
قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ
الْحَكِيمُ
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RELATIONSHIP BETWEEN TUBERCULIN HYPERSENSITIVITY AND SERUM ALBUMIN LEVEL IN PATIENTS WITH PULMONARY TUBERCULOSIS

Thesis

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Introduction

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Tuberculin skin test (TST) is a useful diagnostic test for evaluating persons who have symptoms of tuberculosis or who are suspected of being infected with M.tuberculosis.

(Castelo-Filho, 2004)

It is the standard test for detecting tuberculosis infection before progression to disease occurs, the tuberculin test may also be of particular assistance in evaluating patients with extra pulmonary tuberculosis, who may have normal findings on chest roentgenogram. *(Reichman, 1979)*

Tuberculin, a broth culture filtrate of tubercle bacilli, was first described in detail by *Robert Koch in 1891*, a year after he introduced it as a potential cure for tuberculosis.
Although its purported curative properties proved unfounded *Koch* observed that subcutaneous inoculation of tuberculin led to a characteristic febrile reaction in patient who had tuberculosis but not in those who did not have tuberculosis, giving rise to its use in the diagnosis of the disease. *(Edwards & Edwards, 1960).*

The technique was refined over the next 2 decades so that cutaneous or intradermal inoculation restricted the reaction to the skin, subsequently, a standardized version of tuberculin, the purified protein derivative (PPD), was introduced in 1934. *(Edwards & Edwards, 1960)*

Infection with M.tuberculosis results in a cell mediated immune response giving rise to sensitized T lymphocytes both CD4+ and CD8+ targeted to M.tuberculosis antigens, stimulation by M.tuberculosis antigens causes these T cells to release interferon γ, the TST functions by eliciting this response in previously sensitized individuals.

In such individuals, an intradermal injection of PPD evokes a delayed hypersensitivity response (DTH) mediated by sensitized T cells and results in cutaneous induration. *(Lavani et al., 1998)*

Normaly, a period of 2 to 10 weeks is required after infection for a DTH response to tuberculin to develop, infants <6 months of age may have a false negative tuberculin skin test reaction because their immune systems have not yet fully developed. *(Reichman, 1979)*

The tuberculin test usually only read after 48 and 72 hours and this late response is regarded as a typical example of type IV or delayed hypersensitivity. *(Coombs & Gell, 1975)*

The delayed hypersensitivity response has been shown to be reduced under conditions of a restricted dietary intake of protein.

The 48 hour response was the most affected by low albumin and haemoglobin levels, both of which were significantly associated with a history of decreasing weight and appetite.
(Kardjito &Grange, 1981)

Aim Of The Work

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The aim of this work is to investigate the possible relationship between intensity of tuberculin skin reaction and serum albumin levels in patients with pulmonary tuberculosis.

Review Of Literature

Epidemiology

Tuberculosis (abbreviated as TB for tubercle bacillus or Tuberculosis) is a common and deadly infectious disease caused by mycobacteria, mainly Mycobacterium tuberculosis. Tuberculosis most commonly attacks the lungs (as pulmonary TB) but can also affect the central nervous system, the lymphatic system, the circulatory system, the genitourinary system, bones, joints and even the skin. Other mycobacteria such as Mycobacterium bovis, Mycobacterium africanum, Mycobacterium canetti, and Mycobacterium microti can also cause tuberculosis, but these species do not usually infect healthy adults. *(Raviglione O'Brien, 2004)*

Over one-third of the world's population has been infected by the TB bacterium, and new infections occur at a rate of one per second. Not everyone infected develops the full blown disease; asymptomatic, latent TB infection is most common. However, one in ten latent infections will progress to active TB disease, which, if left untreated, kills more than half of its victims.

In 2004, mortality and morbidity statistics included 14.6 million chronic active TB cases, 8.9 million new cases, and 1.6 million deaths, mostly in developing countries. In addition, a rising number of people in the developed world are contracting tuberculosis because their immune systems are compromised by immunosuppressive drugs, substance abuse, or HIV/AIDS. *(WHO, 2006)*

The rise in HIV infections and the neglect of TB control programs have enabled a resurgence of tuberculosis. *(Iademarco et al., 2003)*

The emergence of drug-resistant strains has also contributed to this new epidemic with, from 2000 to 2004, 20% of TB cases being resistant to standard treatments and 2% resistant to second line drugs. TB incidence varies widely, even in neighboring countries, apparently because of differences in health care systems. *(Sobero et al., 2006)*

The World Health Organization declared TB a global health emergency in 1993.

According to the World Health Organization (WHO), nearly 2 billion people one third of the world's population have been exposed to the tuberculosis pathogen.

Annually, 8 million people become ill with tuberculosis, and 2 million people die from the disease worldwide. In 2004, around 14.6 million people had active TB disease with 9 million new cases. The annual incidence rate varies from 356 per 100,000 in Africa to 41 per 100,000 in the Americas. Tuberculosis is the world's greatest infectious killer of women of reproductive age and the leading cause of death among people with HIV/AIDS.

(WHO. 2006)

The incidence of TB varies with age. In Africa, TB primarily affects adolescents and young adults. *(WHO. 2006).* However, in countries where TB has gone from high to low incidence, such as the United States, TB is mainly a disease of older people. *(CDC. 2005)*

There are a number of known factors that make people more susceptible to TB infection:

- Worldwide, the most important of these is HIV. Co-infection with HIV is a particular problem in Sub-Saharan Africa, due to the high incidence of HIV in these countries. *(Chaisson & Martinson, 2008)*
- Smoking more than 20 cigarettes a day also increases the risk of TB by two to four times. *(Jha et al., 2008)*
- Diabetes mellitus is also an important risk factor that is growing in importance in developing countries. *(Restrepo, 2007)*

Transmission

Tuberculosis spreads from person to person through the air by droplet nuclei, particles 1 to 5 mm in diameter that contain M. tuberculosis complex. *(Edwards & Kirkpatrick, 1986)*

- Droplet nuclei are produced when persons with pulmonary or laryngeal tuberculosis cough, sneeze, speak, or sing. They also may be produced by aerosol treatments, sputum induction, aerosolization during bronchoscopy, and through manipulation of lesions or processing of tissue or secretions in the hospital or laboratory.
- Droplet nuclei, containing two to three M. tuberculosis organisms *(Riley, 1993),* are so small that air currents normally present in any indoor space can keep them airborne for long periods of time *(Riley, 1974).*
- Droplet nuclei are small enough to reach the alveoli within the lungs, where the organisms replicate.

Although patients with tuberculosis also generate larger particles containing numerous bacilli, these particles do not serve as effective vehicles for transmission of infection because they do not remain airborne, and if inhaled, do not reach alveoli. Organisms deposited on intact mucosa or skin, do not invade tissue. When large particles are inhaled, they impact on the wall of the upper airways, where they are trapped in the mucous blanket, carried to the oropharynx, and swallowed or expectorated. *(Murray, 1986)*