

Comparison of host factors in patients with tuberculous mediastinal lymphadenopathy and cavitory pulmonary tuberculosis

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I. Introduction

Tuberculosis remains a world- wide public health problem . India has the highest tuberculosis cases in the world accounting for nearly one fourth of global tuberculosis burden.¹

Mediastinal lymph adenopathy due to tuberculosis is a common presentation in paediatric age group. This is due to primary tuberculosis .Mediastinal lymph adenopathy due to tuberculosis is also seen in adults. Disease may represent primary infection, spread from contiguous sites, or reactivation². The mediastinal lymphadenopathy is encountered about 46% in children^{3,4}. The tubercular mediastinal lymph adenopathy without lung parenchymal lesion in adult has been reported to be about 6%^{5,6,7}.

Cavitory pulmonary tuberculosis occurs mainly in post-primary tuberculosis . Post -primary tuberculosis tends to produce more damage to the lungs than primary tuberculosis . Several host factors ,age ,sex, smoking habit, nutritional status ,inter -current infection ,duration of exposure and contact of sputum positive cases etc . may play important role. This prospective case control study was therefore planned to find out effects of several host factors for developing tubercular mediastinal lymph adenopathy and cavitory pulmonary tuberculosis .

Study design.methods and results

This is a prospective study carried out over a period of two years(January2012—January2014) at the IPGME&R, Kolkata . We selected and categorized the patients in two groups 1) mediastinal lymphadenopathy group. 2)cavitory pulmonary tuberculosis group in this study .

Those patients having mediastinal lymphnode enlargement demonstrated by chest x-rays without presence of other organ involvement like lung ,liver ,bone ,spleen other than cervical lymph nodes were included in this study in mediastinal lymphadenopathy group .

Besides routine investigations including complete haemogram,liver function test ,mantoux test ,chest x-rays ,the following investigations were done accordingly, for confirmation criteria for tuberculosis of mediastinal lymph adenopathy.

- 1)CECT of chest .
- 2)FNABC and/or cervical lymph node biopsy .
- 3)CTguided FNABC from mediastinal lymph node and bronchoscopy were done in selected patients .
- 4) Sputum for AFB—3times.
- 5)HIV serology was done with consent . Cases were included all are HIV-ve cases .

Among the cases, a total of 50 patients with isolated mediastinal lymph adenopathy were subjected to this study .CECTscan was done in all 50 cases . it is seen that most common side of mediastinal lymph adenopathy in tuberculosis was right paratracheal nodes and peripheral rim enhancement with low attenuation at center of node was the most frequent pattern.⁸ Homogeneous enhancement , inhomogeneous enhancement and calcification of the involved lymphnodes were also seen .

In x-ray chest of 50 cases –though the lung involvement is not seen but in CECT scan revealed –lung infiltration in 16 cases, consolidation in 4 cases ,retroperitoneal lymph adenopathy in 4 cases , hypodense lesion in spleen in 2 cases and in liver in 1 case.

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For confirmation of the diagnosis , peripheral lymph node biopsy from cervical region was done in 32 cases , CTguided mediastinal lymph node biopsy was done in 4 cases , bronchoscopy (broncho-alveolar lavage and transbronchial lung biopsy)was done in 9 cases ,cold abscess aspiration in cervical region was done in 1 case. Diagnosis was made in 46 cases by isolation of organism (acid -fast bacilli) or by presence of caseating granuloma as tubercular lymphadenopathy. In the remaining 4 cases of mediastinal lymph adenopathy, the Mantoux reaction ,presence of necrosis in the mediastinal lymph nodes on CTscan finding and response to anti-tubercular treatment⁹ were the only evidence of tuberculosis .

In other category, 50 cases of pulmonary cavitory tuberculosis ,had their sputum positive for acid -fast bacilli , were taken . This group was subjected to chest x-rays at presentation and on follow up. CTscan was not done in this group .

We compared the host factors namely age , sex , symptoms, smoking habits , occupation , family history of tuberculosis, socio-economic status , nutritional status, mantoux reactivity, serum albumin , total leukocyte count in patient with tuberculosis presented with mediastinal lymph adenopathy alone and those who presented with pulmonary cavitory lesions .

In present study ,HIV status was done in all cases .only HIV negative cases are included in the study .

Age distribution among the patients have been shown in table 1. In tubercular mediastinal lymph adenopathy group age ranged from 14-58years with a mean of 30.2⁺- 12.4 years . 64% of the subjects were male . In pulmonary cavitory tuberculous group , age ranged between 15-66 years with a mean of 32.4⁺-13.5 years . 56% of the subjects were male .

Age(years)	Mediastinal group		Fibro-cavitory group	
	male	female	male	female
10-14	2	0	0	0
15-34	21	9	18	12
35-54	8	8	8	7
55+	1	1	2	3
total	32	18	28	22
0-34	23	9	18	12
35+	9	9	10	10
total	32	18	28	22

Table—1. Age and sex distribution among the patients.

In tubercular mediastinal lymphadenopathy group , only 11 cases were smoker (38 cases –non-smoker) and all were male . In cavitory tuberculosis group , 17 cases were smoker . Among them , 15 were male and 2 were female .

In tubercular mediastinal lymphadenopathy group , only 8 out of 50 cases had family history of tuberculosis and in cavitory tuberculosis group , 9 out of 50 cases had family history of tuberculosis.

When selected –occupation (table—2) were grouped into category , it is seen 6 health Care workers had tubercular mediastinal lymph adenopathy while no health care workers were included in cavitory group . There were 6 unemployed cases in cavitory tuberculosis group which showed its association with underprivileged people and poverty .

Occupational group	Mediastinal L.N.Group	Fibro-cavitory group	P Value
Health care worker.	6	0	0.035
Doctor.	2		
Nurse.	2		
Para-medical staff.	2		
Executive contact with public. (govt. officer. Officer in private company)	6	1	0.268
Extensive contact with public(bus, auto driver, shop keeper,porter, barber)	12	14	0.819
Dust exposure (machine operators, painting.)	4	1	0.358
Student.	13	13	1.000
House-wife	9	14	0.341
unemployed	0	6	0.035

Table:2. Occupation of patients in study.

Socio –economic status was assessed by modified Kuppaswamy scale .¹⁰ This is based upon 3 variables : education ,occupation and income . A weightage is assigned for each variable according to a seven points predefined scale .Total score indicates socioeconomic score as follows :

26—29 upper class .

16—25 upper middle class .
 11---15 lower middle class .
 5---10 upper lower class .
 Below 5 lower class .

Cases in relation to socioeconomic status of study patients have been shown in table --3. In present study , in tubercular mediastinal lymph adenopathy group , 6 cases in upper class , 30 cases in upper middle class , 10 cases in lower middle class , 4 cases in upper lower class were seen . In contrast , in cavitory tuberculosis group , 1 case in upper class , 5 cases in upper middle class , 21 in lower middle class and 23 cases in upper lower class were seen .

Socioeconomic status.	Mediastinal L.N. Group.	Fibro-cavitory group	P value.
Upper class.	6	1	0.120
Upper middle.	30	5	0.000
Lower middle.	10	21	0.030
Upper lower.	4	23	0.000
lower	0	0	

Table:3. Cases in relation to socioeconomic status of study patients.

Nutritional status of an individual can be assessed by various methods . These include densitometry, bioelectrical impedance, total body water , body mass index (BMI) and skin fold thickness (SFT). Of these BMI and SFT have clinical utility in field conditions . Measurement of SFT of one site (e.g . triceps skinfold thickness) was taken by using Lange Caliper . Measurement of triceps skinfold thickness was taken at the midway between the tip of the acromion and olecrenon process . Statistically significant difference were observed in weight , body mass index and skinfold thickness values . All these were lower in cavitory tuberculosis group as compared to tubercular mediastinal lymph adenopathy group . Serum total protein , and serum albumin level results were not statistically significant ..

	Mediastinal group	Fibro-cavitory group	P Value
Weight	50.98_+13.65	45.74+_9.73	0.029
height	163.04+_ 7.25	162.1+_10.86	0.612

Table:4. Cases in relation to weight and height.

	Mediastinal group	Fibro-cavitory group	P Value
BMI	19.14+_4.9	17.41+_3.4	0.045
SFT	8.6+_2.48	7.42+_1.75	0.008

TABLE:5. Cases in relation to BMI and skin fold thickness (SFT)

Laboratory parameters eg:--Total leukocyte count was significantly high in case of cavitory tuberculosis as compared to tubercular mediastinal lymphadenopathy (p=0.000). These difference was due to polymorphonuclear leucocytosis with cavitory tuberculosis which was statistically significant as compare to tubercular mediastinal lymphadenopathy (P=0.0004).But there was no statistically significant difference in total lycocyte count in both the groups (P = 0.056).

II. Discussion

We are prompted to undertake this study on account of several number of patients having isolated mediastinal lymphadenopathy are found in our medical out patient department (M.O.P.D). Most of these patients had isolated mediastinal lymph adenopathy without any significant pulmonary parenchymal lesion on plain x-ray chest. These patients are detected to have mediastinal lymph node enlargement on CECT scan also. It appears unlikely that the increase number of patients being diagnosed to have mediastinal tubercular adenitis is solely as a result of its detection due to greater availability of CT scan in the recent years. It is likely that the clinical spectrum of tuberculosis in adult is showing a varied trend with changes in host characteristics and the host parasite relationship.

In our study, adults with tubercular mediastinal lymphadenopathy were more often from higher socio-economic group with good nutritional status and patients with cavitory tuberculosis were more likely to belong to lower socio-economic status.

There could be several explanations for excess of extensive disease (cavitory tuberculosis) among the poor. It is related to overcrowding, alcoholism, poor nutritional status and lack of access to healthcare¹¹. High burden of disease in this groups of subjects has a multiplier effect. Patients with tuberculosis remain sputum positive for a longer period of time, and there is heavy bacillary load in their sputum resulting in transmission of infection to other members of the overcrowded community. Cavitory tubercular disease is generally the

result of breakdown of infection acquired in the past where as mediastinal lymphadenopathy is likely to represent primary infection in adult.

It has been postulated that patients with extreme malnutrition, or under-weight for their height can develop advanced pulmonary tuberculosis (cavitary tubercular disease).^{12,13} However it is not certain whether it is a cause or effect of these factors. Poor nutrition has been implicated in down regulation of immune system leading to increased susceptibility to infection.¹⁴

In the present study it was observed that lower body mass index patients having poor nutritional status in the form of under-weight and lower skin fold thickness were associated with advanced pulmonary tuberculosis i.e in cavitary tuberculosis group and the difference between the two groups was statistically significant.

Tubercular mediastinal lymphadenopathy is commonly seen in young children. Shibpuri and Ban (1957) reported that pubertal and young adult women were the most common (victims) subjects of hilar and mediastinal lymphadenopathy in their study with a female male ratio of 2.8:1.¹⁵ The rate of tuberculosis (including advanced tuberculosis) is higher in males in nearly all populations around the world. This is usually attributed to difference of social roles where males are more likely to engage in work outside the home and hence they have greater opportunity for a variety of contacts. In our study, the rate of tuberculosis is higher in males in both the groups. This could also be due to social setup where males more often seek medical treatment.

Mantoux positivity denotes infection with *Mycobacterium tuberculosis*. In the context of mediastinal lymphadenopathy, negative mantoux tests diagnose diseases other than tuberculosis (such as sarcoidosis, lymphoma etc.). Negative tuberculin test in advanced fibrocavitary tuberculosis may be due to anergy. In pulmonary tuberculosis, tuberculin test has been reported to be positive in 70% to 90%.¹⁶ In case of lymphnode tuberculosis also it is positive in 78% to 98%.¹⁷ Of cases. Scarce literature is available regarding tuberculin test in isolated mediastinal adenopathy. Approximately two third of our patients both in mediastinal adenopathy group and in cavitary group were tuberculin positive. This observation further emphasizes that tuberculin test is of little value in the diagnosis of both forms of tuberculosis in adults.

Anaemia is common in advanced pulmonary tuberculosis. Anaemia has been documented in 16-76% of patients with pulmonary tuberculosis.¹⁸ In our study also anemia was seen in 74% of case of cavitary pulmonary tuberculosis. The majority had normochromic normocytic red cell morphology, probably reflecting anaemia of chronic disease. Anaemia was present in 58% of tubercular mediastinal adenopathy patients.

The majority of patients of both the groups had elevated ESR at presentation and the difference between the two groups were not statistically significant.

Total leucocyte count was significantly high in case of cavitary tuberculosis.¹⁹ This was largely the result of neutrophilia i.e reactive leucocytosis, although lymphocytosis was seen in a small number of patients. This leucocytosis was more in extensive cavitary tuberculosis group as compared to tubercular mediastinal lymphadenopathy group.

In the present study low serum albumin was found in 38% of patients of cavitary tuberculosis group and in 28% patients of mediastinal lymphadenopathy group. This was a reflection of either malnutrition or the severity of the disease. Elevation of serum alkaline phosphatase, serum aspartate aminotransferase and serum alanine aminotransferase in 24% of patients with cavitary group and in 10% of patients of mediastinal lymphadenopathy group might indicate hepatic disease due to viral infections, drug induced hepatotoxicity or subclinical dissemination to liver.

In our study, stepwise logistic regression analysis showed a strong relationship between age, socio-economic status, total leucocyte count and the type of tuberculosis. This study showed that adult patients with tubercular mediastinal lymphadenopathy are younger in age and are better in socio-economic status as compared to patients with cavitary disease. Also total leucocyte count was higher in patients with cavitary disease.

Probably patients with good body mass index and good nutritional status having contact with tuberculosis was more likely to develop mediastinal lymphadenopathy as compared to cavitary disease.

III. Conclusions

1. Tubercular mediastinal lymphadenopathy though common in pediatric age group, has been occurring in increasing frequency in adult population.
2. Patients with cavitary disease were found to be poorer, older and had higher total leucocyte count as compared to patients with tubercular mediastinal lymphadenopathy.
3. Patients with cavitary disease were found to have lower body mass index, lower skin fold thickness as compared to patients with tubercular mediastinal lymphadenopathy.

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