

TUBERCULOSIS IN GERIATRIC PATIENTS

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ABSTRACT

Tuberculosis is developing as a noteworthy medical problem in geriatrics. The indications are frequently non-particular and prompt postponed finding. Propelled infection state exhibit at the time of determination and regularly the analysis made at autopsy instead of amid life. Aging factors and presence of co-morbidities additionally modify the clinical picture. The doctors need a high record of doubt for the finding of tuberculosis in regards to geriatric patients give non-particular and misty side effects. Extraordinary consideration must be given to the observing for patients consistence with treatment, reactions of medications and medication associations.

Keywords: Tuberculosis, Risk factors, Patient compliance, Chemotherapy, DOT

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INTRODUCTION

Tuberculosis is one of the world's most threatening malady and remains as an unbridled infectious disease of global attention. An evaluated 33% of the total population is tainted with *Mycobacterium tuberculosis* and 7-8 million people spoiled with TB every year. Among other vulnerable populations including the elderly population (age ≥ 65) it remains a clinical and epidemiological ailment despite the relentless decrease in the rate of TB cases coming about because of the general usage of powerful TB control programs, supervised short course direct observation treatment (DOTs), and attempts precautionary measures to control the human immunodeficiency infection/AIDS (HIV/AIDS) virus, which is also play significant role in outspread of this malady. The geriatrics are at the danger of building up this ailment especially infection with human immunodeficiency infection (HIV) is the most serious hazard figure for improvement of TB [1]. Especially in created nations the geriatric population speaks to the biggest pool of TB contamination [2]. It has been suggested that TB in geriatric ought to name a different entity in light of the fact that the incidence of TB in elderly may fluctuate from youthful adults [3]. Clinical elements of TB in geriatrics might be atypical, non-particular and indistinct with age related co-morbidities. Malnutrition, alteration in body functions with advancing age and underlying chronic and acute diseases, can damage and disrupt the integument barriers, weaken the microbial freedom procedures and subsequently add to decrease in individual immune responses [4]. These differences

may postpone the determination and thus prompts morbidity and mortality in elderly patients [5].

According to Global Burden of Disease estimates, only 26% of TB cases examined were 65 years and more aged patients, the greater part of tuberculosis-related passing's almost 60.3% diagnosed among elderly most in those having age of 65 or above [6].

The World Health Organization evaluates that 19%–43% of the total population is exposed with tuberculosis and about >8 million individuals build up this illness and >2 million people died of it each year [7]. Most of the cases (about 95%) emerged in under developed countries. These increased number of TB cases in developing countries may be due to the lack of facilities require for satisfactory treatment [8].

Although significant cases of geriatric TB appear among community natives, suggested that the chance of expanded occurrence of active tuberculosis in nursing home people is 2-3 folds increases [9] as compared to migrated people. The expanded spreadness of tuberculosis sickness inside assembles settings of community, for example nursing homes, homeless shelters, jails (prisons) have raised alarming situation of tuberculosis malady in the regulated elderly population. Long term stay in these settings showed Positive tuberculin reactivity, indicating that chances of tuberculosis ailment is more in these setups than others [10].

CAUSES OF TUBERCULOSIS

Tuberculosis is an infection caused by the rod-shaped, non-spore-forming, aerobic bacterium *Mycobacterium tuberculosis* also known as tubercle

bacilli [11]. In 1882, the microbiologist Robert Koch discovered the tubercle bacillus, at a time when one of every seven deaths in Europe was caused by TB [12]. Tuberculosis (TB) is defined as a disease caused by members of (MAC) the *M. tuberculosis* complex involves different species such as (*M. bovis*, *M. africanum*, *M. microti*, *M. caprae*, *M. pinnipedii*, *M. Canetti* and *M. mungi*) mostly, but not all of these species have been found to cause disease in humans [13].

PATHOGENESIS AND PREDISPOSING FACTORS

Tuberculosis in geriatrics is of two types by its origin i.e. exogenous and endogenous. Over 90% of cases in the elderly represent to endogenous tuberculosis, i.e. reactivation of inactive disease in the lungs or somewhere else in the body. In individual cases it is inconceivable to recognize which of the pathogenic factor is involve, but there are theoretical reasons to estimate that for the most part endogenous reactivation is vital in elderly patients [14].

Tuberculosis is a prototype disease in which cell invulnerability assumes critical part in the spread of contamination. In elderly age-related decay of cell insusceptibility brings about reactivation of dormant disease condition. Researches organized on the immunoglobulin status in the geriatric pulmonary tuberculosis patients, have demonstrated no insufficiency in their humoral responses [15]. It has been seen that the cytokine production because of in contact with *Mycobacterium tuberculosis* is all around saved in old age [16].

Mycobacterium tuberculosis is spread by small airborne droplets (droplet nuclei of 1-5 micron in diameter) from person to person, generated by the coughing, sneezing, talking, speaking & singing. Close contacts of TB patients are at highest risk of becoming infected with *M. tuberculosis*. In air droplets presence, number, virulence, ventilation rate and presentation of the bacilli to UV light all impact transmission. Presentation of *Mycobacterium tuberculosis* into the lungs prompts contamination of the respiratory framework, however the living beings can spread to different organs, for example, the lymphatics, pleura, joints and meninges, so cause additional pneumonic tuberculosis.

Person to person transmission (Table 1) is affected by a variety of factors including source patient and exposed person characteristics, aspects of the exposure, and virulence of the infecting strain of MTC [17-20]. Co-morbidities and utilization of immunosuppressive medication like corticosteroid prompts impedance of cell mediated immunity. Adverse social variables, poor living conditions and hindered invulnerability influence the elderly a great deal more than adolescent.

SPECTRUM OF INFECTION

Patient's insusceptibility and the virulence of the contaminated strain decide the pathogenesis of the TB infection [21]. Toward one side of the spectrum is the reactive form seen as an inert wherein the disease is contained and confined also shaped granulomatous tubercles, i.e., there is a dynamic resistant reaction form immune system. While if there should be an occurrence of problematic reaction exudative lesions are formed, in which excess quantity of organisms are produced in zones of caseous necrosis encompassed by nonspecific inflammatory cells, epithelial and giant cells.

At the opposite side of the spectrum are the sores of nonreactive miliary tuberculosis when there are extensive groupings of increasing tubercle bacilli with insignificant or no resistant reaction(immunity). This shape is more typical in geriatrics particularly when patients may simply give delayed fever and no central manifestations or signs [22].

DIAGNOSTIC DIFFICULTIES

In geriatrics a portion of the analytical troubles experienced in the determination of TB may likewise influence the analysis of all other associated abnormal conditions. The contributory elements may be poor memory, deafness, mental confusion or debilitation in way of talking. The existence of other constant ailments and co-morbidities give unclear clinical picture and fade the symptoms of tuberculosis [23].

There are specific troubles in determination of tuberculosis influencing different sites. The patient may seem unwell without demonstrating a particular central sign. In geriatric age response of body to ailments is diminished. The lack of success in determination of respiratory tuberculosis is due to undefined indications and significant underlying conditions like Chronic Obstructive Pulmonary Disease (COPD) and failure to produce sputum or all, atypical radiographic investigations like solitary nodules, mass like densities, bronchial-pneumonia and lower projection infiltrates [24].

CLINICAL FEATURES OF TUBERCULOSIS

As tuberculosis is a bacterial infection which is caused by *Mycobacterium tuberculin* so infect many organs so it has following different types and clinical presentation is variable in elderly patients.

Pulmonary Tuberculosis

It is a contagious bacterial infection which involves the lungs. It is also known as respiratory tuberculosis. It may affect following organs such as Lungs, pleural cavity, mediastinal lymph nodes, larynx [25]. It is contagious which means that bacterium is easily transmitted from an infected person to a healthy person. The patients with compromised immune system infected from HIV/AIDS, cancer, diabetes or have suffered from malnutrition or living in crowded

and uncleaned places or have traveled or lived in a place where people are already infected with the TB have far greater chances than others [26]. Geriatrics has pleurisy with effusion TB than Primary respiratory TB. Post primary form of TB is more common in old age persons.

Meningeal Tuberculosis

Tuberculosis meningitis (TBM) is a serious form of tuberculosis and is more common occur therefore of reactivation of inactive or weak foci of infection which influences the meninges of the brain and spinal cord also. Clinical features are atypical, sub-acute or chronic. Fever and other signs of meningitis is absent only reveal a confused person on diagnosis. Biochemistry shows disturbances in electrolytes only. So CSF examination must be performed. The stage at which it is diagnosed and time at which treatment started may affect the prognosis of disease [27].

Gastrointestinal Tuberculosis

Its symptoms are often non-particular and undefined, often ascribed to motility disorders. Abdominal TB remains under diagnosed in elderly.

Genitourinary Tuberculosis

It is due to the reactivation of weak haematogenous foci in the kidneys, is seen in geriatrics widely. The symptoms are often unusual and may include dysuria and frequency which are attributed to enlarged prostate. Less common symptoms include flank pain and hematuria. About 20% patients have no appearance of symptoms and are only diagnosed by urine sediment. Onset of TB of the female genitourinary tract is above the age of 65 [28-30].

Tuberculosis of Bones and Joints

The pathologic lesion is a combination of osteomyelitis and arthritis, usually occurring as a result of reactivation of dormant foci TB is especially prone to damage the spine and the closures of the long bones. It left undiagnosed because symptoms are often confused with the age-related osteoarthritis [31]. If not treated, the spinal fragments (vertebrae) may destruct and cause immobility in one or both legs and knees [32]. Absence of fever and systemic indications may be absent the findings should be suspected in any elderly patient with unexplained unifocal inflammation or demolition of bone or joint.

Disseminated Tuberculosis

It is the type of TB in which infection spreads from lungs to other parts of the body. Disseminated tuberculosis can affect various organs [33]. Symptoms include abdominal pain or swelling, chills, cough and shortness of breath, fatigue, fever, general discomfort, uneasiness, or ill feeling (malaise), joint pain, pale skin due to anemia (pallor), sweating, swollen glands, weight loss [34].

Miliary Tuberculosis

It is very difficult to diagnose it in the elderly patients because the symptoms of high-grade fever, meningitis and serositis are absent. Disease progress slowly with low grade fever and no local sign and symptoms appear. Examination reveals only anemia and hepatosplenomegaly. Chest X-rays may also appear normal (Table 2). Undiagnosed miliary TB lead to mortality mostly [35].

TUBERCULOSIS TREATMENT IN ELDERLY TB Infection

High risk patients without active ailment ought to experience treatment of TB: Isoniazid 300mg/day for 6 to 12 months.

Treatment in First 2 Months

Active TB requires 4 antituberculosis drugs usually Isoniazid, Rifampin, Pyrazinamide, Ethambutol. Treatment duration is 42 months or almost 3 years until all laboratory investigations achieve their standard value.

Treatment in Next 4 months

For period of 4 months TB patients continue isoniazid and rifampin and some patients are susceptible to both of these drugs. Actually, most of geriatric patient attain their original strains by use of this combination of drugs.

Alternative Therapy

Isoniazid and rifampin for 9 months is additionally adequate for most elderly patients.

Additional Therapy

Pyridoxine 25-50mg/day is given to overcome peripheral neuropathy, a side effect of isoniazid utilization. Study showed that various factors affect the transmission of *Mycobacterium tuberculosis*. Special precautionary measures are required to prevent its transmission to other people.

Study revealed that different diagnostic tools are used for the confirmation of TB infection. Only single diagnostic test is not enough. The different tests may include chest X-ray, sputum microscopy, ESR and tuberculin test. Different investigations which are necessary for the final analysis of TB are LFTs, RFTs, organic chemistry of blood and urine and CSF sample test.

THERAPY GUIDLINES

Tuberculosis (TB) is a noteworthy reason for ailment and expiry of people around the world, particularly in developing countries. Even in developed countries TB remains a public health concern among the elderly [36]. Despite the increased rate of TB in the elderly, few publications have presented the clinical characteristics of TB in this specific age group in our country. This review meant to comprehend clinical elements, co-morbidities and understand risk factors alongside hazardous components of TB in the elderly [37].

Table 1: Factors involved in the person-to-person transmission of tuberculosis.

Source patient	Sputum smear positivity (increased) Higher frequency of cough (increased)
Exposed person	Previous MTC infection (protective) Innate immunity (protective)
Exposure	Higher frequency and duration of exposure (increased) Poor ventilation (increased)
Susceptibility	Susceptibility (immune status) of the exposed individual. Genetic susceptibility (increased)
Environment	Space, ventilation, air circulation, air pressure, Specimen handling

Table 2: Practices of GPs for final diagnosis of respiratory TB (n=22).

Tests	Number	Percentage
Sputum microscopy only	3	14.0
Chest X-ray and sputum microscopy	13	59.0
Chest X-ray and ESR	1	4.5
Chest X-ray, Sputum microscopy and ESR	2	9.0
Chest X-ray, tuberculin test and ESR	1	4.5
tuberculin test only	1	4.5
Chest X-ray, sputum microscopy, tuberculin test and ESR	1	4.5

Evidence proposes that tuberculosis alimnt in elderly patients also results from reactivation of hidden contaminants. Evidence suggests that most cases of active tuberculosis in elderly patients result from reactivation of latent infection. Each patient with recently analyzed TB illness, a particular treatment and care related suggestions should be conducted by specific team with the cooperation of other TB control program [38].

Official guidelines recommend a minimum of 6 months of combination antibiotic therapy with a specific goal to accomplish these objectives. The fundamental objectives of tuberculosis treatment are to cope up rapid multiplication of bacilli, to overcome medication resistance, and sanitization of contaminated host tissues to avoid clinical relapse [39].

The initial phase of basic treatment regimens recommended for treating older age patients of TB disease caused by organisms is urgent to avoid the rise of medication resistance. The drugs Isoniazid, Rifampicin, Pyrazinamide, and Ethambutol are first line of therapy in regimen. Isoniazid and Rifampicin consider short-course regimens with high cure rates. Pyrazinamide has intense aseptic property, which permits additionally shortening of the regimen from 9 to 6 months [40].

The following continuation period of treatment has duration of either 4 or 7 months. The 4-month continuation stage should be utilized as a part of patients with uncomplicated, non-cavitary TB and 17-month continuation stage is prescribed just for patients with broad severe respiratory TB sickness and whose sputum culture investigated at the season of finishing

of 2 months of treatment is positive. The 4-month continuation phase should be used in patients with uncomplicated, non-cavitary, drug-susceptible TB and 7-month continuation phase is recommended only for patients with extensive pulmonary TB disease caused by drug-susceptible organisms and whose sputum culture obtained at the time of completion of 2 months of treatment is positive. Most of the untreated patients of respiratory TB illness can be treated with either a 6 month or a 9-month regimen, despite the fact that the 6-month regimen is utilized for a large community of patients [41].

DOT (Direct Observation Therapy) technique whereby a prepared human services laborer or another prepared assigned individual observes a patient swallow his medication properly or not and document it. DOT is the important methodology for treatment of TB illness and, if opportunities available, for inert tuberculosis disease (LTBI) treatment. DOT can decrease the medication susceptibility of patient, encourage treatment success and reoccurrence chances after the finish of treatment if resources allow, for Latent Tuberculosis Infection (LTBI) treatment. TB should always be monitored with adequate care and medication plan.

Therapy straightforwardly seen in a medicinal office or facility setting however can likewise be seen by an outreach worker specialist in the field (e.g., patient's home, place of work, school, or other commonly settled upon place). In a few circumstances, staff of correctional facilities or medication treatment programs, home medicinal services specialists, maternal and pediatrics wellbeing staff, or assigned group individuals may give DOT [42].

Therapeutic Difficulties

Old age tuberculosis introduces issues not only in findings but also create therapeutic challenges. The primary issues are a poor compliance with treatment, poor adaptability of treatment and association of fundamental or related ailments. The fundamental driver of success in treatment of tuberculosis is poor patient interaction with his therapy. Old individuals particularly the very old are untrustworthy about taking tablets consistently, at the proper time or in the correct dosage, especially if several medications are to be taken concurrently [43].

Poor memory, poor visual perception and mental upsetting might be contributory components. Preventive supervision is required as old individuals noticeably become unresponsive about their treatment and do not have the interest to finish their treatment. Likewise, the adverse reactions may create poor image of therapy in them. Doses of medications must be precisely observed and thinks about demonstrated that advancing age as an imperative indicator of hepatotoxicity because of INH and Rifampicin [44]. Compound preparation of Rifampicin with INH has an additive but not synergistic hepatotoxic impact. Month to month checking of serum transaminases is prescribed in elderly patients. Special care should be taken if there is chance of hepatic or renal impairment or failure.

Ethambutol can cause diminution of visual acuity, so a careful examination is performed before administering it. Nephrotoxicity and ototoxicity is more prevailing in the old age patients. Therapy with Ethambutol and streptomycin should be started by weighing the risk benefit ratio. Drug-drug reaction should likewise be considered in geriatrics that is

probably going to be on treatment for co-morbidities: I.e.g. INH can decrease the anticonvulsant activity of phenytoin; Rifampicin can affect the activity of digoxin, tolbutamide and corticosteroids. To avoid these all drug interaction related problems and undesirable effects adjustment of dose of medication has wide importance.

Tuberculosis (TB) has been associated with significant morbidity and mortality, and still remains a major global health problem. It is estimated that 2 billion people are latently infected with *Mycobacterium tuberculosis*, resulting in approximately 3 million deaths worldwide per year. One feature of TB among the elderly was the frequent association of other comorbid conditions which may impair cell-mediated immunity. Common conditions include are HIV/AIDS, old age, malignancy, immunosuppressive therapy (glucocorticosteroids, chemotherapy, etc.), diabetes mellitus, end-stage renal disease requiring dialysis, malnutrition and liver cirrhosis.

Human immunodeficiency virus (HIV) is the greatest risk factor for development of TB, elderly patients are particularly at risk for development of this disease. A person who is HIV-positive and infected with TB is 30 times more likely to develop clinical symptoms than is an infected person who is HIV negative, because their weakened immune systems allow the bacteria to develop unchecked.

Without effective chemotherapy treatment, 50% to 60% of people with tuberculosis will die of the disease. Tuberculosis in the elderly is a serious disorder and it is potentially curable if treated early. Physicians and care givers must show alertness to the special problems of diagnosis and treatment to save their lives.

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