Tuberculosis as a Re-Emerging Disease

Essay

Submitted for the Partial Fulfillment of Master (M. Sc.) Degree in

Infectious diseases & Endemic Hepatogastroenterology

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2012

Abstract

Re-emerging infectious diseases: are those infectious diseases which have, as the name states, re-emerged after period of decline in incidence (e.g. tuberculosis) (**Cumbey and Gimarc, 2007).** There are many factors contributing in emerging and re-emerging diseases, these factors include genetic, biological, social, political, and economic factors (**Morens et al., 2008).**

Tuberculosis, a disease caused by several species of mycobacteria, has afflicted humankind for many thousands of years. It is a worldwide disease and in many countries is a major cause of death. After declining in incidence for a number of years, it has begun to increase in frequency, especially in developing and underdeveloped countries as a re-emerging infectious disease **(Shampo and Rosenow, 2009).**

The emergence of multidrug-resistant (MDR) and extensively drug resistant (XDR) strains of Mycobacterium tuberculosis is a real threat to achieve tuberculosis (TB) control and elimination globally. More than 510,000 new cases of MDR-TB occur each year and XDR-TB cases are recognized in every setting where there has been the capacity to detect them **(Migliori et al., 2009).**

This work aimed at reviewing the tuberculosis as a re-emerging infectious disease, factors contributing in its re-emergence, and how to control and prevent its propagation.

Key words:

T.B., re-emerging infections.

Acknowledgment

I thank ***Allah*** who granted me the ability to complete this essay.

I would like to express my supreme gratitude and great appreciation to ***Dr. Eman Medhat Hassan, Professor of Endemic Medicine, Cairo University,*** for her continuous guidance, and valuable instructions throughout this essay.

It is pleasure to express my supreme gratitude and appreciation to ***Dr. Ahmad Fouad Soliman, Assistant Professor of Endemic Medicine, Cairo University,*** for his continues guidance, close supervision, and valuable instructions throughout this essay.

I am deeply grateful for ***my late parents*** for the tremendous support they gave me throughout their lives. I pray to Allah to bless their souls.

Finally, I would like to express my gratitude to my husband ***Dr. Ahmad Nabil Lotfy Hassan, Assistant Professor of Endemic Medicine, Cairo University***, and ***my sister Mai Khaled Jabr***, for their continuous support and encouragement.

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2012

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List of Abbreviations

Abbreviation	Term
ADA	Adenosine de-aminase.
AFB	Acid fast bacilli.
AIDS	Acquired immunodeficiency syndrome.
Ag85- B ESAT/01 CAF induced	Antigen 85 B early secreted antigenic target/01 Carcinoma associated fibroblast induced
AMI	Adaptive mediated immunity.
AST	Antituberculous susptibility treatment.
ATT	Antituberculous treatment.
BACTEC MGIT 960	(Becton- Mycobacteria Growth Indictor Tube).
BCG	Bacillus Calemette Guerin.
CDC	Center of disease prevention and control.
CGD	Chronic granulomatous disease.
CMI	Cell mediated immunity.
CR3	Complement receptor 3.
CSF	Cluster stimulating factor.
CT	Computed tomography.
CTL	Cytolytic T lymphocyte.
DC	Dendritic cell.
DC- SIGN	Dendritic cell- specific intercellular adhesion molecule -3-grabbing non integrin.
1,25 $(OH)^2D3$	1, 25 Dihydroxy vitamin D3.
DOT	Direct observation treatment.
EID	Emerging infectious disease.
ELISA	Enzyme linked immuosorbance assay.
EMB	Ethambutol.
EPTB	Extra- pulmonary tuberculosis.
Fe^{+2}	Ferrous.
FFP3	Filtering face piece3.
FOXP3	Fork head box protein 3.

GM-CSF	Granulocyte-macrophage colony-stimulating factor.
HAART	Highly active anti-retrovirus treatment.
HCW	Health care worker.
HIV	Human immunodeficiency virus.
H2O2	Hydrogen peroxide.
IGRA	Interferon gamma release assay.
IL	Interleukin.
INF	Interferon.
INH	Isoniazide.
IRAK4	Interleukin- 1- receptor associated kinase 4.
IUATLD	International union against tuberculosis and lung disease.
LAM	Lipo arabinomannan.
LAMP	Loop- mediated isothermal amplification.
LED	Light emitting diode.
LFT	Liver function test.
LTBI	Latent tuberculosis infection.
MDR	Multidrug resistance.
MHC	Major histocompatability complex.
MMR	Macrophage mannose receptor.
MODS	Microscopic observation drug susceptibility.
Mg^{+2}	Magnesium.
MRI	Magnetic resonance image.
MTB/RIF	Mycobacterium tuberculosis resistance to rifampicine.
My D 88	Myeloid differentiation primary response gene 88.
NA	Not applicable.
NAATs	Nucleic acid amplification tests.
NADPH	Nicotinamide adenine dinucleotide phosphate.
NICE	National institute for health and clinical excellence.
NK cell	Natural killer cell.
NOD	Nucleotide oligomerization domain.
OCT	Outbreak control team.
OPD	Operative pulmonary department.
PAS	Para-amino salicylic acid.

PMN	Polymorph nuclear leukocyte.
PPD RT 23	Purified protein derivative.
PRA	PCR- restriction enzyme analysis.
PZA	Pyrazinamide.
rBCG	Recombinant bacillus calamette Guerin.
RMP	Rifampin.
ROI	Radioactive oxygen intermediate.
SARS	Sever acute respiratory syndrome.
SCID	Severe combined immunodeficiency disease.
STM	Streptomycin.
TB	Tuberculosis.
TGF	Transforming growth factor.
T h1 cell	T helper 1 cell.
TLR	Toll- like receptor.
TNF	Tumor necrosis factor.
T reg cell	T regulatory cell.
TST	Tuberculin skin test.
TU	Tuberculin unit.
UNAIDS	United nations program on HIV/AIDS.
VDR	Vitamin D receptor.
WHO	World health organization.
XDR	Extensive drug resistant.

Introduction

The infectious diseases are not only a problem in third world countries, but also affect every nation around the world. An alarming number of people fall victims to infectious diseases and every year millions of people die of these confounding conditions worldwide. Researchers are racing to find cures and vaccines for many of the world's most threatening conditions **(Cumbey and Gimarc, 2007).**

An emerging infectious disease (EID): is an infectious disease whose incidence has increased in the past 20 years and threatens to increase in the near future. EIDs include diseases caused by a newly identified microorganism or newly identified strain of a known microorganism (e.g. SARS, AIDS), new infections resulting from change or evolution of an existing organism (e.g. influenza), a known infection which spreads to a new geographic area or population (e.g. West Nile virus), newly recognized infection in an area undergoing ecologic transformation (e.g. Lyme disease), and pre-existing and recognized infections reemerging due to drug resistance of their agent or to a breakdown in public health (e.g. tuberculosis) **(Fauci, 2005).**

Also of growing concern is adverse synergetic interaction among emerging diseases as well as interaction with other infectious and non-infectious conditions that leads to the development of novel syndemics **(Fauci, 2005).**

Re-emerging infectious diseases: are those infectious diseases which have, as the name states, re-emerged after period of decline in incidence (e.g. tuberculosis) **(Cumbey and Gimarc, 2007).**

Tuberculosis, a disease caused by several species of mycobacteria, has afflicted humankind for many thousands of years. It is a worldwide disease and in many countries is a major cause of death. After declining in incidence for a number of years, it has begun to increase in frequency, especially in developing and underdeveloped countries as a reemerging infectious disease **(Shampo and Rosenow, 2009**).

A third of the world's population has been infected with M. tuberculosis, and new infections occur at a rate of one per second (**WHO, 2007).** However, not all infections with M. tuberculosis cause TB disease and many infections are asymptomatic **(CDC, 2007).**

In 2007, an estimated 13.7 million people had active TB disease, with 9.3 million new cases and 1.8 million deaths; the annual incidence rate varied from 363 per 100,000 in Africa to 32 per 100,000 in the Americas **(WHO, 2009).**

Tuberculosis is the world's greatest infectious killer of women at reproductive age and the leading cause of death among people with HIV/AIDS (**Sobero and Peabody, 2006).**

The emergence of **multidrug-resistant (MDR)** and **extensively drug resistant (XDR)** strains of Mycobacterium tuberculosis is a real threat to achieve tuberculosis (TB) control and elimination globally. More than 510,000 new cases of MDR-TB occur each year and XDR-TB cases are recognized in every setting where there has been the capacity to detect them **(Migliori et al., 2009).**

The Aim of This Work

This work aims at reviewing tuberculosis as a re-emerging infectious disease; the factors contributing in its re-emergence; and how to control and prevent its propagation.

CHAPTER: I

Epidemiology of Tuberculosis

Historical Background:

Tuberculosis has been known under a variety of names such as ***phthisis, Scrofula, tabes, bronchitis, and inflammation of the lungs, hectic fever, gastric fever,*** and ***lupus.*** It was also known as the ***great white plague*** or ***"consumption"***. The actual name ***"Tuberculosis"*** was introduced during the first half of the nineteenth century and it refers to the diseased condition caused by infectious agents known as tuberculosis bacteria or tubercle bacilli **(Neil and Croft, 2005).**

The first evidence of the infection in humans was found in a cemetery near Heidelberg, in the Neolithic bone remains that show evidence of the type of angulation often seen with spinal tuberculosis **(Madkour et al., 2004).** Signs of the disease have also been found in Egyptian mummies dated between 3000 and 2400 B.C. **(Zink et al., 2003).**

Figure 1: Tubercular decay has been found in the spines of Egyptian mummies. Pictured: Egyptian mummy in the British Museum (Hershkovits et al., 2008).