



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكرو فيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكرو فيلم



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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Diagnostic Efficacy of Carba NP Strip Test for Carbapenemase Detection

Thesis

Submitted for Partial Fulfillment of Master Degree in Clinical Pathology

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2021

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

*First and foremost, I feel always indebted to **ALLAH**,
the Most Kind and Most Merciful.*

*I'd like to express my respectful thanks and profound
gratitude to **Prof. Dr. Shereen Ahmed El Masry**,
Professor of Clinical Pathology, Faculty of Medicine, Ain Shams
University for her keen guidance, kind supervision, valuable
advice and continuous encouragement, which made possible the
completion of this work.*

*I am also delighted to express my deepest gratitude and
thanks to **Dr. Noha Alaa El-Din Mohammed Fahim**,
Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams
University, for her kind care, continuous supervision, valuable
instructions, constant help and great assistance throughout this
work.*

Lamya Ahmed

List of Contents

Title	Page No.
List of Abbreviations.....	i
List of Tables	iii
List of Figures	v
Introduction	1
Aim of the Work.....	3
Review of Literature	4
Materials and Methods	40
Results	74
Discussion	98
Conclusion and Recommendations.....	107
Summary	108
References	111
Arabic Summary	—

List of Abbreviations

Abb.	Full term
A/A	Acid/acid
AIM.....	Australian imipenemase
aPI	Acute pelvic infections
CAP.....	Community acquired pneumonia
CHDLs.....	Carbapenem-hydrolyzing class D β -lactamases
cIAI	Complicated intra-abdominal infections
CIM.....	Carbapenem inactivation method
CPE	Carbapenemase producing Enterobacteriaceae
CRE	Carbapenem resistant Enterobacteriaceae
cSSSI	Complicated skin and skin-structure infections
cUTI.....	Complicated urinary tract infections
DIM	Dutch imipenemase
DNA.....	Deoxyribonucleic acid
<i>E. coli</i>	<i>Escherichia coli</i>
EDTA.....	Ethylene diamine tetra-acetic acid
ESBL	Extended spectrum β -lactamase
GES.....	Guiana extended spectrum
GIM	German imipenemase
HAP	Hospital acquired pneumonia
HMM.....	High molecular mass
IMI.....	Imipenem hydrolyzing β -lactamase
IMP	Imipenemase
K/A.....	Alkaline/acid
K/K.....	Alkaline/alkaline
KPC	<i>Klebsiella pneumoniae</i> carbapenemase
LMM	Low molecular mass

List of Abbreviations Cont...

Abb.	Full term
MALDI-TOF MS ..	Matrix-assisted laser desorption ionization-time of flight mass spectrometry
MBLs	Metallo- β -lactamases
MDR	Multidrug resistance
MEM.....	Meropenem
MHA	Mueller-Hinton agar
MHB	Mueller-Hinton broth
MHT	Modified Hodge test
MIC.....	Minimal inhibitory concentration
NDM.....	New Delhi metallo-blactamase
NMC	Non metalloenzyme carbapenemase
NP.....	Nosocomial pneumonia
NPV	Negative predictive value
OXA-48.....	Oxacillinase-48
PBP _s	Penicillin-binding proteins
PCR.....	Polymerase chain reaction
PPV.....	Positive predictive value
RCNP.....	Rapidec Carba NP test
Real-time PCR ...	Real-time polymerase chain reaction
<i>SFC-1</i>	<i>S. fonticola</i>
SIM.....	Seoul imipenemase
SME	<i>S. marcescens</i> enzyme
SPM.....	Sao Paulo MBL
SSI	Surgical-site infection
TSB.....	Tryptone soya broth
VIM.....	Verona imipenemase
WGS	Whole genome sequencing

List of Tables

Table No.	Title	Page No.
Table (1):	Components of reaction master mix for each 25 µl reaction for each primer.....	68
Table (2):	Three-step cycling protocol.....	68
Table (3):	Different types of isolates included in the present study.....	74
Table (4):	Results of carba NP tube test for the 50 tested isolates.....	75
Table (5):	Results of Carba NP strip test in present study.....	77
Table (6):	Results of phenotypic methods regarding reading time of positive results.....	78
Table (7):	Results of MIC broth microdilution test for meropenem.	80
Table (8):	Distribution of <i>bla</i> _{KPC} among the different isolates.....	81
Table (9):	Distribution of <i>bla</i> _{OXA} among the different isolates	82
Table (10):	Distribution of <i>bla</i> _{VIM} among the different isolates.....	83
Table (11):	Distribution of <i>bla</i> _{GES} among the different isolates.....	84
Table (12):	Correlation between MIC and both Carba NP tube and strip method.....	85
Table (13):	Correlation between MIC and both Carba NP tube and strip method in <i>Klebsiella</i> spp.....	87
Table (14):	Correlation between MIC and both Carba NP tube and strip method in <i>Pseudomonas</i> spp.....	89

List of Tables Cont...

Table No.	Title	Page No.
Table (15):	Correlation between MIC and both Carba NP tube and strip method in <i>E.coli</i>	91
Table (16):	Diagnostic performance of Carba NP tube test compared to MIC for meropenem	93
Table (17):	Diagnostic performance of Carba NP strip test compared to MIC for meropenem	93
Table (18):	Correlation between Carba NP tube test and strip method regarding time of reading positive results.....	94
Table (19):	Correlation between Carba NP tube test and type of PCR gene in positive PCR results.	95
Table (20):	Correlation between Carba NP strip test and type of PCR gene in positive PCR results.	95

List of Figures

Fig. No.	Title	Page No.
Figure (1):	Chemical structures of (a) imipenem; (b) meropenem; (c) biapenem; (d) ertapenem; and doripenem.....	5
Figure (2):	Double disk synergy test.....	29
Figure (3):	E-test showing Carbapenemase production.....	30
Figure (4):	Uninoculated test tubes used as control tubes labeled C and inoculated test tubes giving negative result.	61
Figure (5):	Control tubes and inoculated test tubes giving positive result (yellow color).	61
Figure (6):	1) uninoculated control strip with solution A. 2) uninoculated test strip with solution B. 3) inoculated control strip with slight pink color from the mucoid <i>Klebsiella</i> colony.....	63
Figure (7):	Inoculated test strips giving negative results (no color change in test strip).....	63
Figure (8):	Real-time multiplex PCR melting curves of the amplicons generated by primers targeting four carbapenemase types	69
Figure (9):	A positive isolate for <i>bla_{KPC}</i>	70
Figure (10):	A negative isolate for <i>bla_{KPC}</i>	70
Figure (11):	A positive isolate for <i>bla_{VIM}</i>	70
Figure (12):	A negative isolate for <i>bla_{VIM}</i>	70
Figure (13):	A positive isolate for <i>bla_{OXA-48}</i>	70
Figure (14):	A negative isolate for <i>bla_{OXA-48}</i>	70
Figure (15):	A positive isolate for <i>bla_{GES}</i>	71
Figure (16):	A negative isolate for <i>bla_{GES}</i>	71

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (17):	A negative isolate for <i>bla</i> _{IMP}	71
Figure (18):	Different types of isolates involved in the current study.	74
Figure (19):	Results of Carba NP tube test in the current study.	76
Figure (20):	Results of Carba NP strip test for the tested isolates in present study.....	77
Figure (21):	Results of phenotypic methods regarding reading time of positive results.	79
Figure (22):	Results of MIC broth microdilution method for meropenem.....	80
Figure (23):	Distribution of <i>bla</i> _{KPC} among the different isolates.	81
Figure (24):	Distribution of <i>bla</i> _{OXA-48} among the different isolates	82
Figure (25):	Distribution of <i>bla</i> _{VIM} among the different isolates	83
Figure (26):	Distribution of <i>bla</i> _{GES} among the different isolates	84
Figure (27):	Correlation between Carba NP tube test and MIC results.	86
Figure (28):	Correlation between Carba NP strip test and MIC results.	86
Figure (29):	Correlation between Carba NP tube test and MIC results in <i>Klebsiella</i> spp.	88
Figure (30):	Correlation between Carba NP strip test and MIC results in <i>klebsiella</i> spp.	88
Figure (31):	Correlation between Carba NP tube test and MIC results in <i>Pseudomonas</i> spp.	90
Figure (32):	Correlation between Carba NP strip test and MIC results in <i>Pseudomonas</i> spp.	90

List of Figures Cont...

Fig. No.	Title	Page No.
Figure (33):	Correlation between Carba NP tube test and MIC results in <i>E.coli</i>	92
Figure (34):	Correlation between Carba NP strip test and MIC results in <i>E.coli</i>	92
Figure (35):	Correlation between Carba NP tube test and strip method regarding time of reading positive results.	94

INTRODUCTION

Clinical isolates of carbapenem resistant *Enterobacteriaceae* (CRE) by carbapenemase production have now spread worldwide. Carbapenemases commonly found in these organisms include class A *Klebsiella pneumoniae* carbapenemase (KPC), class B New Delhi metallo- β -lactamase (NDM), imipenemase (IMP) and Verona imipenemase (VIM), and class D oxacillinase-48 OXA-48) (**Nordmann *et al.*, 2012a**).

Carbapenemase producers notoriously exhibit multidrug resistance phenotypes, making treatment of infections extremely difficult as they are able to hydrolyze a broad spectrum of β -lactams including the penicillins, cephalosporins, hospital carbapenems and monobactam. They have the potential to spread rapidly in environments and cause nosocomial infections with high mortality rates (**Pitout *et al.*, 2015**).

Molecular detection of carbapenemase genes remains high cost and requires special equipment. Phenotypic carbapenemase confirmatory tests including the modified Hodge test (MHT) and B-lactamase inhibitor-based tests are time-consuming (18–24 h). Therefore, rapid and inexpensive phenotypic methods for detecting CRE are needed for appropriate antimicrobial therapy and infection control measures to prevent their dissemination (**Poirel *et al.*, 2012; Dortet *et al.*, 2014; CLSI, 2018**).