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PHARMACOTHERAPEUTIC ANALYSIS OF TUBERCULOSIS

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Abstract:
Tuberculosis is an airborne disease caused by the bacterium Mycobacterium tuberculosis. M. tuberculosis and seven very closely related mycobacterial species (M. bovis, M. africanum, M. microti, M. caprae, M. pinnipedii, M. canetti and M. mungi) together comprise what is known as the M. tuberculosis complex. Most, but not all, of these species have been found to cause disease in humans. The case study has been designed to report pulmonary tuberculosis in a patient of 45 years age admitted in the DHQ Sialkot, who is recently diagnosed as having the disease but the symptoms and seriousness of disease was at its peak at the time of diagnosis. Complete history of the patient is taken along with his past medical history by direct interview of the patient. His chest X-ray as well as sputum AFB detection reveals the presence of disease. Patient was hospitalized until the confirmation of diagnosis and was discharged with the instruction of anti-tuberculosis drugs therapy. After studying and analyzing tuberculosis I concluded that, the treatment prescribed by physician is rational and true.
Keywords: *Multi-drug resistance tuberculosis (MDRTB), Tuberculosis, Rifampicin, Pyrazinamide*

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INTRODUCTION:

Tuberculosis is an airborne disease caused by the bacterium Mycobacterium tuberculosis. M. tuberculosis and seven very closely related mycobacterial species (M. bovis, M. africanum, M. microti, M. caprae, M. pinnipedii, M. canetti and M. mungi) together comprise what is known as the M. tuberculosis complex. Most, but not all, of these species have been found to cause disease in humans. The majority of TB cases are caused by M. tuberculosis. M. tuberculosis organisms are also called tubercle bacilli.[1]The causative organism, tubercle bacillus was discovered by Robert Koch in 1882.[2] Tuberculosis is the one of the most common causes of death among infectious diseases. Currently it is responsible for more deaths worldwide than any other infectious disease.[3]Poverty, malnutrition, overcrowding and drug resistance are the contributing factors for the incidence of the disease. People with active infection have signs or symptoms caused by actively replicating tubercle bacilli. If this is in the lungs they are potentially contagious and usually have symptoms such as cough, chest pain, shortness of breath, fatigue, weight loss, fever and night sweats.[4]

Multi-drug resistance strains of tuberculosis are a worldwide problem now a day which threatens the control of disease. The most common source of MDRTB is previous incomplete or inadequate treatment that causes resistance of infectious agent to traditional anti-tuberculosis drugs. Chemotherapy of the patient against TB demands complete knowledge about individual effective drugs. If multiple drug-resistant TB is detected, treatment with at least four effective antibiotics for 18 to 24 months is recommended.[5]

The main goal of the therapy is to remove the infectious agent from the host tissue, cure the sick patient, to prevent its spread in community and to control the emergence of multi-drug resistance tuberculosis. Directly Observed Therapy(DOT) is a proven strategy to ensure patient's adherence to the therapy in which patient receives medication under observationof health care personnel. This way of treatment has increased the compliance and has decreased the emergence of MDRTD.[6]
Mycobacterium tuberculosis strain red in sputum[7]

CASE PRESENTATION:

The patient, a 45 years old man, who is resident of Shahabpura, Sialkot and farmer by occupation, admitted in DHQ Sialkot with the complaint of persistent cough, low grade fever and fatigue from last three months. The patient was in usual state of health three months back from the date of admission when he started having sudden bouts of productive cough that remains throughout the whole day and becomes severe at night; sputum associated with cough is green in colour. Cough is also associated with low grade fever which is of gradual in onset, continuous and causes night sweating. Patient is feeling generalized weakness and weight loss with decreased appetiteand is unable to perform his daily routine activities

He took medications for cough and fever from the local quacks of the area but found them of no use. He visited DHQ, Sialkot when his condition became worse where the doctor did his general physical examination and found him dyspnoeic and heard abnormal breathing sounds on auscultation of chest. The doctor advised X-ray chest and sputum AFB (acid fast bacilli) staining test for the confirmation of diagnosis.

The chest x-ray is a diagnostic test for pulmonary tuberculosis. It shows the tubercle lesions on the affected lungs that appear as cavitation and infiltrates on x-ray. But the opacities can be confused with any other pathology of lungs so just x-ray chest is not enough for the confirmation of diagnosis; it only gives rise to a suspect against pulmonary tuberculosis.

Chest X-ray of the patient shows cavitation's and infiltrates which is the common finding of the tuberculus lungs.

AFB(acid fast bacilli), if present, can easily be detected in sputum by Zeil Nelson (ZN) staining technique that gives the confirmation of diagnosis of pulmonary tuberculosis. In this patient the test results were positive for the presence of AFB in sputum.

Sample	**Result**
Sputum for AFB	Positive (ZN Staining technique)

Anti-tuberculosis therapy is prescribed to patient and advised him to show the maximum adherence to the therapy. If patient seems non-compliant to therapy then DOT should be selected in which ingestion of drugs by patient is observed directly by healthcare personnel. Patient is also advised to take vitamin B6(pyridoxine) supplements, as the anti-tuberculosis drugs decrease the absorption of the vitamin from gut. The primary treatment strategy for patient involves,

Primary treatment strategy:

medication	Duration	Dosage
Isoniazid	6 months	5 mg/kg OD, orally
Rifampicin	6 months	10 mg/kg OD, orally
Pyrazinamide	First 2 months	Based on lean body weight
Ethambutol	First 2 months	Based on lean body weight
Pyridoxine	6 months	25 mg/kg OD, orally

DISCUSSION:

Tuberculosis is still a serious and even a fatal disease in under developed countries like Pakistan because of poverty, poor sanitation and unhygienic conditions. For the diagnosis of TB history of the patient consisting of standard questions is required as well as investigations are necessary to confirm the diagnosis.

Signs and symptoms of TB aggravate if left untreated for long time and can cause morbidity as well as mortality. This chronic infection rarely disseminates but if does so then it's really fatal. Increasing mortality and morbidity because of tuberculosis is very clear from the past surveys and is the one of the leading causes of death globally. [8] An article from American Thoracic Society, CDC, and Infectious Diseases Society of America also supported that treatment in such a way that the ratios of cured people are more which are taking that regimen. [9]

The treatment with isonazid and rifampicin is done for two months. If the patient demonstrates neither symptomatic nor radiographic improvement then we also use pyrazinamide with rifampicin for 2 months.[10]

And it is also the responsibility of our respected government to provide better sanitary conditions to its citizens and government should led a proper vaccination campaign in order to eliminate this infectious disease to some extent like in developed countries.

CONCLUSION:

The effective drug therapy for tuberculosis is essential to eliminate the infection from patient. It should be preferably selected as DOT, which is an observed way of treatment and there is no chance of patient's non-adherence to the drugs and selected drugs show their maximum effectiveness against the organism. After studying and analyzing tuberculosis I concluded that, the treatment prescribed by physician is rational and true.

Recommendations

- Physician must take an appropriate history of patient and his family to recognize the spread of disease among close living people.
- Overcrowding in the residential area of patient should also be asked in order to obtain the detail of hygiene and living status of patient.
- Physician must carefully observe the signs and symptoms of disease in patient to make the diagnosis of the disease and patient's current state of disease severity.
- Physician should confirm his diagnosis by the results of appropriate lab investigations and prescribe the drugs according to the sensitivity of organism.
- Patient should be monitored after regular intervals to Liver function should be assessed prior to starting the therapy. Monthly LFTs should be monitored in the patients with abnormal liver baseline functions.
- Patients on ethambutol should be monitored for visual disturbance and if treated for more than 2 months with Ethambutol, monthly vision check-ups should be recommended.
- Chest x-ray of the patient should be obtained at the end of therapy in order to serve it as new baseline of lungs.
- Patient should be told the importance of completion of therapy and incase of any adverse effects of drugs patient should be advised to seek the medical attention.
- Monitor the prognosis of his disease and effectiveness of prescribed drugs.
- Physicians must carefully monitor patient with intermittent symptoms to ensure that they do not develop chronic symptoms requiring maintenance therapy.

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