



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكرو فيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY



“Prevalence of *mecC* Gene among Methicillin Resistant Staphylococcus Aureus (MRSA) Isolated from Patients in Ain-Shams University Hospital”

Thesis

***Submitted for Partial Fulfillment of the Requirements for M.D Degree in
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلْ اعْمَلُوا

فَسِيرَى اللَّهِ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ
وَسَتُرَدُّونَ إِلَى عَالِمِ الْغَيْبِ وَالشَّهَادَةِ
فَيُنَبِّئُكُمْ بِمَا كُنْتُمْ تَعْمَلُونَ

صَدَقَ اللَّهُ الْعَظِيمُ

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"In the Name of God, the Most Gracious, the Most Merciful"

"And say, Do [as you will], for Allah will see your deeds, and [so, will] His Messenger and the believers. And you will be returned to the Knower of the unseen and the witnessed, and He will inform you of what you used to do."

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
HA-MRSA	Hospital associated MRSA
CA-MRSA	Community acquired MRSA
LA-MRSA	Live-stock associated MRSA
SCC	Staphylococcal Cassette Chromosome
ICU	Intensive Care Units
PVL	Panton-Valentine leukocidin.
AST	Active Surveillance Testing
CoNS	coagulase negative <i>Staphylococcus</i>
BMD	Broth microdilution
MH	Muller-Hinton
MIC	Minimal Inhibitory Concentration
PCR	polymerase chain reaction
mPCR	Multiplex polymerase chain reaction
CLSI	clinical laboratory standards institute
DA	Clindamycin
FOX	Cefoxitin
E	Erythromycin
P	Penicillin
SXT	Trimethoprim/Sulfamethoxazole
DO	Doxycycline
LZO	Linezolid
RA	Rifampin
CIP	Ciprofloxacin
C	Chloramphenicol
CN	Gentamycin
LEV	Levofloxacin

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INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (MRSA) has emerged as a major cause of nosocomial infections and was regarded as Hospital associated MRSA (HA-MRSA) Since its discovery in the 1960's, in 1990's it was recognized in patients with no previous contact with healthcare facilities and was designated as community acquired MRSA (CA-MRSA), MRSA also has been recognized in a wide range of host species with evidence of animal to human transmission and was therefore regarded as Live-stock associated MRSA (LA-MRSA). MRSA poses a serious problem for infection prevention and control and antibiotic treatment globally (*Lakhundi, S., & Zhang, K.,2018*).

In a healthcare setting, such as a hospital or nursing home, MRSA can cause severe problems such as bloodstream infections, pneumonia and surgical site infections (*CDC, 2016*).

Resistance against almost all beta-lactam compounds in clinical use in MRSA is conferred by the expression of a modified Penicillin-binding protein 2a (PBP2a) that is encoded by the *mecA* gene carried on a staphylococcal cassette chromosome *mec* (*SCCmec*) (*Kumurya, 2015*).

The report of MRSA encoding a divergent *mecA* gene in 2011 was highly significant. This homologue, designated *mecC*, poses diagnostic problems with the potential to be misdiagnosed as

methicillin-sensitive *S. aureus*, with important potential consequences for individual patients and for the surveillance of MRSA (*paterson et al., 2014*).

The new homologue of *mecA* (*mecC*) was described sharing only 70% DNA identity with the *mecA* (*Garcia-Alvarez et al., 2011*).

MecC MRSA have been reported from 13 European countries and have been isolated from 14 different host species, with evidence of a recent increase in Denmark Published at the same time as the UK, work in the Republic of Ireland independently described *mecC* in human MRSA strains isolated in 2010 (*Garcia-Alvarez et al., 2011*).

This *mecC* MRSA produce a distinctive antibiotic susceptibility profile compared to *mecA*. Where both Oxacillin and Cefoxitin are included, *mecA* MRSA, as might be expected, typically display resistance to both. By contrast, the majority of *mecC* MRSA show resistance to Cefoxitin, and are therefore reported as MRSA, but however show susceptibility to Oxacillin (*Cartwright, 2013*).

Also, Resistance to non β lactam antibiotics is uncommon among *mecC* mediated MRSA (*Paterson et al., 2014*). So, detection of the prevalence of *mecC* MRSA is important to give more options in the treatment of MRSA infections.

There are limited data available on the epidemiology and prevalence of (MRSA) that encode the recently described *mecA* homologue (*mecC*) in Egypt. To address this knowledge gap this study was done.

AIM OF WORK

The aim of this study was to detect the prevalence of *mecC* gene in clinical isolates of MRSA in Ain-Shams University Hospitals and to correlate minimal inhibitory concentration (MIC) of Oxacillin with the *mecC* gene expression in MRSA isolates.