramedical Sciences, Khyber Medical University, Peshawar.
[5] Lab Technician, Institute of Paramedical Sciences, Khyber Medical University, Peshawar.

Corresponding Author
Aman Ullah
Lecturer, Institute of Paramedical Sciences
Khyber Medical Sciences, Peshawar

ABSTRACT

Objective: To determine antibiotic susceptibility pattern of Methicillin resistant Staphylococcus aureus at Hayatabad Medical Complex Peshawar.

Material & Methods: A retrospective cross sectional study was conducted at Hayatabad Medical Complex Peshawar during the period 2015 to 2017. A total of 200 samples were collected and processed according to standard microbiological techniques within hour for isolating MRSA. First of all, the specimens were cultured on Mannitol salt agar (MSA) in aerobic conditions for 24 hours at 35°C. After that fresh colonies were obtained and further biochemical tests catalase and coagulase and Gram staining were performed for the identification of S. aureus. Antimicrobial susceptibility testing were performed by modified Kary-Bauer process and the results were observed , measured and compared with the charts provided by clinical laboratory institutes (CLSI).

Results: Out of total 200 subjects, 120 were males and 80 were females. The percentage of MRSA in pus was highest (82%) followed by blood (11%), urine (3%), wound swabs (1.5%), high vaginal swab (1%), tissue (1%) and ear swab (0.5%). The MRSA in 2016-2017 are highly resistant to Chloramphenicol, Ciprofloxacin, Clindamycin, Cotrimoxazole, Doxycycline Erythromycin, Fusidic Acid and Quinupristin/dalfopristin as compared to 2015-2016.

Conclusion: The high resistance of MRSA in our setup should not go without serious concern. Implementation of strict aseptic techniques and suitable antimicrobial policy may reduce the spread of MRSA in our environment.

Key Words: : Antibiotic, Bacteria, MRSA, Resistance.

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INTRODUCTION

Methicillin resistant Staphylococcus aureus is a gram positive facultative anaerobic cocci grow best at temperature 35-37°C and differentiated from other cocci by catalase.[1, 2, 3] S. aureus strains are both hospital acquired and community acquired, both show different antibiotic susceptibility pattern.[4] In start era penicillin was the drug of choice up to the mid of 5th decade of 20th century, after the resistance to penicillin another antibiotic methicillin were available at late 1960.[5, 6, 7]. In 1961 S. aureus

resistance to methicillin were reported and it was revealed that mecA gene is responsible for the resistance.[8, 9, 10]The rate of incidence of MRSA inclines with the passage of time and is the significant cause of community and health care unit infections across the world.[11]

Like other parts of the world in Pakistan the prevalence of MRSA inclines as after the emergence in 1989, at that time the rate of MRSA was 5% but in previous studies it is revealed that in last decade this value inclined to 43%.[12]

This was very essentialto find out the efficacy of conventional antibiotics valuable for intervention of different infection caused by MRSA. Many studies have conducted in this regard across Pakistan and in Peshawar but the data are limited and old. For this reason we conducted this study to make available the latest treatment and empirical guidelines to doctors and physicians of the region. For this purpose we use eight commonly using antibiotics to determine antibiotic susceptibility pattern of MRSA in Peshawar Pakistan.

MATERIAL AND METHODS

A retrospective cross sectional study was designed to assess the antibiotic susceptibility pattern of MRSA. A total of 200 samples were collected from medical teaching institutes Hayatabad Medical Complex Peshawar KPK Pakistan during the period 2015 to 2017. All the clinical samples were processed according to standard microbiological techniques within hour for isolating MRSA. First of all, the specimens were cultured on Mannitol salt agar (MSA) in aerobic conditions for 24 hours at 35°C. After that fresh colonies were obtained and further biochemical tests catalase and coagulase and Gram staining were performed for the identification of S. aureus. Antimicrobial susceptibility testing were performed by modified Kary-Bauer process and the results were observed , measured and compared with the charts provided by clinical laboratory institutes (CLSI).[1]

Testing for antibiotic susceptibility was performed against ten antibiotics includes Amikacin, Chloramphenicol, Ciprofloxacin, Clindamycin, Cotrimoxazole, Doxycycline, Erythromycin, Fusidic acid, Linezolid, Quinupristin/dalfopristin. For the testing of antibiotic susceptibility 0.5% McFarland turbidity standard were prepared and then streaked on Muller Hinton agar according to the standard microbiological technique. All the media and antibiotics were purchased from Oxoid Company.

RESULTS

A total of two hundred MRSA isolates from different clinical specimens were processed against ten antibiotics during October 2015 to October 2017. Out of this blood showed11%, ear swab 0.5%, HVS 1%, Pus 82%, tissue 1%, urine 3% and wound swabs 1.5% contribution. (Table 1) Among the studied samples 120 belong to male subject and the remaining 80 were belonging to female.

Table 1: Different clinical specimens

S/No	SPECIMENS	COLLECTED SAMPLES	Percent
1	Blood	22	11%
2	Ear swabs	01	0.5%
3	HVS	02	01%
4	Pus	164	82%
5	Tissue	02	01%
6	Urine	06	03%
7	Wound swabs	03	1.5%

Among the samples collected during October 2015 to October 2016 Quinupristin-dalfopristin, Linezolid, Chloramphenicol, and Clindamycin showed significant sensitivity while Doxycycline and Fusidic Acid showed good sensitivity. The remaining antibiotics showed moderate sensitivity. The MRSA showed high resistant toward Erythromycin and Ciprofloxacin. While the Quinupristin-dalfopristin and Linezolid showed greater sensitive toward MRSA. (Table 2)

Table 2: Percentage sensitivity and resistance of MRSA during 2015-2016

S/N	ANTIBIOTICS	CODE	SENSITIVE		RESISTANT		TOTAL
			NO	%	NO	%	
1	Amikacin	AK	26	43.33	34	56.66	60
2	Chloramphenicol	C	47	78.33	13	21.66	60
3	Ciprofloxacin	CIP	12	20.00	48	80.00	60
4	Clindamycin	DA	47	78.33	13	21.66	60
5	Cotrimoxazole	SXT	20	33.33	40	66.66	60
6	Doxycycline	DO	46	76.66	14	23.33	60
7	Erythromycin	E	08	13.33	52	86.66	60
8	Fusidic Acid	FD	45	75.00	15	25.00	60
9	Linezolid	LZD	49	81.66	11	18.33	60
10	Quinupristin-dalfopristin	QD	56	93.33	04	06.66	60

Similarly among 140 samples collected during October 2016 to October 2017 the Linezolid and doxycycline showed significant sensitivity against MRSA. Chloramphenicol, Clindamycin, Quinupristin-dalfopristin showed good sensitivity. Rest of the antibiotics showed high resistant to MRSA. (Table 3)

Table 3: Percentage sensitivity and resistance of MRSA during 2016-2017

S/N	ANTIBIOTICS	CODE	SENSITIVE		RESISTANT		TOTAL
			NO	%	NO	%	
1	Amikacin	AK	61	43.57	79	56.43	140
2	Chloramphenicol	C	97	69.28	43	30.71	140
3	Ciprofloxacin	CIP	13	09.28	127	90.71	140
4	Clindamycin	DA	83	59.28	57	40.71	140
5	Cotrimoxazole	SXT	19	13.57	121	86.43	140
6	Doxycycline	DO	106	75.71	34	24.28	140
7	Erythromycin	E	18	12.85	122	87.14	140
8	Fusidic Acid	FD	83	59.28	57	40.71	140
9	Linezolid	LZD	130	92.85	10	07.14	140
10	Quinupristin-dalfopristin	QD	86	61.42	54	38.57	140

The MRSA in 2016-2017 are highly resistant to Chloramphenicol, Ciprofloxacin, Clindamycin, Cotrimoxazole, Doxycycline Erythromycin, Fusidic Acid and Quinupristin-dalfopristin as compared to 2015-2016. Only two antibiotics Linezolid and Amikacin show slightly sensitive. (Table 4)

Table 4: Comparison between resistance of MRSA from 2015-2016 to 2016-2017

S/N	Antibiotics	Code	2015-2016	2016-2017
1	Amikacin	AK	56.66%	56.43%
2	Chloramphenicol	C	21.66%	30.71%
3	Ciprofloxacin	CIP	80.00%	90.71%
4	Clindamycin	DA	21.66%	40.71%
5	Cotrimoxazole	SXT	66.66%	86.43%
6	Doxycycline	DO	23.33%	24.28%
7	Erythromycin	E	86.66%	87.14%
8	Fusidic Acid	FD	25.00%	40.71%
9	Linezolid	LZD	18.33%	07.14%
10	Quinupristin-dalfopristin	QD	06.66%	38.57%

DISCUSSION

MRSA has been reported as a major bacterial pathogen worldwide due to its devastating nature of growing and its inclined increase in its resistance to antibiotics. *S. Aureus* is the most common cause of skin infections especially in surgical wounds and burns and trauma. In our study 200 clinical isolates of MRSA were studied which were isolated from different clinical samples. In the present comparative study it has found that resistance of MRSA has increased at a steady rate to most antimicrobial agents such as, Chloramphenicol from 21.66% (2015) to 30.71% (2017), Ciprofloxacin from 80% (2015) to 90.71% (2017), Clindamycin form 21.66% (2015) to 40.71% (2017), Cotrimoxazole from 66.66% in (2015) to 86.43% (2017),; Doxycycline from 23.33% (2015) to 24.28% (2017), Erythromycin from 86.66% (2015) to 87.14% (2017), Fusidic Acid from 25% (2015) to 40.71% (2017), and Quinupristin-dalfopristin from 06.66% (2015) to 38.57% (2017) . While Linezolid from 18.33% (2015) to 07.14% (2017) and Amikacin from 56.66% (2015) to 56.43% (2017).

Similarly the trend of antibiotic susceptibility pattern of MRSA has been revealed by many other researchers in Pakistan and worldwide. Ashiq and Tareen et al. shown 5% prevalence of MRSA in Karachi.[14] Qureshi and Hannan et al. publicized the frequency of MRSA 13.8% which was more than the first report.[15] Siddique et al in 1999 publicized another report in Sargodha which shown further inclined in frequency of MRSA results was 22.3% MRSA.[16] Khatoon et al revealed 39% prevalence of MRSA in Lahore.[17] Hafeez et al. reported 42% frequency of MRSA in Peshawar.[18]

CONCLUSION

MRSA should be considered as a serious problem and its prevalence should be

controlled. In conclusion the high prevalence of MRSA should not go without our serious concern. Awareness, cleanliness, modification in techniques and suitable antimicrobial policy may reduce the spread of MRSA in our community. Irregular and unnecessary usage of antibiotics should be avoided and only prescribed antibiotics should be used. All health care and hospitals should follow preventive guidelines and arrange seminars about MRSA dangers and prevention on electronic media. Proper diagnose should be made for all suspected infection caused by MRSA. Linezolid and Quinupristin-dalfopristin revealed good results against MRSA in our study. But the prescription of these antibiotics should be limited subjected to proper antimicrobial sensitivity assay report.

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