بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Antimicrobial Resistance among *Streptococcus Agalactiae* Colonizers in Pregnant Women

Thesis

For Partial Fulfillment of Master Degree
in **Clinical Pathology**

By

Mona Byoumee Ragay
M.B.B.C.H.,

Under supervision of

Prof. Dr. Sherin Ahmed Sami ElMasry
Professor of Clinical Pathology
Faculty of Medicine – Ain Shams University

Dr. Noha Alaa EL-Din Mohammed Fahim
Lecturer of Clinical Pathology
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Shams University
2021

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. Sherin Ahmed Sami ElMasry,*** *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.*

I would like to express my hearty thanks to all my family for their support till this work was completed.

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Mona Byoumee Ragay

List of Contents

Title	Page No.

List of Tables

Table No.	Title	Page No.

List of Figures

List of Figures (Cont...)

List of Abbreviations

Abb.	Full term

ACP ..... *αC protein*
ALADI ..... *Automated Laboratory Diagnostic Instrument*
API ..... *Analytical profile index*
AST ..... *Antimicrobial susceptibility testing*
BBB ..... *Blood–brain barrier*
CAMP ..... *Christie Atkins Munch Peterson*
cMLSB ..... *Constitutive macrolide, lincosamide and streptogramin B*
CNS ..... *Central nervous system*
CPS ..... *Capsular polysaccharide*
DM ..... *Daptomycin*
ECM ..... *Extracellular matrix*
EOD ..... *Early onset diseases*
FA ..... *Fluorescent antibody*
GA ..... *Gestational age*
GBS ..... *Group β Streptococcus*
GM-CSF ..... *Granulocyte / macrophage-colony stimulating factor*
HGT ..... *Horizontal gene transfer*
HlyB ..... *Hyaluronate lyase*
IAP ..... *Intrapartum antibiotic prophylaxis*
iMLSB ..... *Inducible macrolide, lincosamide and streptogramin B*
LAMP ..... *Loop-mediated isothermal amplification*
LB ..... *Live-born*
LZ ..... *Linezolid*
MALDI-TOF/MS…Matrix-assisted laser desorption/ionization time-of flight mass spectrometry
MIC ..... *Minimal inhibitory concentration*
MLSB ..... *Macrolide, lincosamide and streptogramin B*

List of Abbreviations (cont...)

Abb.	Full term
NA	*Nucleic acid*
NAATs	*Nucleic acid amplification tests*
O2	*Oxygen*
PBP2	*Penicillin binding protein 2*
PCR	*Polymerase chain reaction*
POC	*Point of care*
PYR	*Pyrrolidonyl arylamidase*
ROS	*Reactive oxygen species*
ScpB	*GBS C5a peptidase*
VA	*Vancomycin*
β-H/C	*β-hemolysin / cytolysin*

INTRODUCTION

Group β *Streptococcus* (GBS) or *Streptococcus Agalactiae* can colonize the gastrointestinal and genitourinary tracts and has been considered one of the most important risks for the development of neonatal diseases. GBS is often associated with medical intercurrences during pregnancy and the postpartum period and can be associated with life-threatening disease in newborns due to sepsis, pneumonia, and meningitis ***(Hamedi et al., 2012).***

Prenatal GBS screening is recommended by the Centers for Disease Control and Prevention (CDC) by means of specimens harvested from the vaginal introitus and perianal region from all the pregnant women between 35 and 37 weeks of gestation ***(Huang et al., 2019).***

Intrapartum antibiotic prophylaxis (IAP) reduces both the vertical transmission of *Streptococcus Agalactiae* or group β *Streptococcus* (GBS) and the early onset of neonatal sepsis. However, existing guidelines do not recommend that antimicrobial susceptibility testing (AST) be routinely performed. Penicillin or ampicillin is indicated as first-choice antibiotics, cefazolin being an alternative in the case of history of mild allergic reactions, and vancomycin or clindamycin an alternative in the event of severe reactions ***(Matani et al., 2016)***. Concerns about IAP pertain potential toxicity and,

mainly, potential pressure towards antibiotic resistance among GBS strains ***(Huang et al., 2019).***

GBS colonization rates in pregnant women vary according to socioeconomic, cultural, and demographic conditions as well as the methods used for detection ***(Huang et al., 2019).***

Penicillin remains the agent of choice for intrapartum antibiotic prophylaxis, with ampicillin as an acceptable alternative (AI), Penicillin-allergic women who do not have a history of anaphylaxis, angioedema, respiratory distress or urticaria following administration of penicillin or a cephalosporin should receive cefazolin (BII). Antimicrobial susceptibility testing should be ordered for antenatal GBS cultures performed on penicillin-allergic women at high risk for anaphylaxis because of a history of anaphylaxis, angioedema, respiratory distress or urticaria ***(Revised guidelines from CDC, 2010***).

The high rate of resistance in GBS strongly supports the current Centers for Disease Control and Prevention recommendation that antibiotic susceptibility testing be performed if erythromycin or clindamycin therapy is needed to prevent neonatal GBS infection ***(Hayes et al., 2020).***

The standard method for diagnosis of GBS colonization comprises culture of combined vaginal and rectal samples in a selective enrichment medium, such as Lim broth, i.e. Todd-

Hewitt broth with colistin and nalidixic acid, followed by subculture on sheep blood agar. However, this method requires at least 48 h for fully GBS identification. CDC identified various research priorities, including 'the development of media with a reliable colour indicator to signal the presence of GBS to improve accuracy of prenatal culture results and facilitate prenatal culture processing at clinical laboratories with limited technical capacity. It includes a novel chromogenic agar, i.e. chromID *Strepto* B (formerly *Strepto* B ID) agar or ChromAgar, which highlights GBS as red colonies after aerobic incubation ***(Nabil et al., 2017).***