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Antimicrobial resistance in MRSA strains before and during COVID-19 pandemic

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INTRODUCTION

During the COVID-19 pandemic, the widespread use of antibiotics has potentially exacerbated antimicrobial resistance. This antibiotic misuse is considered a predisposing factor for the emergence of multidrug-resistant Methicillin-resistant Staphylococcus aureus (MRSA). The objective of this study is to document the evolution in antimicrobial resistance to fluoroquinolones, aminoglycosides, and macrolides among MRSA strains isolated at CHU Tlemcen before and during the COVID-19 pandemic.

MATERIALS AND METHODS

This is an observational, retrospective, monocentric epidemiological study conducted at CHU Tlemcen from January 2019 to May 2023. 164 MRSA isolates were obtained from clinical specimens received at the CHU Tlemcen microbiology laboratory, 71 from January 2019 to March 2020 (pre-COVID-19 pandemic) and 93 from April 2020 to May 2023 (during the COVID-19 pandemic), and their antimicrobial resistance profiles were compared. In vitro susceptibility testing against antimicrobials was performed using disk diffusion technique following CLSI guidelines. Data analysis was conducted using IBM SPSS Statistics 25 and Microsoft Excel 2016.

RESULTS

FIG 1 : DISTRIBUTION OF ISOLAT BY GENDER

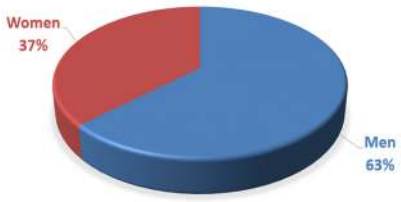

FIG 2 : DISTRIBUTION OF ISOLAT BY HOSPITAL WARDS

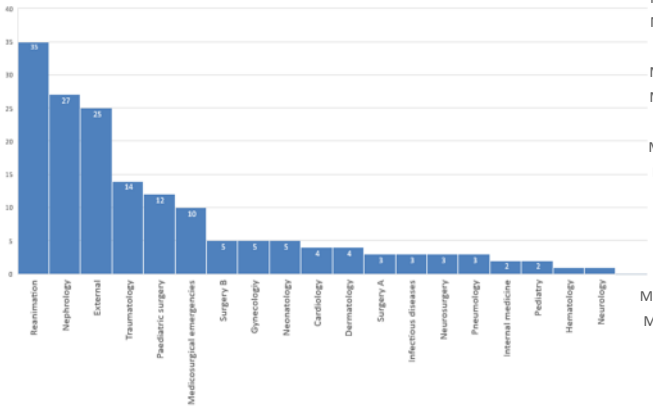

FIG 3 : DISTRIBUTION OF ISOLAT BY SPECIMEN TYPE

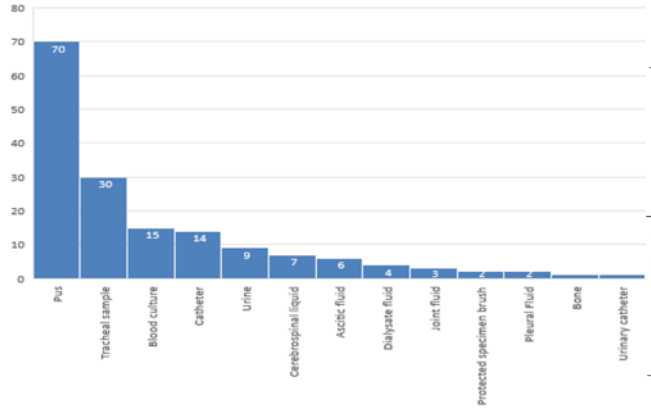

FIG 4 : EVOLUTION OF THE PERCENTAGES OF RESISTANT ISOLATES DURING THE COVID-19 PANDEMIC

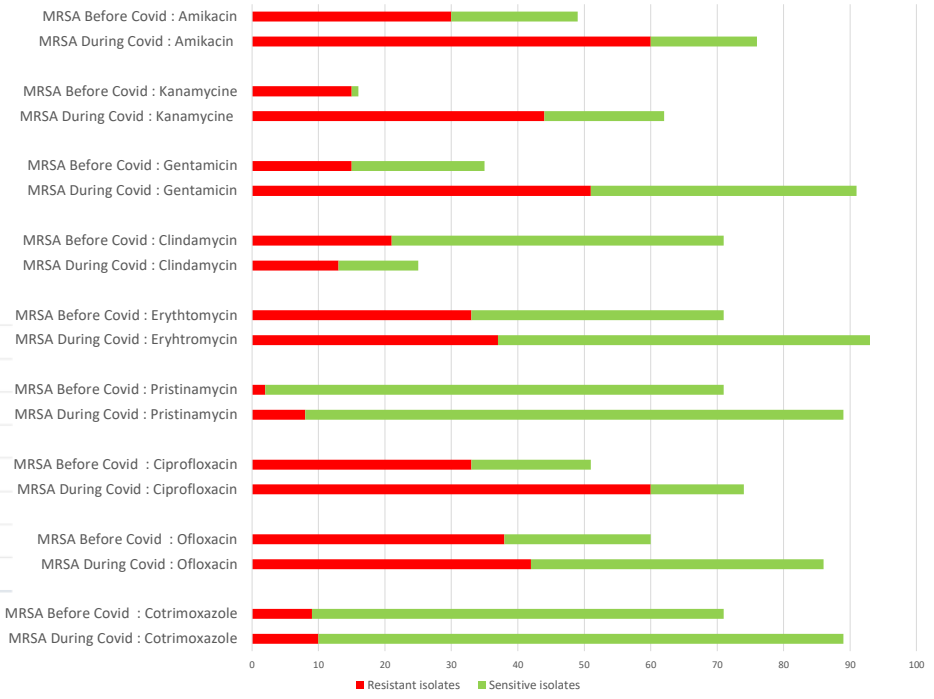

TABLE 1 : CHI SQUARE TEST RESULTS FOR THE EVOLUTION OF RESISTANCE DATA

Study variables	Amikacin R	Amikacin S	Totals	p^a	p^b
MRSA During-Covid	60	16	76		
MRSA Before Covid	30	19	49	**0.031204**	0.05
Totals	90	35	125		

Study variables	Gentamicin R	Gentamicin S	Totals	p^a	p^b
MRSA During-Covid	51	40	91		
MRSA Before Covid	15	20	35	0.184346	0.05
Totals	66	60	126		

Study variables	Clindamycin R	Clindamycin S	Totals	p^a	p^b
MRSA During-Covid	13	12	25		
MRSA Before Covid	21	50	71	**0.043803**	0.05
Totals	34	62	96		

Study variables	Pristinamycin R	Pristinamycin S	Totals	p^a	p^b
MRSA During-Covid	8	81	89		
MRSA Before Covid	2	69	71	0.202786[a]	0.05
Totals	10	150	160		

Study variables	Ciprofloxacin R	Ciprofloxacin S	Totals	p^a	p^b
MRSA During Covid	60	14	74		
MRSA Before Covid	33	18	51	**0.039236**	0.05
Totals	93	32	125		

Study variables	Ofloxacin R	Ofloxacin S	Totals	p^a	p^b
MRSA During- Covid	42	44	86		
MRSA Before Covid	38	22	60	0.083353	0.05
Totals	80	66	146		

DISCUSSION

The majority of isolates were from male patients (63%), consistent with findings from studies in Egypt, Japan, and Canada. MRSA was mainly found in pus or wound swabs (42.68%), aligning with data from Pakistan and India, indicating Staphylococcus aureus as a common cause of skin infections. MRSA strains were predominantly isolated from the intensive care unit (ICU), confirming its role as a major nosocomial pathogen, as seen in Iran. Our study showed increased resistance rates among isolated MRSA strains to Amikacin, Gentamicin, Clindamycin, Pristinamycin, Ciprofloxacin, and Ofloxacin. Significant increases were noted for Amikacin (from 61.22% to 78.95%: p-value = 0.031204), Clindamycin (from 29.58% to 52%: p-value = 0.043803), and Ciprofloxacin (from 64.70% to 81.33%: p-value = 0.039236). Post-COVID isolates were 1.29 times more likely to be resistant to Amikacin, 1.78 times more likely for Clindamycin, and 1.25 times more likely for Ciprofloxacin. These findings are consistent with those of Sulayyim et al.'s systematic review (1) and López-Jácome et al.'s study (2). An anticipated rise in Clindamycin resistance occurred due to the extensive use of azithromycin for COVID-19. Increased consumption of extended-spectrum drugs like Amikacin and Ciprofloxacin during the pandemic may be linked to a higher risk of bacterial superinfection and increased antibiotic misuse (3) (4).

CONCLUSION

Our study reveals a troubling increase in MRSA resistance to key antibiotics such as Amikacin, Clindamycin, and Ciprofloxacin during the COVID-19 pandemic. This escalation, likely fueled by heightened concerns about bacterial infections secondary to COVID-19, underscores the urgent need for responsible antibiotic use to reduce antimicrobial resistance and preserve our ability to effectively combat bacterial infections in the future. Implementing comprehensive antibiotic management programs and promoting public awareness campaigns on appropriate antibiotic usage could play vital roles in addressing this pressing issue

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