



**Study of Multi Drug Resistant Tuberculosis
and Extensively Drug Resistant
Tuberculosis at El Mansoura Chest Hospital
at Dakahlia and El Maamoura Chest
Hospital at Alexandria**

Thesis

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دراسة السل المقاوم والبالغ المقاومة للأدوية المتعددة بمستشفى
صدر المنصورة بالدقهلية ومستشفى صدر المعمورة بالاسكندرية

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٢٠١٦

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لَسْبَدَانِكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

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List of Abbreviations

AFB	: Acid fast bacilli
ADA	: Adenosine deaminase
ATP	: Adenosine triphosphate
ALT	: Alanine transaminase
Am	: Amikacin
Amx/Clv	: Amoxicillin/clavulanate
ART	: Antiretroviral therapy
AST	: Aspartate transaminase
BCG	: Bacille Calmette-Guérin vaccine
BMM	: Broth microdilution method
Cm	: Capreomycin
CO₂	: Carbon dioxide
Cat	: Category
CDC	: Centers for Disease Control and Prevention
CCM	: Central carbon metabolism
CNS	: Central nervous system
CSF	: Cerebrospinal fluid
CXR	: Chest X-ray
Cfx	: Ciprofloxacin
Clr	: Clarithromycin
Cfz	: Clofazimine
CT	: Computed tomography
CAD	: Computer-aided detection
Cs	: Cycloserine
DTH	: Delayed-type hypersensitivity
DNA	: Deoxyribonucleic acid
DM	: Diabetes mellitus
DOT	: Direct observation therapy
DRS	: Drug resistance susceptibility
DR-TB	: Drug resistant tuberculosis
DST	: Drug susceptibility
ESR	: Erythrocyte sedimentation rate
E	: Ethambutol

List of Abbreviations

Eto	: Ethionamide
EEA	: European Economic Area region ,
EU	: European union
XDR-TB	: Extensively drug resistant tuberculosis
EQA	: External quality assurance
EPTB	: Extra-pulmonary tuberculosis
FBS	: Fasting blood sugar
Fig.	: Figure
FDC	: Fixed dose combination
FQ	: Fluroquinolones
FIND	: Foundation for Innovative New Diagnostics
Gfx	: Gatifloxacin
g/dl	: Gram/deciliter
GLC	: Green light committee
Hb	: Haemoglobin
HBV	: Hepatitis b virus
HCV	: Hepatitis c virus
HBCs	: High burden countries
HRCT	: High resolution computed tomography
HIV	: Human immunodeficiency virus
HCL	: Hydrochloric acid
IGRAs	: Interferon gamma release assays
INF α or γ	: Interferon α or γ
IL	: Interleukin
IV	: Intravenous
H	: Isoniazid
INH	: Isoniazid
Km	: Kanamycin
LTBI	: Latent TB infection
Lfx	: Levofloxacin
LCR	: Ligase chain reaction
LPAs	: Line probe assays
Lzd	: Linezolid
LB	: Lipid body

List of Abbreviations

LAMP	: Loop-mediated isothermal amplification test
LJ	: Lowenstein-jensen
MRI	: Magnetic resonance imaging
Max.	: Maximum
µg	: Microgram
µL	: Microliter
MODS	: Microscopic observation drug susceptibility assay
MICs	: Minimal inhibitory concentrations
Min.	: Minimum
Mfx	: Moxifloxacin
MES	: Multidrug efflux systems
MDR-TB	: Multi-drug resistant tuberculosis
MGIT)	: Mycobacterial growth indicator tube
M	: Mycobacterium
Mtb	: <i>Mycobacterium tuberculosis</i>
NIOSH	: National Institute for Occupational Services and Health
NRA	: Nitrate reductase enzyme
NTM	: Non-tuberculous mycobacteria
NAAT)	: Nucleic acid amplification (tests
Ofx	: Ofloxacin
PAS	: Para- amino salicylic acid
PNBA	: Para-amino-benzoic acid
PCR	: Polymerase chain reaction
PET-CT	: Positron emission tomography- computed tomography
PA	: Postero-anterior
K	: Potassium
Pto	: Protionamide
PTB	: Pulmonary tuberculosis
PPD	: Purified protein derivative
PZA	: Pyrazinamide
Z	: Pyrazinamide
RNI	: Reactive nitrogen intermediates

List of Abbreviations

ROI	: Reactive oxygen intermediates
RBCs	: Red blood cells
R	: Rifampicin
RR-TB	: Rifampicin resistant tuberculosis
Na	: Sodium
NaOH	: Sodium hydroxide
SD	: Standard deviation
S	: Streptomycin
SRL	: supranational reference laboratory
Th_{1,2}	: T helper _{1,2}
Trd	: Terizidone
TEMA	: Tetrazolium microplate assay
Th	: Thioacetazone
TSH	: Thyroid stimulating hormone
TDR-TB	: Totally drug resistant tuberculosis
TST	: Tuberculin skin test
TB	: Tuberculosis
TB-RIF	: Tuberculosis- rifampicin
TNF-)	: Tumor necrosis factor-
USA	: United States of America
VOC	: Volatile organic compound
WBCs	: White blood cells
WHO	: World health organization
ZN	: Zeihl-neelsen

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Abstract

Tuberculosis (TB) is a chronic specific bacterial infection caused by bacteria of the *Mycobacterium tuberculosis*. It primarily affects the lungs (pulmonary tuberculosis) but, in a minority of cases other organs may also be involved (extra-pulmonary tuberculosis).

There were 10.4 million new TB cases in 2016 and 1.4 million TB deaths (1 million among HIV-negative people and 0.4 million among HIV-positive people).

Pulmonary tuberculosis is a major cause of morbidity and mortality worldwide, resulting in the greatest number of deaths due to any one single infectious agent. Drug resistance threatens global tuberculosis control efforts.

In Egypt, Tuberculosis is considered to be the third most important communicable disease after schistosomiasis and hepatitis C.

Strains of *Mycobacterium tuberculosis* that are resistant to both isoniazid and rifampicin with or without resistance to other drugs have been termed multi-drug resistant strains. XDR including resistance to isoniazid, rifampicin, at least one of injectable 2nd line anti-TB drugs and a fluoroquinolone with or without resistance to other drugs.

Keywords:

Study of Multi Drug Resistant Tuberculosis and Extensively Drug Resistant Tuberculosis at El Mansoura Chest Hospital at Dakahlia and El Maamoura Chest Hospital at Alexandria