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RESEARCH ARTICLE

YIELD OF SPUTUM FOR AFB IN TUBERCULAR PLEURAL EFFUSION WITH OR WITHOUT ANY RADIOLOGICAL MANIFESTATIONS.

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Abstract

Aim:- To find out the yield of sputum for AFB in cases of tubercular pleural effusion with or without any radiological manifestations.

Methods:- 78 patients who attended the Department Of Pulmonary Medicine, V.S.S.MCH, Burla during the period of October 2012 to September 2014 were included in this study.

Results:- Out of 78 patients studied majority of the patients were males, with male : female ratio of 4.2:1 (63:15) and most of the patients were in the age group of 46-55 yrs. The mean age of the patients was 40.44 yrs \pm 11.35 yrs. The most of the patients were farmers i.e. 39 (50%), followed by labourers i.e. 11 (14.10%), while majority of females were housewives i.e. 12 (15.38%). In the study it was found that 50% patients of pleural effusion with parenchymal lesions on chest radiography were positive for sputum smear for AFB while only 7.14% for whom parenchymal lesion was absent. This is found to be statistically significant with p-value of 0.0006 (<0.05). As per the clinical findings, out of the 6 patients with cough and expectoration only 2 had smear positive for AFB & out of 5 patients with hemoptysis only one was positive for AFB.

Conclusion:- The sputum smear examination with or without radiological parenchymal lesions in tubercular pleural effusion needs meticulous examination for both AFB smear and culture.

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Introduction:-

Tuberculosis is a disease known to mankind since long and continues to be public health menace. Though India is the second-most populous country in the world one fourth of the global incident TB cases occur in India annually. In 2012, out of the estimated global annual incidence of 8.6 million TB cases, 2.3 million TB cases were estimated to have occurred in India⁽¹⁾. Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*. Pulmonary

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tuberculosis is the most common form of TB (more than 85% of all TB cases). The link between TB and HIV is quite significant with WHO estimating that 6-7% of TB patients are also co infected with HIV^[2]. Thoracic diseases cover a wide spectrum of lesions involving distinct compartments i.e. airways, lung parenchyma, pleura, chest wall & mediastinum. Pleural involvement is common in various respiratory diseases including inflammatory, infections, occupation & neoplastic entities. Pleural effusion, the result of the accumulation of fluid in the pleural space is a common medical problem. It can be due to primary pleural disease, due to disease in lungs & extra thoracic pathologies. Several mechanisms underlying pleural effusion include increased permeability of pleural membrane, increased pulmonary capillary pressure, decreased negative intra pleural pressure, decreased oncotic pressure and obstructed lymphatic flow. Tuberculosis is one of the common causes of exudative pleural effusion in India. The clinical presentation of TB can mimic several diseases and can be of diagnostic problem even in endemic areas. Virulence and load of the infecting mycobacterium, the immune status of the host, the organ system involved, all influences the clinical manifestation of tuberculosis. Pleural effusion is one of the common complications of primary tuberculosis or in conjunction with pulmonary infiltrate typical of post primary tuberculosis. Tubercular pleural effusion is thought to result from a delayed hypersensitivity reaction which occurs in response to the presence of mycobacterial antigens in the pleural space. These mycobacterial antigens may gain access to the pleural space from rupture of a small, subpleural caseous focus. Tubercular pleural effusion has been described as an acute granulomatous pleuritis occurring as a sequel to recent tuberculous infection in young adults and children who usually do not have radiographically apparent parenchymal lesion. However it may occur in older adults and in patients with classical reactivation tuberculosis. Parenchymal lung lesion is usually not apparent on chest radiography in cases of tuberculous pleural effusion^[3]. Sputum for acid fast bacilli (AFB) is seldom looked for diagnosing tubercular pleural effusion. However, with computerized tomography parenchymal lesion including focal areas of sub pleural cavitation and lymphadenopathy can be visualized which is not detected on chest radiography^[4]. Therefore in these cases there is possibility of isolation of tubercle bacilli in sputum will help us as a diagnostic tool. It may also have epidemiological significance, which requires thorough examination of all contacts of tuberculous pleural effusion which also has therapeutic implication^[3].

The aim of my study is to find out the yield of sputum for AFB in cases of tubercular pleural effusion with or without any radiological manifestations. The present study was done to emphasise the importance of preliminary pleural fluid analysis in a resource limited setting, and sputum smear examination for acid fast bacilli (AFB) where investigation and facilities are inadequate, cost of treatment is unaffordable, careful analysis of pleural fluid still remains a very convenient, low cost and safe investigation that helps in diagnosing cases of pleural effusion.

Material and Method:-

It was a prospective and observational study. 78 patients who attended the Department Of Pulmonary Medicine, V.S.S.MCH, Burla during the period of October 2012 to September 2014 were included in this study. The study was approved by the Institutional Ethical Committee. The patients were explained the study protocol, and informed consent was taken before including them in the study. Inclusion criteria were patients who were >15 years of age, cases of exudative pleural effusion as per lights criteria and cases of tubercular pleural effusion. Exclusion criteria were patients of chronic renal insufficiency and liver insufficiency, patients having past history of pulmonary tuberculosis, multiple pathology of pleural effusion :- patients having more than one etiology of pleural effusion (empyema, lymphoma and other connective tissue disorder) and patient who did not give consent.

Methodology:-

A detailed clinical history and physical examination was done with emphasis on age, sex, occupation, socio-economic status of the patient, duration of symptoms and specific complaints like fever, chest pain, shortness of breath, expectoration, loss of appetite, weight loss and other constitutional symptoms. History of co-morbidities like type II diabetes mellitus, systemic hypertension, chronic kidney disease, sickling etc. was taken and were excluded from the study if found out to have any. Chest radiograph- posterior – anterior and lateral view was done for all the patients. Pleural effusion was radiologically classified as minimal, moderate and massive pleural effusion. Minimal pleural effusion was the one which obliterated the costophrenic angle and the cardiophrenic angle and /or the upper margins of effusion reached the anterior end of the 4th costochondral junction. In a moderate sized pleural effusion, the homogenous opacity caused by the fluid was highest in the axilla. The opacity was directed downward and medially with a superior concave curvature at the lower border of 2nd rib anteriorly. In massive pleural effusion, the upper level of pleural fluid was above the 2nd costochondral junction. All these patients were evaluated for hemoglobin, differential leucocyte count, total leucocyte count, sputum examination for AFB and malignant cells,

fasting blood sugar, blood urea, serum creatinine, HIV antibody test, FNAC of the lymph nodes were done in cases where peripheral lymphadenopathy was detected. Ultrasonographic examination of chest, abdomen and pelvis was also done. It helped to detect the amount of pleural fluid, presence/absence of pleural thickening, presence of mass lesion, to tap in cases of encysted pleural effusion. Pleural fluid aspiration was done under all aseptic precautions and under local anesthesia. The pleural fluid was analysed both macroscopically and microscopically. The colour, odour, and turbidity was noted. The fluid was sent for biochemical investigation for adenosine deaminase (ADA), glucose, protein in plain tube and in an ethylenediaminetetra-acetic acid tube for total and differential count. Exudates and transudates were classified according to Lights criteria. Based on the history and physical examination and the routine blood investigation, a provisional diagnosis was made which was supplemented with investigation of pleural fluid. After cumulative details of history, clinical examination and relevant investigations which could be possible in our setup, a final diagnosis was made. Only those patients who had exudative pleural effusion and whose adenosine deaminase (ADA) levels were >40 IU/L were classified as cases of tubercular pleural effusion, after excluding other causes of high ADA. Infective effusion were diagnosed by detection of organism in pleural fluid. Two sputum samples of the patients with tubercular pleural effusion was collected, both spontaneous and induced in patients who were unable to expectorate. It was collected in leak proof containers. Attention is to be given that sputum specimen be free from food particles, residues and extraneous materials. Sputum was collected in early hours of the morning after proper cleansing of the mouth and was instructed to avoid the collection of only saliva. The sputum examination for acid fast bacilli (AFB) was done by fluorescence microscopy. Reference values of ADA in Serum, plasma, pleural, pericardial and ascitic fluid were Normal - <30 IU/L, Suspect - $30 - 40$ IU/L, Strong suspect - $>40 - 60$ IU/L, Positive - >60 IU/L, for CSF was Normal- <10 IU/L & Positive - >10 IU/L.

Observation:-

Out of 78 patients studied majority of the patients were males, with male :female ratio of 4.2:1 (63:15). Majority of the patients were in the age group of 46-55 yrs. The mean age of the patients was $40.44 \text{ yrs} \pm 11.35 \text{ yrs}$. According to body mass index the distribution of patients were in range of $18.5-22.9 \text{ Kg/m}^2$ i.e. normal in 33 (42.3%), 30 (38.46) patients were in $16.1-18.4 \text{ Kg/m}^2$ i.e. in under weight category, 9 patients (11.53%) were in severe malnourishment category, 5 (6.41%) patients were over weight in the range of $23-24.9 \text{ Kg/m}^2$ and 1 patient is obese in the range of $25-29.9 \text{ Kg/m}^2$. Regarding symptomatology fever was the most common symptom in 57 patients (73.07%) followed by chest pain in 56 patients (71.79%) and cough in 34 patients (43.58%), 6 patients presented with expectoration (7.69%), and weight loss was also a presenting complain in 6 patients (7.69%). 5 patients (6.41%) had hemoptysis & 5 patients presented with breathlessness and 3 patients (3.84%) had loss of appetite at the time of presentation. In this study pallor was the most common clinical sign in 44 patients (56.54%), clubbing was found in 4 patients (5.12%) and lymphadenopathy was found in 3 patients (3.84%). Unilateral pleural effusion was found in 74 (94.87%) patients (30 left & 44 right) and only 4 (5.12%) patients had bilateral effusion. In 50 (64.10%) patients had moderate pleural effusion, while 22 patients (28.20%) had mild pleural effusion, 3 patients (3.84%) had massive pleural effusion and 3 patients (3.84%) had encysted pleural effusion.

In the present study, the value of pleural fluid adenosine deaminase (ADA) was found out to the range of 40-59 IU/L in 25 patients (32.05%), 60-79 IU/L in 21 patients (26.92%), while 25 patients (32.05%) had the levels between 80-99 IU/L, 4 patients (5.12%) had in the range of 100-119 IU/L and 3 patients (3.84%) had between 120-140 IU/L.

Level of adenosine deaminase			
Sl. No	Adenosine deaminase (iu/l)	No. Of patients	Percentage (%)
1	40-59	25	32.05
2	60-79	21	26.92
3	80-99	25	32.05
4	100-119	4	5.12
5	120-140	3	3.84

Pleural Fluid Ada With Respect To Sputum Smear For Afb Status:-

Sl. No	Sputum smear for afb	No. Of patients	Percentage (%)	Pleural fluid ada			Standard deviation
				Min	Max	Mean	
1	Positive	8	10.25	76	103	90.17	± 11.48
2	Negative	70	89.74	40.6	136	72.90	± 21.73

In this study the sputum positive patients were 8 in nos. i.e. 10.25%, the mean pleural fluid ADA was found to be $90.17 \text{ IU/L} \pm 11.48$. The sputum negative patients were 70 in number i.e. 89.74%, with a mean pleural fluid ADA of

72.90 IU/L \pm 21.73. The relation of pleural fluid ADA with respect to sputum status was not statistically significant i.e. $p > 0.05$.

Pleural fluid ada with respect to chest radio graphic finding

Sl. No	Chest radiographic findings	No. Of patients	Pleural fluid ada			Standard deviation
			Min	Max	Mean	
1.	Effusion with cavity	1	103	103	103	± 0
2	Effusion with infiltration	8	45.3	103	86.73	± 19.31
3	Pleural effusion	70	40.6	136	72.67	± 21.78

The mean pleural fluid ADA was found to be 103U/l (highest) for infiltration with cavity and pleural effusion, 86.73 U/L in patients with infiltration and lowest with 72.67 U/L in 70 patients with patients who had pleural effusion with no parenchymal infiltrations or cavity. The standard deviation of pleural fluid ADA in patients with infiltrative lesions on chest X -Ray was found out to be ± 19.31 and with pleural effusion was found out to be ± 21.78 .

Correlation Of Pleural Fluid Ada With Lymphocyte Count (%) In Dc:-

Sl.no		Mean	Standard deviation	Coefficient correlation	P-value
1.	Pleural fluid lymphocyte	83.62	± 4.24	0.0753	> 0.05
2.	Pleural fluid ada	73.78	± 21.92		

In the present study the mean of the pleural fluid lymphocyte count was found out to be 83.62 and the mean of pleural fluid of ADA was found out to be 73.78 with a standard deviation of ± 4.24 and ± 21.92 respectively. Both the pleural fluid lymphocyte count and pleural fluid ADA had a positive correlation i.e. 0.0753. But this was not statistically significant as the p value was > 0.05 .

Relation Between Radiological Findings With Sputum Positivity :-

Parenchymal lesion on chest x-ray	Sputum smear for afb positive	Sputum smear for afb negative	P-value
Present(8 cases)	4(50%)	4(50%)	< 0.0006
Absent (70 cases)	5(7.14%)	65(92.85)	

In the study it was found that 50% of patients with parenchymal lesions on chest radiography were positive for sputum smear for AFB while only 7.14% for whom parenchymal lesion was absent. This is found to be statistically significant with p-value of 0.0006(< 0.05). As per the clinical findings, out of the 6 patients with cough and expectoration only 2 had smear positive for AFB & out of 5 patients with hemoptysis only one was positive for AFB.

Discussion:-

In this study majority of the patients were males, with male :female ratio of 4.2:1 (63:15). Most of the patients were in the age group of 46-55 yrs and the mean age of the patients was 40.44 yrs \pm 11.35 yrs. This finding is comparable with the study done by A D Choudhuri, S Bhuniya, S Pandit et al³. and Marcus B. Conde , Angela Chindamo Loivos, Valeria et al.⁶ where they found male female ratio was 3:1. In the study by Marcus B. Conde , Angela Chindamo Loivos, Valeria et al.⁶ the mean age was 37.2 \pm 14.6 yrs which was similar to my study. It was seen that fever was the most common symptom in 57 patients (73.07%) followed by chest pain in 56 patients (71.79%) and cough in 34 patients (43.58%), 6 patients presented with expectoration (7.69%), and weight loss was also a presenting complain in 6 patients (7.69%). About 5 patients (6.41%) had hemoptysis and 3 patients (3.84%) had loss of appetite at the time of presentation. In this study pallor was the most common clinical sign in 44 patients (56.54%), clubbing was found in 4 patients (5.12%) and lymphadenopathy was found in 3 patients (3.84%). Majority of patients i.e. 33 (42.3%) were in range of 18.5-22.9 Kg/m² i.e. normal, while 30 patients were in 16.1-18.4Kg/m² i.e. in under weight category. About 9 patients (11.53%) were in severe malnourishment category. In the present study the majority of patients had unilateral pleural effusion i.e. 74 patients (94.87%) and only 4 patients i.e. (5.12%) had bilateral effusion. In the study by Marcus B. Conde , Angela Chindamo Loivos, Valeria et al.⁶ 96% were unilateral and rest were bi-lateral which is very close to our values. Majority of patients i.e. 50 (64.10%) had moderate pleural effusion, while 22 patients (28.20%) had mild pleural effusion, 3 patients (3.84%) had massive pleural effusion and 3 patients (3.84%) had encysted pleural effusion. In the present study , the value of pleural fluid adenosine deaminase (ADA) was found out to the range of 40-59 IU/L in 25 patients(32.05%), 60-79 IU/L in 21

patients (26.92%), while 25 patients (32.05%) had the levels between 80-99 IU/L, 4 patients (5.12%) had in the range of 100-119 IU/L and 3 patients (3.84%) had between 120-140 IU/L. In the present study the sputum positive patients were 4 in nos. i.e. 3.84%, the mean pleural fluid adenosine deaminase (ADA) was found to be 85.9 IU/L \pm 11.48. The sputum negative patients were 74 in number i.e. 96.16%, with a mean pleural fluid ADA of 73.3 IU/L \pm 21.73. The relation of pleural fluid ADA with respect to sputum status was not statistically significant i.e. $p > 0.05$. The mean pleural fluid ADA was found to be 103 IU/L (highest) for infiltration with cavity and pleural effusion, 86.73 IU/L in patients with infiltration and lowest with 72.67 IU/L in 70 patients with patients who had pleural effusion with no parenchymal infiltrations or cavity. The standard deviation of pleural fluid ADA in patients with infiltrative lesions on chest X-Ray was found out to be \pm 19.31 and with pleural effusion was found out to be \pm 21.78. It was found that the patients with parenchymal lesion had higher ADA than patients without parenchymal lesions on chest radiography. In the present study the mean of the pleural fluid lymphocyte count was found out to be 83.62% and the mean of pleural fluid of ADA was found out to be 73.78 with a standard deviation of \pm 4.24 and \pm 21.92 respectively. Both the pleural fluid lymphocyte count and pleural fluid ADA had a positive correlation i.e. 0.0753. But this was not statistically significant as the p value was > 0.05 . In the study all patient's pleural fluid was lymphocytic predominant while it was 95.45% in the study conducted by A D Choudhuri, S Bhuniya, S Pandit et al.³. In the study it was found that 50% of patients with parenchymal lesions on chest radiography were positive for sputum smear for AFB while only 7.14% for whom parenchymal lesion was absent. This is found to be statistically significant with p -value of 0.0006 (< 0.05). This is against the study conducted by Marcus B. Conde, Angela Chindamo Loivos, Valeria et al.⁵ found out the yield of AFB to be 11% in patients without lesions at chest radiograph and 15% in those with parenchymal lesion which was of no statistical significance. The limitation of the study was Sample size is small, sputum culture for mycobacterium TB could not be done at our set up which could have resulted in better yield of sputum status in patients with no apparent radiological lesion and CT scan of the chest was not done, which could have revealed more parenchymal lesions.

Conclusion:-

The sputum smear examination with or without radiological parenchymal lesion of tubercular pleural effusion needs meticulous examination for both AFB smear and culture. Therefore a routine sputum examination may help as definite diagnostic tool. Often with the absence of apparent lung lesion radiologically, patients are considered sputum negative and non infectious. First of all, if the sputum for acid fast bacilli (AFB) is positive the patient will be stamped as pulmonary tuberculosis. So routine sputum examination can be of epidemiological significance which also needs thorough contact examination in patients with tubercular effusion with no apparent parenchymal lesion on chest X-ray. Secondly, the patient could be followed up who will be categorized as smear positive pulmonary tuberculosis. And finally the person would be declared cured of pulmonary tuberculosis rather than being categorized as treatment completed. Therefore routine sputum examination for AFB in patients with tubercular pleural effusion is a very simple and inexpensive diagnostic tool with therapeutic and epidemiological significance.

References:-

1. TB India 2014 annual status report.
2. Training module for medical practitioners RNTCP, Central TB Division, DGHS, MOHFW, Dec 2010.
3. Chaudhri AD, Bhuniya S, Pandit S, Dey A, Mukharjee S, Bhanja P. Role of sputum examination for acid fast bacilli in tuberculous pleural effusion. Lung India, jan-mar 2011; vol 28, 21-24.
4. Hulnick DH, Naidich DP, Mc Cauley DI. Pleural tuberculosis evaluated by computed tomography, Radiology 1983; 149:759-65.
5. Marcus B. Conde, Angela Chindamo Loivos, Valeria et al. sputum AFB positivity in tuberculous pleural effusion with no radiologically apparent parenchymal lesion, Ind. J. Tub. 1997; 44:13.