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مسئولية عن محتوى هذه الرسالة.

### ملاحظات:





# **Retrospective study for TB cases in Kafr El-Shiekh Chest Hospital during the period between January 2010 and January 2019 and role of GeneXpert in diagnosis**

Thesis

*Submitted for Partial Fulfillment of Master Degree in  
Chest Diseases*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# قَالَ

سَبَّحَانَكَ لَا إِلَهَ إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ  
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# *List of Abbreviations*

Abb.	Full term
AAFB .....	Alcohol and acid-fast bacillus
ADH.....	Antidiuretic hormone
AFB.....	Acid-fast bacilli
AIDS .....	Acquired immunodeficiency syndrome
ALT .....	Alanine aminotransferase
ART.....	Antiretroviral therapy
BCG .....	Bacillus Calmette-Guérin
CAP .....	Community-acquired pneumonia
CBC .....	Complete blood cell
CDC.....	Centers for Disease Control and Prevention
CMV.....	Cytomegalovirus
COPD.....	Chronic obstructive pulmonary disease
CT .....	Computed tomography
DNA.....	Deoxyribonucleic acid
DOT .....	Directly observed therapy
ELISA.....	Enzyme-linked immunosorbent assay
ELISpot .....	Enzyme-linked immunospot
FDA .....	Food and Drug Administration
GI.....	Gastrointestinal
HIV .....	Human immunodeficiency virus
IFN-gamma .....	Interferon-gamma
IGRA.....	Interferon-gamma release assay
IL .....	Interleukin
IV .....	Intravenous
MDDR.....	Molecular detection of drug resistance
MDR-TB.....	Multi-Drug Resistant Tuberculosis

## *List of Abbreviations Cont...*

Abb.	Full term
MODS .....	Microscopic-observation drug susceptibility
MRI.....	Magnetic resonance image
MTBC .....	Mycobacterium tuberculosis complex
MTD.....	Mycobacterium tuberculosis direct
NAA.....	Nucleic acid amplification
NAAT.....	Nucleic acid amplification testing
NPV .....	Negative predictive value
NTP .....	National Tuberculosis control Program
PA .....	Posteroanterior
PCR .....	Polymerase chain reaction
PET.....	Positron emission tomography
PFGE .....	Pulsed field gel electrophoresis
PPD.....	Purified protein derivative
PPV.....	Positive predictive value
QFT-GIT.....	QuantiFERON-TB Gold In-Tube
RIF.....	Resistance to rifampin
RNA .....	Ribonucleic acid
SAT.....	Self-administered therapy
SPECT .....	Single-photon emission CT
TB .....	Tuberculosis
TLA.....	Thin-layer agar
TNF- $\alpha$ .....	Tumor necrosis factor- $\alpha$
VNTR.....	Variable numbers of tandem repeats
WHO .....	World Health Organization
XDR-TB.....	Extremely Multi-Drug Resistant Tuberculosis

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# INTRODUCTION

Tuberculosis is a contagious bacterial disease, that is caused by infection with TB bacilli either by inhalation, ingestion or direct contact with TB bacilli (*Caylà and Orcau, 2011*).

Anyone can get tuberculosis, but certain factors can increase the risk of the disease. These factors include: weakened immune system, malnutrition, very young or advanced age, poverty and substance abuse and health care work (*Zachary, 2015*).

Early detection of the disease, effective chemotherapy and prevention of transmission of the disease is an important factors for decline of TB cases (*World Health Organization, 2015*).

The prevalence rate of TB in Egypt was 26 per 100,000 people according to the World Health Organization (WHO) estimate in 2014, while the incidence rate was 15 per 100,000 people.

Screening, diagnosis, notification and registration of TB cases was implemented all over Egypt according to national TB strategy of the National Tuberculosis control Program (NTP) (*National Tuberculosis control program, 2016*).

Recent methods for diagnosis of TB bacilli like gene expert which diagnose and show the sensitivity of TB bacilli to rifampicin and the new method for treatment and give us great help for diagnosis and proper treatment of TB.

## **AIM OF THE WORK**

The aim of this study is to find out tuberculosis pattern in Kafr EL-Shiekh Governorate during the period between January 2010 and January 2019 and role of GeneXpert in diagnosis of TB.

## Chapter 1

# TUBERCULOSIS

Tuberculosis (TB) is an ancient human disease caused by *Mycobacterium tuberculosis* which mainly affects the lungs, making pulmonary disease the most common presentation. However, TB is a multi-systemic disease with a protean presentation. The organ system most commonly affected include the respiratory system, the gastrointestinal (GI) system, the lymphoreticular system, the skin, the central nervous system, the musculoskeletal system, the reproductive system, and the liver. Evidence of TB has been reported in human remains dated thousands of years. For a human pathogen with no known environmental reservoir, *Mycobacterium tuberculosis* has honed the art of survival and has persisted in human communities from antiquity through modern time (Adigun *et al.*, 2020).

### Etiology

*M. tuberculosis* causes tuberculosis. *M. tuberculosis* is an alcohol and acid-fast bacillus. It is part of a group of organisms classified as the *M. tuberculosis* complex. Other members of this group are, *Mycobacterium africanum*, *Mycobacterium bovis*, and *Mycobacterium microti*. Most other mycobacteria

organisms are classified as non-tuberculous or atypical mycobacterial organisms (*Forbes et al., 2018*).

*M. tuberculosis* is a non-spore forming, non-motile, obligate-aerobic, facultative, catalase negative, intracellular bacteria. The organism is neither gram-positive nor gram-negative because of very poor reaction with the Gram stain. Weakly positive cells can sometimes be demonstrated on Gram stain, a phenomenon known as "ghost cells." The organism has several unique features compared to other bacteria such as the presence of several lipids in the cell wall including mycolic acid, cord factor, and Wax-D. The high lipid content of the cell wall is thought to contribute the following properties of *M. tuberculosis* infection: (*Jilani et al., 2020*)

- Resistance to several antibiotics
- Difficulty staining with Gram stain and several other stains
- Ability to survive under extreme conditions such as extreme acidity or alkalinity, low oxygen situation and intracellular survival(within the macrophage)

The Ziehl-Neelsen stain is one of the most commonly used stains to diagnose T.B. The sample is initially stained with carbol fuchsin (pink color stain), decolorized with acid -alcohol and then counter-stained with another stain(usually, blue