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COMPARATIVE ANALYSIS OF SPUTUM SMEAR POSITIVE PULMONARY TUBERCULOSIS IN ELDERLY PATIENTS OF RURAL TERTIARY CARE TEACHING HOSPITAL INDIA

Medical Science

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ABSTRACT

Introduction : Pulmonary tuberculosis continues to be a problem all over the globe. Elderly population is increasing due to socio-economic and health care achievements. Elderly peoples prone to develop tuberculosis however the diagnosis is made not as early as in other age group due to their comorbid respiratory diseases. Keeping these things in mind an attempt was made to study, pulmonary tuberculosis in elderly population.

Materials and Methods :A prospective clinical observational study' was designed to analyse sputum positive pulmonary tuberculosis observed in those with 60 years and above after the institutional ethical clearance and then informed consent, keeping in mind a rigid inclusion and exclusion criteria.

Result :74 patients were included in this study during April 2014 to March 2015. Their socio-demographic, clinical and laboratory data were recorded in a Performa. They were provided with drug as per RNTCP schedule and follow-up was maintained for those living in Erode

All of them were included under RNTCP and drugs were provided under CAT I in 72 % CAT II in 24% and CAT IV in 4%. Drug reaction were seen in 2 patients only. Follow up of patients living in Erode revealed to be satisfactory.

KEYWORDS

tuberculosis,

INTRODUCTION

The term "elderly" has been designed in many dimensions (biological, social, economical, chronological). Even though a single "cut off" age which would define the elderly age group, the. United nations in 1980 designed 60 years as the age of transition of people to the elderly segment of the population[1]. Some authors classify the elderly as the young old (60-69 years), old old (70-79 years), oldest old (80 years & above)[2]. Due to increased Life Expectancy, the proportion and absolute number of elderly are increasing all over the World[2,3]. The Global population of persons aged 60 years and above is estimated at 600 million in the year 2000 and expected to reach 1.4 billion in 2030. Of this rise more than half will be in Asia. In India, the number of persons 60 years and over was 71 million in 2001. TJ1e proportion of population aged 60 years and above is also rising. It was 5.63% in 1961 and 7.1 % in 2001 and is expected to 9.87% in 2021[3]. India is a "greying nation" with the growth rate of elderly segment 1.5 times higher than the growth rate of the general population. Tuberculosis is one of the commonest problem in the elderly and constitute. significant morbidity and mortality.[5] The disease presentation is often atypical and is missed and is being misdiagnosed as brochitis, asthma, bronchiectasis, pneumonia, pulmonary edema, or malignancy.

In view of, estimated higher incidence of tuberculosis in elderly subjects as compared to younger population, protean clinical manifestations, neglect of consequences, comorbid conditions, therapeutic challenges, drug reaction, poor compliance, elderly individual becomes an interesting subject to clinician and social scientist. Not much literature available in Indian subcontinent on elderly pulmonary tuberculosis, this subject was chosen

Diagn-ostic Category	Tuberculosis Patients	Tuberculosis Treatment	
		Initial Phase (Daily or 3 times per week)	Continuation phase (daily or 3 times per week)
I	New smear-positive cases; new smear-negative pulmonary TB with extensive parenchymal involvement; severe concomitant HIV disease or severe form of extra pulmonary TB	2 HRZE	4 HR or 6 he daily
II	Previously treated sputum smear-positive PTB • Relapse • Treatment after interruption • Treatment failure	2 HRZES/1 HRZE	5 HRE
III	New smear-negative pulmonary TB (other than in category) and less severe forms of extrapulmonary TB	2 HRZE	4 HR or 6 HE daily
IV	Chronic and MDR-TB cases (still sputum-positive after supervised retreatment)	Specially designed standardized or individualized regimens are suggested for this diagnostic category	

MANAGEMENT OF TUBERCULOSIS: WHO - RECOMMENDED TREATMENT REGIMENS:

Tubeculosis in elderly is treatable and curable.

The principles of drug therapy are the same as for any other age group. Antituberculosis agent should be administered according to body weight and pyridoxine 25-50 mg should be given with each dose of isoniazid. Both daily and intermittent regimens can be used. Intermittent regimens are especially used for supervised treatment23. In HIV injected patients, these regimens should be continued for atleast 9 months.In areas where isoniazid resistance is <4% or the population in question has a low risk for drug resistance the 4th drug may be omitted for the initial phase of therapy.

DRUG REACTIONS:

Age appears to be an important factor in determining the risk of INH induced hepatotoxicity. A transient rise in serum enzymes to three times the normal may occur during INH therapy without subsequent development of The most severe reactions caused by Rifampicin are anaemia and renal failure in very old patients. Therefore the patient should be examined regularly for features such as rash and purpura[6].

Both INH and rifampicin has synergistic hepatotoxic effect. So baseline liver function tests to be performed before isoniazid and rifampicin are administered to older persons. Periodic laboratory monitoring seems prudent. An increase in the serum aminotransferase level to 5 times normal level or clinical evidence of hepatitis necessitates the prompt withdrawal of isoniazid (as well as other hepatotoxic drugs). Administration of these drugs may subsequently be resumed at lower doses and gradually increased to full doses according to the patients tolerance. Relapse after drug rechallenge requires trial of an alternative regimen[4]. Ethambutol can cause diminution of visual acuity, central scotomas and disturbance of red-green vision to optic neuritis. Since with normal aging, renal function declines, hearing activity diminishes, vertibular disturbances are more incapacitating, elderly patients have increased risks of suffering from streptomycin induced ototoxicity and nephrotoxicity[4'6]. Drug interactions are more common in elderly since several drugs areto be taken concurrently for other comorbid illness. Therapeutic difficulties and causes for default Greater frequency of advanced disease and high bacillary load which in turn may be due to insidious onset and longer survival rate. The symptoms being ignored for longer time. The pathological condition of the lungs such as destruction of normal tissues and fibrosis of the diseased areas resulting in reduced drug penetration. More frequent intolerance to drugs. Interruption of drug therapy, lack of transport facility. Non-compliance to therapy because of impaired vision and poor memory. Irregular availability of drugs. The presence of associated diseases such as chronic bronchitis emphysema, diabetes etc. More prone to side effects. Interaction with other concomitant medication. Occasionally due to microbial resistance[47]. Solutions to reduced the exclusion / default rates:

- The services of a community DOTS provider could be utilized -'X would deliver the drugs right at the doorsteps of patients. Such providers apart from recognizing the side effects of drugs, should be able to interact with patients and take suitable deemed actions accordingly. Efforts should also be directed to sensitise the community, family and patient in general by information, education and communication activities of RNTCP, so that patients are able to report for symptoms in time.

DRUG RESISTANCE:

- The problems of drug resistance is less common in the elderly subjects as most of these patients are thought to have reactivation of infection which was acquired many decades ago. Hence unless the older individual is from a country or area with a high prevalence of drug resistant Mtb, the patient had been previously inadequately treated with chemotherapy for TB or the patient had acquired the infection from a contact with known MDR-TB, the overwhelming number of TB cases in the elderly should presumably be highly susceptible to isoniazid and rifampicin.

Chemoprophylaxis:

- Older persons with identifiable risk factors such as recent tuberculosis infection should receive preventive therapy with isoniazid, but most infected older persons are at low risk of tuberculosis because their infection is remote and are therefore not candidates for preventive therapy.
- However tuberculin positive subjects who are at increased risk of developing active disease (e.g, Patients with diabetes mellitus, those receiving corticosteorid or other immunosuppressive agents or those with upper lobe scarring on chest radiography) may be administered isoniazid prophylaxis. The most important indication of giving isoniazid prophylaxis is recent conversion of tuberculin test (> 15 mm) since these subjects have greater chances of developing active tuberculosis. For prophylaxis isoniazid is given in a dose of 300mg/day for 6-12 months.

FOLLOWUP:

The patients should be followed for the duration of treatment. Response to treatment and adverse drug reactions should be monitored. Sputum should be subjected to both smear and culture examination initially and then smear once in three months after it has become negative. After the completion of therapy, the sputum smear should be examined every three months for six months. Liver function tests performed periodically and as and when required, if symptoms are suggestive of hepatitis.

MORTALITY:

Tuberculosis as a single infections disease is the leading cause of death in the world among all infections diseases. It is estimated that 7 percent of all deaths and 26 per cent of all preventable deaths Worldwide are due to tuberculosis. Approximately three million deaths worldwide are attributed to TB each year. Age is the single most important variable for mortality followed by radiographic extent of disease, the presence of cavitation, and sputum smear positivity. Mortality is high in tuberculosis in old age and even in the developed world may reach 20-30 percent. The high death rate in old age is probably due to a combination of missed diagnosis, late diagnosis, and inadequate management. Old people with self-neglect, dementia, and other mental disorders often do not present until the disease is in an advanced state

AIMS AND OBJECTIVES:

- To study the socio-demographic pattern of sputum smear positive pulmonary Tuberculosis in elderly.
- To analyse their clinical presentation and diagnostic aspects(Radiological, Microbiological, Immunological, Biochemical, Hematological)
- To elicit co-existing illness among them.

Materials and Method:

Prospective, clinical, observational study designed in IRT-Perundurai Medical college, Erode from April 2014 to March 2015 Study was approved by Ethical committee approved the meanwhile while sampling Consent was obtained from all the patients who willing to participate in the t study. HIV test was carried out after proper counselling. Study is not funded by any financial organization or sponsoring society there is no as such Conflict of interest, research is fully designed for knowledge awareness practice survey among the health fraternity, student and to provide the date for future study.

Inclusion criteria: Patients who satisfied the following were included for the study.

1. Sputum smear positive pulmonary tuberculosis patients of 60 years and above, attending Institute of Road Transport-Perundurai Medical College , Erode.
2. Includes both sexes
3. Willing and co-operative individuals
4. HIV negative status

Exclusion Criteria:

Patients who 'had any of the following or a combination of them were excluded.

1. More seriously sick individuals.
2. HIV co-infection, on Immunosuppressive therapy
3. Associated malignancy
4. Major abdominal/Thoracic Surgeries
5. Un co-operatives/unwilling for review
6. Major cardiac illness
7. Collagen vascular diseases
8. Occupational diseases
9. Liver and renal diseases
10. Extrapulmonary tuberculosis.

LIMITATIONS OF THE STUDY

1. Age and sex matched control was not attempted since only one disease was taken into consideration.
2. Sputum negative elderly was not considered as control group since tuberculosis could not confirmed in these subjects.
3. Overall outcome is not measured since all subjects living outside Erode were referred to concern DOTS centre for drug treatment.
4. PFT was not done in view of sputum positive status.
5. Induced sputum was not attempted, as it was not included in the institutional protocol.
6. Since single group of patients analysed complex statistical analysis was not done.

Results

DATA COLLECTION:

A detailed proforma comprising of socio-demographic aspects, clinical history, examination and investigations has been designed and used.

A model of the proforma is enclosed in the appendix. Each patients was subjected to Anthrophometry, blood tests (Hb, TC, DC, ESR, Blood Sugar, Blood Urea, Serum creatinine and Liver function test), Sputum smear/culture for AFB.

Follow up studies was made at the end of intensive phase of treatment with patients living in Erode city only with the help of local DOTS provider.

This study was conducted in IRT-PMC Erode in the time period from April 2014 to March 2015. Consecutive patients aged 60 years and over attending outpatient department with one or other chest symptoms were evaluated for pulmonary tuberculosis. Mass miniature radiography, three sputum smear for acid fast bacilli were taken as initial screening procedure. Among them 74 patients satisfied the .selection and they were analysed.

AGE

In the present study, the lowest age was 60 years and the highest was 78 years. The mean age was 63.9 years. There were 70 males and 4 females. The mean age was almost equal in both sexes. The distribution of patients in relation to age and sex was given below table:1

Table : 1 DISTRIBUTION OF CASES IN RELATION TO AGE AND SEX

SMOKING STATUS

Among the study population, there were 56 smokers. 6 ex-smokers, and 12 non smokers. The details were provided in table:2 below.

Category	Number of cases (%)
Current Smoker	56 (75.6%)
Non smoker	12(16.2%)
Ex-smoker	6 (8.1%)
Total	**74 (100%)**

Table : 2 SMOKING STATUS

BODY MASS INDEX

BMI of the study patients was ranged from 11.76 to 23.07. The lowest weight recorded in the study was 25 kg in a 60 year old diabetic male. Most thin and fragile and were living in low socio-economic environment. Only 5 out of 74 were from old age homes.

CONTACT HISTORY:

None of them were not able to recall contact with tuberculosis patient. 54 (72.9%) of them denied that they had tuberculosis earlier to the best of their knowledge. Only 20(27%) of them

Age group in years	Males (%)	Females (%)	Total (%)
60-69	61 (82%)	4 (5%)	65 (88%)
70 and above	9 (12%)	0	9 (12%)
Total	70 (94%)	4 (5%)	74 (100%)

explained that they were treated for tuberculosis earlier (range 5-25 years).

PRESENTING COMPLAINTS:

Among 74 patients, cough with expectoration, breathlessness, anorexia and weightloss were the main presenting complaints. The details were provided in table-3.

Table : 3 PRESENTING COMPLAINTS

DURATION OF ILLNESS

Elderly individuals suffered from one or other symptoms suggestive of tuberculosis for a period ranging from few weeks to more than 6 months. The details of. duration of illness were given below table 4.

Duration	Number of cases (%)
< 3 Months	10 (13.5%)
3-6 Months	35 (47%)
> 6 Months	29 (39%)
Total	**74 (100%)**

Table : 4 DURATION OF ILLNESS

SPUTUM SMEAR FOR AFB :

Sputum smear studies was carried out following standard methods. The sputum smear positive status was classified. by RNTCP schedule. The details was provided in table 5 below:

Complaints	Number of cases (%)
Cough with expectoration	67(90%)
Breathlessness	57(73%)
Anorexia and weightloss	48(64%)
Fever	42(57%)
Hemoptysis	23(31%)
Wheezing	18 (24%)
Chest pain	12 (16%)
Night sweat and fatigue	6 (8%)

AFB Status	Number of cases (%)
Scanty	13 (17.0%)
1 +	17 (23%)
2 +	22 (30%)
3 +	22 (30%)
Total	**74 (100%)**

Table : 5 SPUTUM SMEAR FOR AFB

Drug Sensitive pattern	No.of cases (%)
Sensitive	45 (90%)
Resistance	5 (10%)
Total	**50 (100%)**

SPUTUM AFB CIS :

Sputum samples were sent for AFB culture and sensitivity M. Tuberculosis grown from 50 samples. In the rest one was growth, the other 13 samples were contaminated. No attempt was made collect their sputum to culture again. Among 50 patients in which AFB was grown,S of them revealed to have resistant to on or other drugs. 3 cases were MDR-TB. One case resistant to Rijampicin alone. Another one resistant to Streptomycin and Isoniazid. Those patients to whom culture and sensitivity not done follow up with sputum smear study and they were all response to treatment and sputum smear conversion occurs within two months.

Table : 6 SPUTUM AFB C/S PATTERN

ADVERSE EFFECTS :

Drug reaction to injection streptomycin observed in one patient and skin rashes occurred in one another case. The one who had skin rashes responded well to antihistamines and antituberculosis treatment continued along with. The patient who had streptomycin toxicity was explained about his status and the drug was withdrawn and allow to continue other drugs in concurrence of the treating team.

FOLLOW UP :

- Of the 74 patients 28 patients were from neibouring districts. Those came from Erode alone were followed with the help of DOTS provider. During the follow-up of Erode patients, sputum conversion was noticed at the end of 2-3 month depending upon the category they belonged. They cooperated well with DOTS provider. Their adherence to medication was pressive. The family support was satisfactory as per patient statement in 15 out of 20. Symptoms started disappearing in 4 to 8 weeks mostly.

DISCUSSION:

Pulmonary tuberculosis is by far the most common form of tuberculosis in the elderly population. The disease presentation is often atypical and missed and is being misdiagnosed as bronchitis, asthma, bronchiectasis or pneumonia. The biggest problem is their inability to give an accurate account of their symptoms. The presence of other diseases may confuse the clinical picture or mask the symptoms both the patients and the doctor. Knowing well about the in pulmonary difficulties diagnostic tuberculosis among elderly, high index of suspicion needed to diagnose tuberculosis. In the presence study, humble attempt has been made to analyse socio-demographic pattern, clinical presentation and diagnostic aspects among smear positive pulmonary tuberculosis in elderly individuals[12] . In the present study, study subjects were 74, who satisfied certain rigid inclusion and exclusion criteria During the current study mean age of the patients in both sexes did not differ much from each other. The mean age was 63.9 years in our study group. Van den Brande et al found the mean age 71 years[16] . Liaw YS et al found 73 year in China.[4] Another study from Chan et al3 from Hong Kong showed 80.4 years. The highest age is in this study group 92 years. In our study group none other crossed even 80 years[4].

- In the present study, male predominance was observed among elderly pulmonary tuberculosis. M:F ratio was 17.5:1. The male:female ratio observed those enrolled under DOTS, New Delhi showed' 3: 1 Chan et al figured 2:1. Elderly. women attended

to health care facility were minimal in size as per the out patient hospital record. Since men had other comorbidillness, like DM, COPD and smoking habits renders them more symptomatic and early referral.

- In our study elderly tuberculosis in old age home was 5 (6.7%). Rajagopalan et al, Ranjit N Ratnaike et al,[10'18'19]. showed the case rate for elderly in old age homes was about 4 times that of elderly people living at home.
- In our present study, there were 56 (75.6%) current smokers and 6 (8.1 %) were ex-smoker. Total of nearly 78% had smoking habit part or present. Chang et al[3] noted smoking in 29%.
- In the present study BMI was rang~d from 11.76 to 23.07. It was so low against expected weight for height. Umeki et al[14] noticed 43% cases suffered weight loss and low BMI, BMI less than 18 in 60 (81%) patients and below.14 in 12 (16%) patients. Chang et al[3] found mean BMI 44.2 in Hong Kong study. Most of our study population were thin and fragile and were living in low socio-economic environment. Under nutrition said to be a common predisposing factor in Srivastara et al[37] study group, showed elderly people in low socio-economic groups" in urban slums were at higher risk of poor dietary intake.
- In our study 20 (27%) had history of treatment for tuberculosis earlier with wide range of 5-25 years back. Yang PC et al24 found previous tuberculosis incidence in 26.3% Kaltenbach et al[27] noted in 18%.
- In our study group tuberculin anergy found in 71 (96%) elderly patients. Yokoyama et al[28] found tuberculin anergy in 7% of patients under 65 and in 14% of those over 65 years. In our study reaction> 10 mm showed in 3 (4%) cases. Among them two had prior history of tuberculosis, one a known case of diabetes.
- In our study diabetes mellitus was the most prevalent comorbid illness. Out of 74 cases 23 (31%) cases were known diabetic patients and 14 (19%) were found diabetes during the blood analysis. Total burden was 37 (50%) cases. Cavitation noted in 17 (46%) cases out of 37 diabetics. Margarita E Villarino et al[13] noted Asian diabetic tuberculosis patients presented with a higher incidence of cavitary disease and sputum positive status than did a
- control group of non-Asian diabetic TS patients. This was presumably due to higher dose exposure to M. Tuberculosis. COPD co-exist in 18 (24%) cases.
- In the present study, patients svm-ptomatology and duration much more prolonged even more than 6 months in 29 (39%) cases. Toman's found in general population 70% cases were symptomatic within 1-3 months. Our study showed 64 l86%) cases were presented with symptoms more than 3 months duration. Reason behind was most of them were smoker and co-existing illness like COPD, Asthma made them less classical symptoms and prolonged illness and delay in diagnosis.
- In our present study most commonly noted presenting complaints were cough with expectoratlon 67 (90%), Breathlessness 57 (73%) Anorexia and weight loss 48 (64%). Fever noted in 42 (57%) cases in our study but 17.7% in Yamaguchi et al[30] study group. Breathlessness noted in 73% cases by Rizvi et al[34]. Yamaguchi et al noted anorexia in most of the cases like our study group.

CLINICAL PROFILE IN VARIOUS STUDY GROUPS

In our study group, Haemoglobin was less than 12g% in 54 (73%) cases and less than 109 in 16 (22%) cases, correlated well with poor nourishment of our elderly individuals. Neutrophilia and Lymphopenia were identically present compared to .Kaltenbach et al[27] and Yokoyama et al[28] study group 72 (97%) cases out of 74. In our study upper zone involvement with cavitation or infiltration in 98.6% cases. Bilateral disease pattern seen in 58% cases. Palmer and Co-workers noted lesion commonly lie in the apex of one or both lungs

Table 7: CLINICAL PROFILE VARIOUS STUDY GROUP

Symptom	Present study	Chan et al Hong Kong	Rizol et al Pakistan	KatelBach et al France
Cough with sputum	90%	43%	40%	25%
Dyspnea	73%	19%	73%	36%
Anorexia & Weight loss	64%	7%	18%	20%
Fever	57%	14%	10%	18%
Hemoptysis	31%	7%	21%	15.2%

RADIOLOGICAL PROFILE COMPARISON

Lesion	Present Study	Rakesh et al India	Rizol et al Pakistan	Chan et at Hong Kong
Bilateral Extensive Lesion	58%	32.4%	40%	87.5%
Cavitation	19%	-	5%	17%
Upper Zone	98.6%	-	9%	53.8%
Lower zone	36.4%	37.8%	6%	21.1%

In our study group 5 (10%) out of 50 patients revealed to have resistant organism to one or other drugs. Liaw et a1 showed the incidence of 40 drug resistance 39%. In our study none had primary MDR TB. Frieden et al found a 7% rate of primary MDR TB in New York city.

Table 8 :RADIOLOGICAL PROFILE COMPARISON

- In our study group sputum bacillary load was high and was 2+ and 3+ in 44 (60%) cases. All 20 (27%) cases who were reviewed showed sputum conversion at the end of intensive phase. Yokoyama et al study also pointed out the time required for negative conversion of sputum cultures did not differ by age.
- All out patients were treated under DOTS. Viz., 53 (71 %) in CAT I, 18 (24%) in CAT 11,3 (4%) in CAT IV.
- Drug reactions found in only 2 patients, one had skin allergy, another had giddiness and hypotension followed by streptomycin.
- The disease was predominant among males (M:F = 17.5:1). The mean age was 63.9 years. They were thin and fragile and BMI was low. Past history of tuberculosis was noticed in 27%. The presenting features were invariably similar to other age groups published in literature. Breathlessness and chest pain were predominantly present in most to compare to younger population. Duration of illness was longer or they were treated as non- TB disease by local practitioners or could not come for specific treatment due to socio-economic and living situations.
- Hematological studies reveal to have anaemia, and elevated ESR. Mx test response was more than 10mm in three of the cases (4%). Those sputum culture positive (50 out of 64 (78%), drug resistant organism grown in 5 out of 50 (10%). Among them 3 were MDR TB. Radiological lesions were observed in all and it was bilateral in 58% Infiltrative type was predominant than other pattern and upper than other pattern; and upper zone involvement was observed in 98.6%.
- All of them were included under RNTCP and drugs were provided under CAT I in 72 % CAT II in 24% and CAT IV in 4%. Drug reaction were seen in 2 patients only. Follow up of patients living in Erode revealed to be satisfactory.

CONCLUSIONS

Male predominance was observed among elderly pulmonary tuberculosis and M:F ration was 17.5:1. The man age was 63.9 years Smoking status was observed among males and it was 75.6% BMI was lower than the Indian standard Past history of tuberculosis was noticed 27% of cases (20/74) The commonest presenting features were cough with expectoration breathlessness, anorexia and weight loss. Hemotypsis was noticed in 31% of cases Duration of illness from 1 month to more than 6 months. Diabetes was prevalent among 50% of cases (37/74) Anemia, neutophilia, Lymphopenia were observed in most. ESR was invariably above 50mm in one hour in all but 2 patients. Tuberculin response 0mm negative invariably but for 3 cases range from 10-18mm Drug resistant organism were grown in 5 of the 50 isolates, Radiological lesions were observed bilaterally in 58%. The type of lesions was infiltration followed by cavitation. Upper zone involvement was noticed in 98.6% of cases. Patients were provided with antituberculosis treatment (CAT 1 in 53 cases, CAT II in 18 cases CAT IV in 3 cases) Those who had diabetes were advised to start on insulin therapy as per diabetologist advice and follow up Adverse reactions were noticed in two individuals only. Follow up of 46 patients living in Erode was found to be satisfactory in terms of compliance, disappearance of symptoms and co-operations with DOTS provider.

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