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RELATIONSHIPS OF PNUMONIAL INFECTION AND *MYCOBACTERIUM TUBERCULOSIS*

Azhar Omran Althahab[1], Lubna Abdul Muttalib Al-Shalah[2]*, Frial Gemil Abid[1] and Sarah Hashim Al-Helli[1]

[1, 3]Department of Biology, Faculty of Science, Babylon University, Babylon, Iraq.
[2*]Environmental research and study center, Babylon University, Iraq.

Abstract

Pneumonia is an inflammatory condition of the lung. It is mostly caused by infection with viruses or bacteria and less commonly by other microorganisms. This study aimed to generally investigate some bacteria that cause pneumonia specially *Mycobacterium tuberculosis*. This study include 80 sputum samples were obtained from patients suffering pneumonia. The incidence of infection among males was higher than that of females, and the age group between 25 to 35 years was the most affected. Also 20% of people with pulmonary tuberculosis had diabetes. Also 75% of infected people were from the countryside, while 25% were from the city.

Key words : *Mycobacterium tuberculosis*, Diabetes-Tuberculosis, Pnumonial infection.

Introduction

Mycobacterium tuberculosis is bacteria that cause an infectious disease known as pulmonary tuberculosis. In most cases, tuberculosis affects the lungs, but can also affect other parts of the body (WHO, 2018), and most infections don't have symptoms, in which case it is known as latent tuberculosis (WHO, 2018, Ferri, 2010). The *Mycobacterium tuberculosis* is a small, aerobic, non-motile bacillus (Dolin *et al.*, 2010), also the high lipid content of this pathogen accounts for many of its unique clinical characteristics (Southwick, 2007).

Tuberculosis is spread through the air when people who have active tuberculosis in their lungs cough, spit, speak, or sneeze (WHO, 2018, Dolin *et al.*, 2010). People with latent tuberculosis do not spread the disease. Active infection occurs more frequently in people with HIV/ AIDS and in those who smoke (WHO, 2018, CDC 2012).

The risk of reactivation increases with immunosuppression, such as that caused by infection with HIV, in addition to diabetes makes a significant contribution to the burden of incident tuberculosis, and the relationship is particularly strong for the infectious form of tuberculosis (WHO 2012, Stevenson, 2007).

Active tuberculosis diagnosis based on chest X-rays, in addition to microscopic examination and culture of body fluids (sputum sample). While diagnosis of latent tuberculosis depends on the tuberculin skin test (TST) or blood tests (Konstantinose, 2010).

However, using histological stains on expectorated samples from sputum, scientists can identify *Mycobacterium tuberculosis* under a microscope. As *Mycobacterium tuberculosis* retains certain stains still after being treated with acidic solution, it is classified as an acid-fast bacillus (kumar *et al.*, 2007, Harris, 2013). The most common acid-fast staining techniques is called Ziehl-Neelsen strain which dye acid-fast bacilli a bright red that stands out against a blue background (Forbes *et al.*, 2007).

Streptococcus pneumonia it is considered as part of the normal upper respiratory tract flora, it can become pathogenic under the certain condition typically when the immune system of the host is suppressed (Ryan and ray, 2004). *Streptococcus pneumonia* cause pneumonia which is an inflammation of the lungs involving the alveolar ducts and alveolar sacs and associated with acute

Author for correspondence : E-mail: lubnamsa77@gmail.com

respiratory tract infection. Today, pneumonia ranks sixth among the causes of death in the world (Crosta, 2017).

Materials and Methods

A total 80 sputum samples (24 female samples and 56 male samples) were obtained from patients suffering from respiratory infections (tuberculosis and pulmonary infection); who attained to Karbala Hospital during the period from October 2017 to April 2018. The samples were analyzed for any signs of infection. All sputum samples staining with Zeihl-Nelssen stain and microscopical examination were done (Frobes *et al*., 2007). In addition, a blood glucose test was conducted for all patients by using ACCU – CHEK instrument (Germany).

Ethical Approval

A valid consent was achieved from male and female before their inclusion in the study. For every patient, the procedure had been informed before the samples were collected, making absolutely sure that they understood the procedure that was to be carried out.

Results and Discussion

By microscopical examination of (80) clinical samples, *Mycobacterium tuberculosis* appeared as in Fig. (1) and *Streptococcus pneumonia* appeared as in Fig. (2).

Only (16) samples showed positive results to *Mycobacterium tuberculosis* while (20) samples showed positive results to *Streptococcus pneumonia* and (44) samples was positive for both (*Mycobacterium tuberculosis* and *Streptococcus pneumonia*) as shown in table 1. Isolation of more than one bacterial type from the same infection depends on the type of infection and the immune status of patient (WHO.2017,Ahmed and Hasnain, 2011).

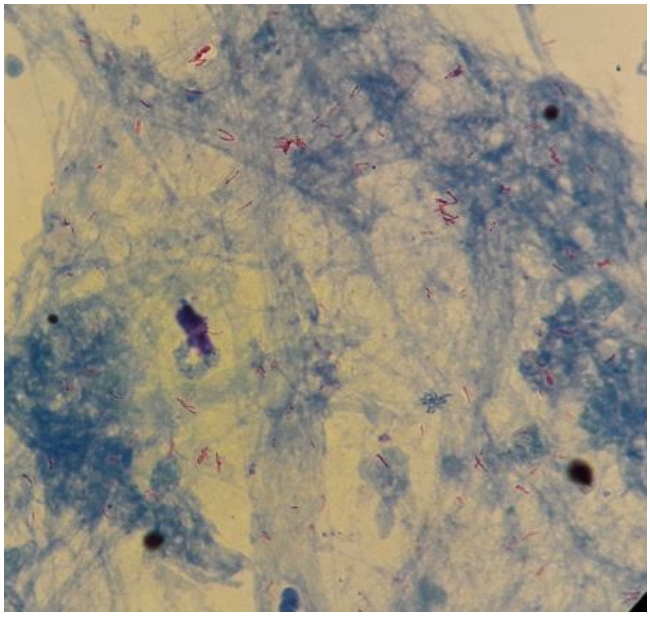

Fig. 1: *Mycobacterium tuberculosis* (100X).

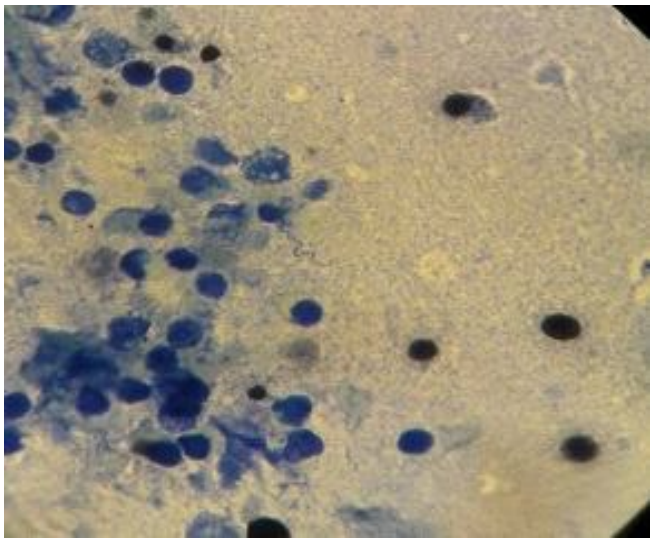

Fig. 2: *Streptococcus pneumonia* (100X).

Table1: Distribution of patients according type of infection.

Type of Infection	Number	Percentage
Mycobacterium tuberculosis	16	20%
Streptococcus pneumonia	20	25%
Mycobacterium tuberculosis + *Streptococcus pneumonia*	44	55%
Total	80	100%

In this study, the ratio of male infection is higher than of female infection. This results corresponds to results of Fang. (1990), these differences were explained to some predisposing factors for infection which are prevalent among males to a large extent such as smoking and alcohol consumption. Cilloniz *et al*., (2016) confirmed to the reason for this difference may be due to immunological susceptibility, hormonal and functional differences, in addition to anatomical variation between the sexes. WHO, (2014) reported that the number of deaths from tuberculosis among men is higher than that of women infected.

In addition, it has been found the highest frequency was recorded in the age group from 25 to 35 years, followed by (35-45) years and (45-55) years respectively. This result is agree with the WHO, (2014) report which

Table 2: Distribution of infections according to gender.

Type of Gender	Number	Percentage
Male	56	70%
Female	24	30%
Total	80	100%

confirmed that the age between 20 to 40 is the most affected by the disease, this is because this category is the most present in the crowded places where the infection is transmitted through droplets or direct contact with the infected human.

Table 3: Distribution of infections according to age groups.

Age	Number	Percentage
15 – 25	8	10%
25 – 35	24	30%
35 – 45	22	27.5%
45 – 55	16	20%
55 – 65	10	12.5%
Total	80	100%

Global increase in diabetes is a significant risk and a challenge to control tuberculosis (Ottmani *et al.*, 2010) and the prevalence rate of tuberculosis-diabetes mellitus is higher in low- and middle-income countries where tuberculosis and diabetes are most prevalent (Ronacher *et al.*, 2015). In this study, a relationship was found between diabetes and tuberculosis, where it was 20% of the patients with tuberculosis suffer from diabetes. This result comes in line with studies conducted by WHO in 2011 and CDC in 2017, the results showed that 25% of tuberculosis cases occurred among diabetic patients. Individuals with diabetes mellitus have three times the risk of developing tuberculosis and there are now more individuals with tuberculosis-diabetes co-morbidity than tuberculosis-HIV co-infection (Kornfeld *et al.*, 2016, Viney *et al.*, 2014), Jeon and Murray, (2008) pointed out that diabetes reduces immune response, so that facilitates infection with tuberculosis microbe or exacerbates its symptoms.

Table 4: Distribution of patients according to diabetes.

Type of Infection	Number	Percentage
TB patient and not diabetes	48	60%
TB patient and diabetes	16	20%
Pneumonia patient and diabetes	12	15%
Pneumonia and not diabetes	4	5%
Total	80	100%

According this study, the city had a 75 percent infection rate, which is higher than that of countryside (25 percent). This is due to several factors such as congestion of the city environment and the increase in pollutants (Lawn and Zumta, 2011). World Health Organization, (2016) indicated that the large number of factories and the lack of vegetation cover can be cause of increase pollution in the cities. Also, the high population density in cities and lack of access to the sun of some places help the grow of tuberculosis bacilli.

Table 5: Distribution of infections according to the geographical area.

Places	Number	Percentage
The City	60	75%
The Countryside	20	25%

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