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"A CLINICO-MICROBIOLOGICAL STUDY OF TUBERCULOSIS IN IMMUNOCOMPROMISED AND IMMUNOCOMPETENT PATIENTS"

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ABSTRACT

Tuberculosis is a widespread, fatal disease caused by Mycobacterium tuberculosis. Tuberculosis typically involves the lungs, but can affect other parts of the body. One-third of the world's population is thought to have been infected with M Tuberculosis with new infections occurring in about 1% of the population each year. More people in the developing world contract tuberculosis because of a poor immune system, largely due to high rates of HIV infection. The current worldwide estimate of the number of cases of HIV infection among adults are 38.6 million, one third of them co-infected with M tuberculosis. Our study showed pleural effusion was the most common presentation in nonHIV group where as cervical lymphadenopathy in HIV group with no difference in occurrence of INH/Rifampicin resistance. There is no statistical difference of sputum positivity in AFB between the groups and without significant correlation of CD4 count among HIV group.

KEYWORD: HIV, EPTB, Respiratory tract.

INTRODUCTION

Tuberculosis is a widespread, and in many cases fatal, infectious disease caused by various strains of mycobacteria, usually Mycobacterium tuberculosis. Tuberculosis typically attacks the lungs, but can also affect other parts of the body. It spreads through the air when people who have an active TB infection cough, sneeze, or otherwise transmit respiratory fluids through the air**.** Most infections do not have symptoms, known as latent tuberculosis. About one in ten latent infections eventually progresses to active disease which, if left untreated, kills majority of the patients.

One-third of the world's population is thought to have been infected with M. Tuberculosis[1] with new infections occurring in about 1% of the population each year.[2] In 2007, an estimated 13.7 million chronic cases were active globally[3], while in 2010, an estimated 8.8 million new cases and 1.5 million associated deaths occurred, mostly in developing countries.[4] The absolute number of tuberculosis cases has been decreasing since 2006 and new cases have decreased since 2002.[4] ore people in the developing world contract tuberculosis because of a poor immune system, largely due to high rates of HIV infection and the corresponding development of AIDS.

HIV/AIDS is a global pandemic, with cases reported virtually from every country. The current worldwide estimate of the number of cases of HIV infection among adults are 38.6 million, one third of them co-infected with M tuberculosis. TB counts for up to a third of AIDS death of worldwide. Six million people are estimated to have co-infection with HIV and tuberculosis. The number of people infected with tuberculosis worldwide is around 2 billion. Two third of HIV patients are in the sub-Saharan Africa, 50% of cases are women. In addition, an estimated 2.3 million children younger than age 15 years are living with HIV/AIDS. Two types of HIV have been characterized: HIV-1 and HIV-2. The lower infectivity of HIV-2 compared to HIV-1 implies that fewer of those exposed to HIV-2 will be infected per exposure. Because of its relatively poor capacity for transmission, HIV-2 is largely confined to West Africa. According to joint United Nations Programme on HIV/AIDS, in 2005 alone there were estimated 4.1 million new cases of infection worldwide (more than 11,000 new infections each day) and 2.8 million deaths from AIDS, making it the fourth leading cause of mortality worldwide.[5]

TB/HIV

Global Scenario

HIV and Tuberculosis (TB) a "cursed duo", is a major public health problem. Globally, nearly 2 billion people are infected with Mycobacterium tuberculosis and about 33.2 million are estimated to be living with HIV infection[6]. An estimated 1.37 million new cases of HIV-TB occurred in 2007, representing 15% of the total global burden of TB. An estimated 456 000 HIV-TB deaths accounted for 23% of global HIV/AIDS mortality.[7]

Indian Scenario

India accounts for one-fifth of the world's new TB cases. Every year 1.8 million people of the country develop TB and 370000 people die of it. In India, the estimated prevalence of HIV in the adult population is 0.36% and 2.5 million people are living with HIV/AIDS. At present, about 5% of new TB cases in India occur in people with HIV co-infection.

TB is one of the most virulent opportunistic infections and it appears early in the course of the HIV infection than other opportunistic infections. As it is one of the first opportunistic infection to appear in HIV–infected people, TB may be one of the earlier signs of HIV infection. HIV specifically eliminates macrophages and CD4 cells that provide immunity against TB thereby increases the spread of TB. People who are co-infected with both HIV and latent TB have 800 times greater risk for developing active TB disease and becoming infectious compared to people not infected with HIV.

Definitions

MDR TB is defined as laboratory-confirmed resistance to the two most potent first-line medications, isoniazid and rifampin with or without any other anti- tubercular drugs.

XDR TB is defined as resistance to both isoniazid and rifampin with additional resistance to at least one fluoroquinolone and one injectable agent (amikacin, kanamycin, or capreomycin).

Drug-resistance among TB cases: about 3.6% of patients taking first time ATD in lifetime have multidrug - resistant strains (MDR – TB). Levels are much higher – about 20% - in those previously treated for TB. The frequency of MDR - TB varies substantially between countries. About 10% of MDR - TB cases are also resistant to the two most important second - line drug classes, or extensively drug - resistant TB (XDR-TB).

By September 2013, 92 countries had reported at least one XDR - TB case. MDR - TB case - load and deaths: WHO estimates that there were about 450,000 new (incident) MDR - TB cases in the world in 2012. More than one half of these cases occurred in China, India, and the Russian Federation. About 170,000 MDR - TB deaths are estimated to have occurred in 2012.

Detection of MDR – TB patients: is increasing. Almost 84,000 patients with MDR- TB were notified to WHO globally in 2012, up from 62,000 in 2011. The biggest increases were in India, South Africa and Ukraine. Only about 9% of retreatment TB cases had DST results reported although the proportion was much higher in certain high burden countries.

AIMS AND OBJECTIVES

Aim of study is to observe clinical presentation of Tuberculosis in patients enrolled in opd/indoor of STM and Medical College, Kolkata in Immunocompromised and Immunocompetent patients. Smear positive specimens will be subjected to LPA and the result will be analysed and compared in both groups.

- **SPECIFIC OBJECTIVE OF THE STUDY**

1. To observe the patterns of clinical presentation of tuberculosis among Immunocompromised and Immunocompetent patients.
2. To observe the smear positivity in different clinical specimens.
3. To study resistance of isoniazid and rifampicin in sputum positive samples by DNA PCR followed by Line Probe Assay.

MATERIALS AND METHODS

(1) **STUDY AREA** - School of Tropical Medicine, Kolkata and Department of Chest Medicine MCH, Kolkata.

(2) **STUDY POPULATION** –Immunocompromised and Immunocompetent patients with diagnosed tuberculosis who attended outpatient department or admitted at Carmichael Hospital for Tropical Diseases, School of Tropical Medicine, Kolkata and Department of Chest Medicine MCH, Kolkata.

(3) **STUDY PERIOD**- July-2013 to June-2014.

(4) **SAMPLE SIZE**-50(25 in each group)

(5) **SAMPLE DESIGN**-SELECTION OF PATIENTS- Patients presenting with clinical features of tuberculosis and diagnosed as Pulmonary TB or Extra-Pulmonary TB were referred to ICTC (Integrated Counselling and Testing Centre) for HIV Screening. Both the groups were screened and finally recruited for the study using the following inclusion exclusion criteria after taking informed consent.

INCLUSION CRITERIA

(a) HIV uninfected adults of both sexes with confirmed tuberculosis.

(b) HIV infected, diabetic, on long term steroid therapy or other Non-HIV Immunocompromised state patients of both sexes with confirmed tuberculosis.

(c) Patients living in and around Kolkata.

EXCLUSION CRITERIA

(a) Immunocompromised and Immunocompetent adults without TB.

(b) Infants and children (less than 18 years).

(6) **STUDY DESIGN**- Descriptive cross sectional study.

Which includes

(a) Detailed Medical History
(b) Clinical Examination
(c) Informed consent.
(d) HIV serology screening.
(e) Routine laboratory investigation
1) Complete haemogram
2) Sputum for Acid Fast Bacilli stain (AFB) two consecutive samples.AFB positive samples will be tested for INH and Rifampicin resistant by Line probe assay.
3) Liver Function Test
4) Serum Urea, Creatinine
5) Fasting & post-prandial blood sugar.
(f) Chest X-ray PA view
(g) USG Whole Abdomen,
(h) Blood for CD4 Count (In HIV infected patients)
(i) ECG (all 12 leads).

If Required

Other relevant X ray/s,
Other relevant USG/s,
CT or MRI of symptom directed organs,
FNAC from lymph node for AFB,
Excisional Biopsy of Lymph Node,
Bone marrow aspiration for cytology,
Pleural fluid/ CSF/ Ascitic fluid study for Biochemical, Cytological parameters and AFB smear.
All from specified laboratories and radiology units of Medical college and hospital and Calcutta School of Tropical Medicine, Kolkata.

(8) STUDY TOOLS

- Pre-designed and pre-tested schedule for data collection.
- Prescriptions.(medicines used by patient)
- Other allied instruments required during clinical examination of the patient.
- Patient information sheet and Consent forms (In English, Hindi &Bengali languages)

(9) STUDY TECHNIQUES

❖ Patients attending OPD/Admitted at School of Tropical Medicine with TB are at first selected as immunocompetent and immunocompromised groups based on ICTC screening or other immunocompromised states & also considering their inclusion and exclusion criteria.
❖ Interviewing the patients using the schedule to elicit proper medical history.
❖ Clinical Examination.
❖ Scrutiny of Biochemical, Pathological, Radiological & Microbiological reports
❖ Scrutiny of prescriptions.

(10) PLAN FOR ANALYSIS OF DATA

Analysis of the collected data was done by standard statistical methods. All data were collected, compiled and was subjected to suitable statistical analysis by using appropriate statistical methods. The computer software SPSS version 17.0 and Microsoft Office Excel 2007 were used for statistical analysis. Simple statistical tools like Mean, Median, Standard deviation, standard error of mean, Fisher's exact test: P value and chi-square test were used for calculation. Statistical analysis was done by two way ANOVA.

(11) Case Definitions

1) Literate- A person who can read and write with understanding in any language.
2) Illiterate- A person who cannot read or write with understanding in any language.
3) Socio-economic status- As per Modified Kuppuswamy scale(2007) the socioeconomic status depends on three variables education, occupation and family income per month in rupees. According to the score there are five class i.e. Upper(score 26-29),Upper middle(score 16-25), Lower middle(score 10-15), Upper lower(score 5-10), Lower(score <5).For our convenience we divided into Upper(26-29),Middle(11-25) and Lower(less than or equal to 10) Class.

RESULT AND ANALYSIS

All data were collected, compiled and was subjected to suitable statistical analysis by using appropriate statistical methods. The computer software SPSS version 17.0 and Microsoft Office Excel 2007 were used for statistical analysis. Simple statistical tools like Mean, Median, Standard deviation, standard error of mean, Fisher's exact test: P value and chi-square test were used for calculation. Statistical analysis was done by two way ANOVA.

Table 1: Distribution of cases according to age (n=50)

AGE	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
18-28	7	28	6	24	13	26
29-38	5	20	10	40	15	30
39-48	8	32	8	32	16	32
49-58	3	12	1	4	4	8
59-68	0	0	0	0	0	0
69-78	2	8	0	0	2	4
Total	25	100	25	100	50	100

Age distribution: Two-way ANOVA				
Source of Variation	**% of total variation**	**P value**	**P value summary**	**Significant?**
HIV	0.0	> 0.9999	Not significant	No
Age	88.17	0.0229	Significant	Yes

Table 1 showing most common age for Non-IC patients was 39-48 and for IC patients was 29-38. Mean Age was 35.08 in IC patients and 38.36 in Non-IC patients. The Median age was 39 for Non-IC patients and 37 for IC patients. Effect of age on the distribution of patients was found to be statistically significant according to two way ANOVA ($p < 0.05$).

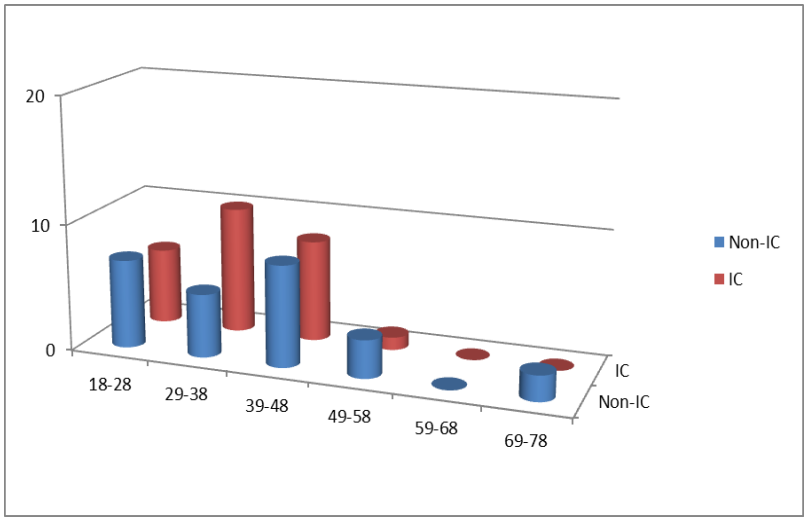

Figure 1: Bar-diagram showing age distribution of cases.

Table 2: Distribution of cases according to gender (n=50)

Gender	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Male	19	76	21	84	40	80
Female	6	24	4	16	10	20
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.7252					
P value summary	Not significant					
Statistically significant?	No					

Table 2 shows that 76% of patients in Non-IC group are males and only 24% are females. It also shows that 84% of patients in IC group were males and 16% were females. Gender and occurrence of HIV-TB co-infection were not found to be significantly related with each other.

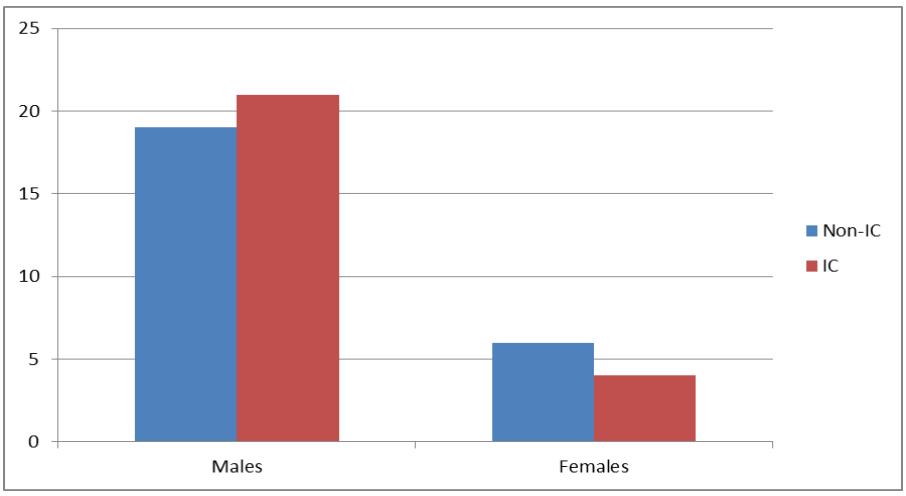

Figure 2: Bar-diagram showing distribution of cases according to gender.

Table 3: Showing distribution of cases according to socio-economic status (n=50)

Socio-economic status	Non-IC(%out of 25)		IC(%out of 25)		Total(n)	
	Count	%	Count	%	Count	%
Upper	1	4	0	0	1	2
Middle	9	36	2	8	11	22
Lower	15	60	23	92	38	76
Total	25	100	25	100	50	100
This table could not be analyzed since values in two categories are less than 5. Hence the data was presented as below for statistical analysis.						

Socio-economic status	Non-IC(%out of 25)		IC(%out of 25)		Total(n)	
	Count	%	Count	%	Count	%
Upper-Middle	10	40	2	8	12	24
Lower	15	60	23	92	38	76
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0181					
P value summary	Significant					
Statistically significant?	Yes					

Table 3 is showing that among the case population 2% are of upper, 22% are of middle and 76% are of lower socio-economic status. 4% of the Non-IC patients were from Upper class and 92% of the IC patients were from Lower class. No IC patient was found from upper class. Prevalence of HIV-TB coinfection was found to be significantly more in lower socioeconomic status. ($p< 0.05$).

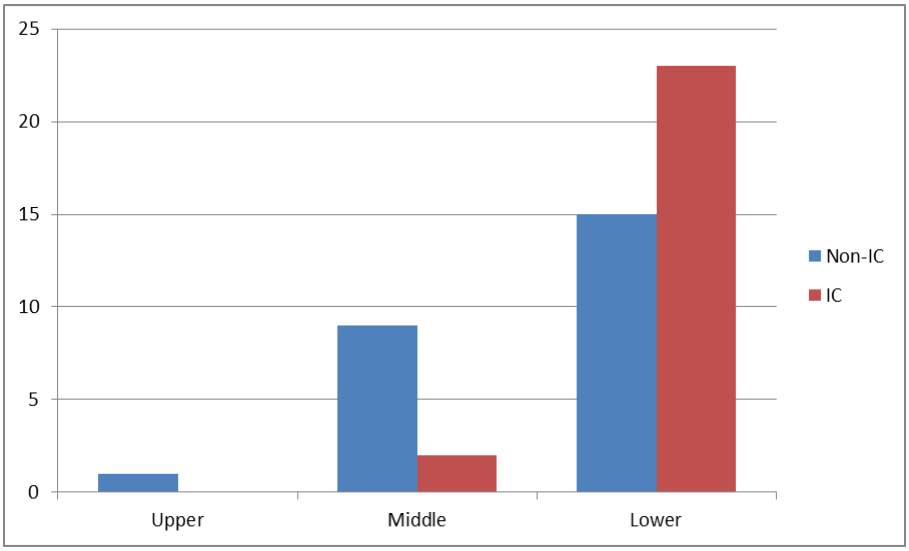

Figure 3: Bar-diagram showing distribution of cases according to socio-economic status.

Table 4: Showing distribution of cases according to presenting complaints (n=50)

	Non-IC(%out of 25)	IC(%out of 25)	Total(n)	Percentage%
Fever	22(88)	23(92)	45	90
Cough	17(68)	7(28)	24	48
Chest Pain	2(8)	1(4)	3	6
SOB	8(32)	3(12)	11	22
Wt.Loss	10(40)	9(36)	19	38
Pain Abd	2(8)	9(36)	11	22
Lymph Node	5(20)	11(44)	16	32
Headache	3(12)	3(12)	6	12
Vomiting	3(12)	3(12)	6	12
Convulsion	1(4)	1(4)	2	4
Diarrhoea	3(12)	4(16)	7	14

Table 4 showing that among the presenting complaints fever (90%) was the most common presentation. Cough (48%) and weight loss were present in 38% cases, shortness of breath (22%) and pain abdomen in 22% cases. Lymph node swelling and diarrhoea were present respectively 32% and 14%. Non-IC patients presented with cough(68%), SOB(32%), pain abdomen(8%), Lymph node(20%) as compared to 28%,12%,36%,44% in IC patients respectively.

Table 4a: Showing distribution of cases according to Cough (n=50)

Cough	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Yes	17	68	7	28	24	48
No	8	32	18	72	26	52
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0101					
P value summary	Significant					
Statistically significant?	Yes					

Cough was significantly present in Non-IC patients.(Fisher's test, $p< 0.05$).

Table 4b: Showing distribution of cases according to SOB (n=50)

SOB	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Yes	8	32	3	12	11	22
No	17	68	22	88	39	78
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.1706					
P value summary	Not significant					
Statistically significant?	No					

SOB is not significantly related to immune status (Fisher's test, $p> 0.05$).

Table 4c: Showing distribution of cases according to pain in abdomen (n=50)

Pain Abd	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Yes	2	8	9	36	11	22
No	23	92	16	64	39	78
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0374					
P value summary	Significant					
Statistically significant?	Yes					

Pain in abdomen is significantly present in IC patients. (Fisher's test, $p< 0.05$)

Table 4d: Showing distribution of cases according to Lymph node (n=50)

Lymph node	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Yes	5	20	11	44	16	32
No	20	80	14	56	34	68
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.1284					
P value summary	Not significant					
Statistically significant?	No					

Lymph node swelling is not significantly related to immune status (Fisher's test, $p>0.05$).

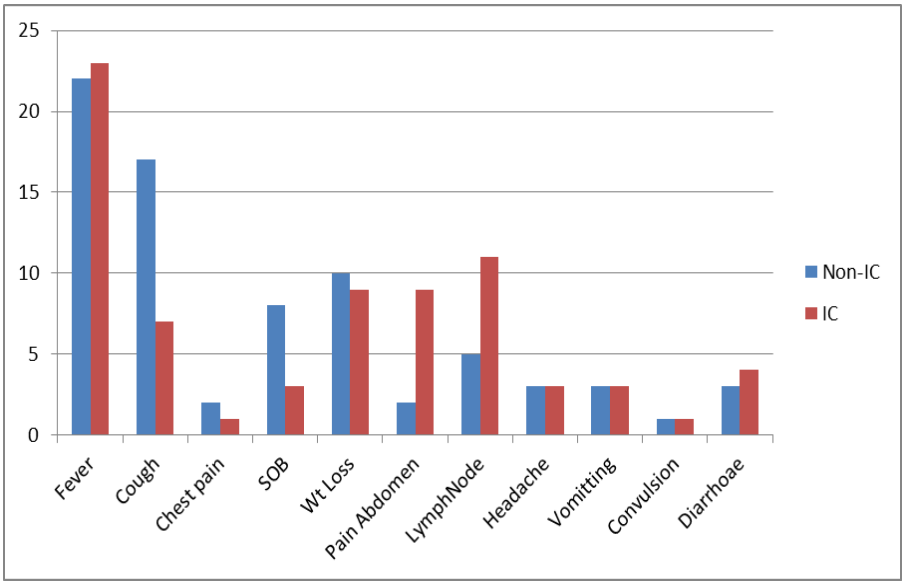

Figure 4: Bar-diagram showing distribution of cases according to presenting complaints.

Table 5a: Showing distribution of cases according to Haemoglobin (gm/dl) (n=50)

	Non-IC(%out of 25)		IC(%out of 25)			
	Male	**Female**	**Male**	**Female**	**Total(n)**	**Percentage%**
No Anaemia	5(20)	1(4)	0	0	6	12
Mild anaemia	7(28)	1(4)	0	1(4)	9	18
Mod anaemia	5(20)	4(16)	9(36)	0	18	36
Severe anaemia	2(8)	0	12(48)	3(12)	17	34
Total	19	6	21	4	50	100

Above table shows 10% of male did not suffer from anaemia (normal-Hb-M ≥13gm/dl,F≥12gm/dl), 14% male and 4% female suffer from mild anaemia (Hb-M-11 to <13 gm/dl, F- 11 to <12 gm/dl), 28% male and 8% female suffer from moderate anaemia (Hb-8 to <11 gm/dl), 28% male and 6% female suffer from severe anaemia (Hb-<8 gm/dl). So majority of study subjects suffer from moderate anaemia **(WHO/NMH/NHD/MNM/11.1 & NRHM'13)**. Range of Hb was 3.1 to 11.3 in IC patients and 6.8 to 16.2 in Non-IC patients. Mean Hb for IC was 7.672 and for Non-IC it was 11.224.Median Hb for Non-IC was 11.5 and that for IC was 7.4 respectively. Above table shows that Non-IC males had mild anaemia, Non-IC females had Moderate anaemia, IC males had Severe anaemia and IC females also had severe anaemia respectively.The S.D.and S.E. of mean were 2.4 and 0.49 for Non-IC and 1.94 and 0.38 for IC patients respectively.

Table 5b: Showing comparison of cases according to Haemoglobin (gm/dl) (n=50)

Anaemia	**Non-IC(%out of 25)**		**IC(%out of 25)**		**Total(n)**	
	Count	**%**	**Count**	**%**	**Count**	**%**
No	6	24	0	0	6	12
Yes	19	76	25	100	44	88
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0223					
P value summary	Significant					
Statistically significant?	Yes					

Table 5b showing Anaemia and occurrence of HIV-TB coinfection were found to be significantly related with each other. IC group is significantly more anaemic than Non-IC group. (Fisher's test, $p < 0.05$).

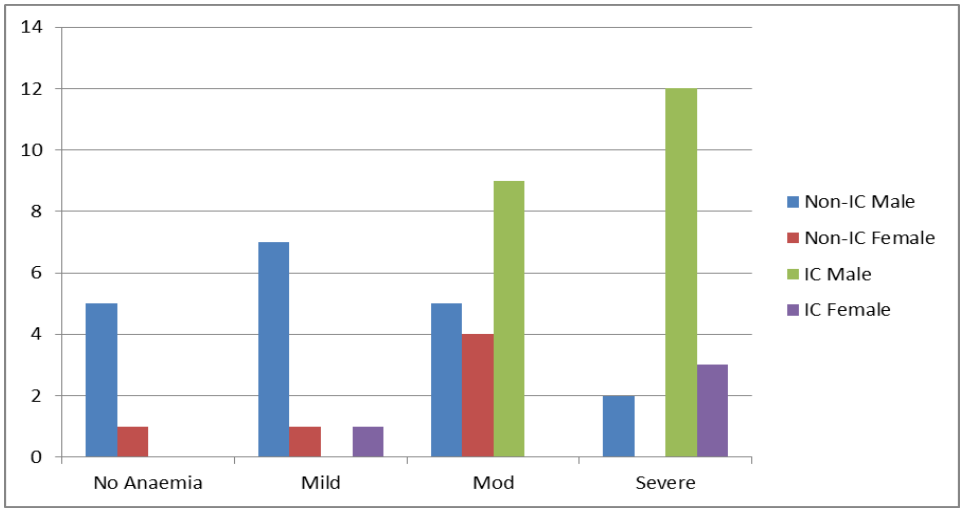

Figure 5: Bar-diagram showing distribution of cases according to Hb (gm/dl)

Table 6: Showing distribution of cases according to Albumin (gm/dl) (n=50)

Albumin	Non-IC(%out of 25)		IC(%out of 25)		Total(n)	
	Count	%	Count	%	Count	%
<3.5	15	60	24	96	39	78
3.5-5.0	10	40	1	4	11	22
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0046					
P value summary	Extremely significant					
Statistically significant?	Yes					

Table 6 shows among the case population 78% were hypoalbuminemic (<3.5 gm/dl), 22% had normal albumin levels (3.5-5 gm/dl). Albumin level was below 3.5gm/dl in IC patients(96%) as compared to Non-IC(60%). Range of albumin was 2.1 to 4.5 gm/dl in Non-IC while it was 1.9 to 3.7 in IC. Mean of albumin was 3.332 in Non-IC and 2.57 in IC. Median of albumin was 3.2 in Non-IC and 2.6 in IC respectively. The S.D and S.E of mean were 0.74 and 0.14 for Non-IC and 0.41 and 0.08 for IC patients respectively. Effect of HIV-TB coinfection on albumin level was found to be statistically significant. Hypoalbuminemia is significantly more common in IC group(Fisher's test, $p< 0.05$).

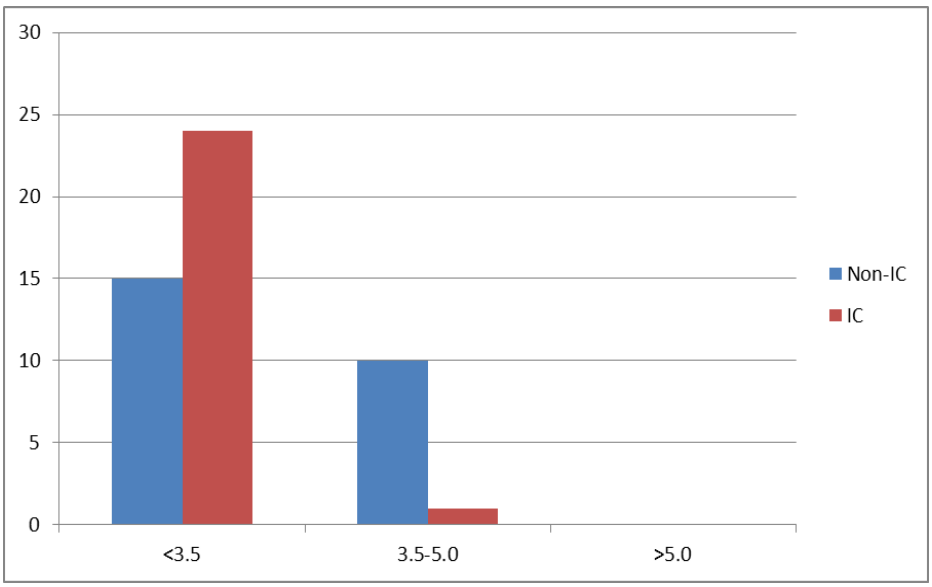

Figure 6: Bar diagram showing distribution of cases according to Albumin (gm/dl)

Table 7: Showing distribution of cases according to globulin (gm/dl) (n=50)

Globulin	Non-IC(%out of 25)		IC(%out of 25)		Total(n)	
	Count	%	Count	%	Count	%
≤ 3.5	15	60	24	96	39	78
>3.5	10	40	1	4	11	22
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0046					
P value summary	Extremely significant					
Statistically significant?	Yes					

Table 7 shows among the case population 54% had normal globulin (2-3.5 gm/dl) and 44% had hyperglobulinemia (>3.5 gm/dl). It also shows that 80% Non-IC patients had normal globulin level and 72% IC patients had hyperglobulinemia. Effect of HIV-TB coinfection on globulin level was found to be statistically significant. Hyperglobulinemia is significantly more common in IC group (Fisher's test, p< 0.05).

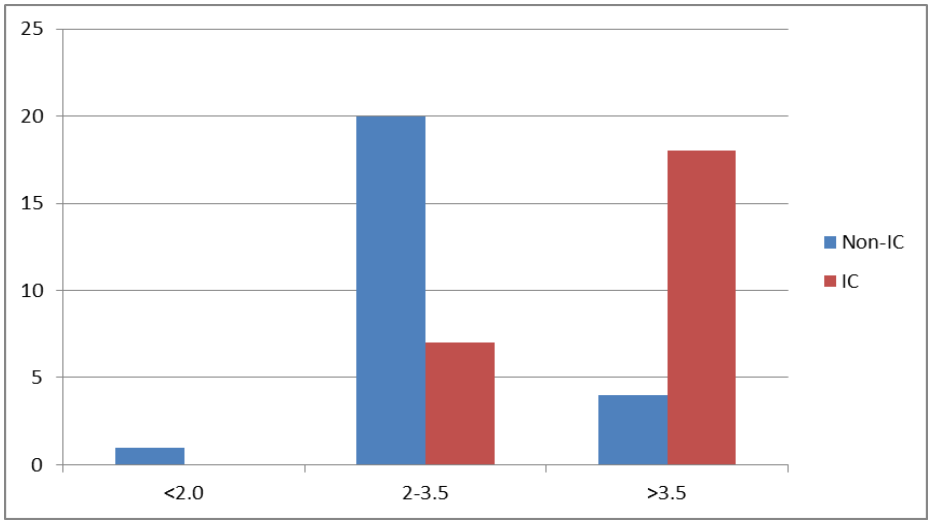

Figure 7: Bar diagram showing distribution of cases according to globulin.

Table 8a: Showing distribution of cases according to rise of SGPT in non-alcoholic infected patients (n=26)

SGPT	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Grade 0	13	76	2	22	15	58
Grade1/2	4	24	7	78	11	42
Total	17	100	9	100	26	100

Table 8b: Showing distribution of cases according to rise of ALP in non-alcoholic infected patients (n=26)

ALP	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Grade 0	11	65	2	22	13	50
Grade1/2	6	35	7	78	13	50
Total	17	100	9	100	26	100

The above tables shows distribution of raise in liver enzymes (SGPT and ALP) as per Grade [Acquired Immune Deficiency Syndrome (AIDS) Clinical Trials Group (CTG)]. Effect of HIV-TB coinfection on SGPT level was found to be statistically significant. SGPT level were higher in IC patients as compared to Non-IC patients (Fisher's test, p< 0.05).

In contrast to the results of SGPT level, effect of HIV-TB coinfection on ALP level was found to be statistically insignificant. (Fisher's test, p >0.05).

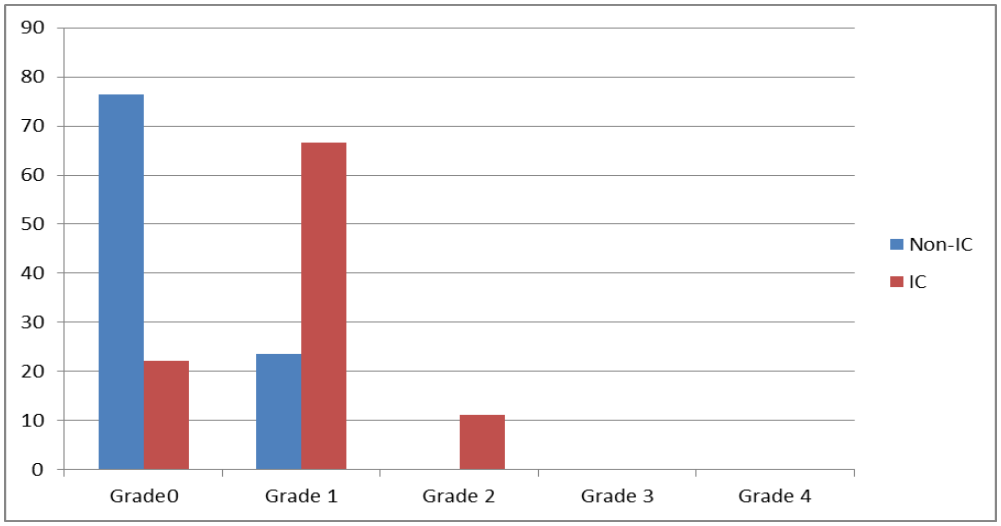

Figure 8(a): Bar diagram showing distribution of cases (%) according to SGPT level.

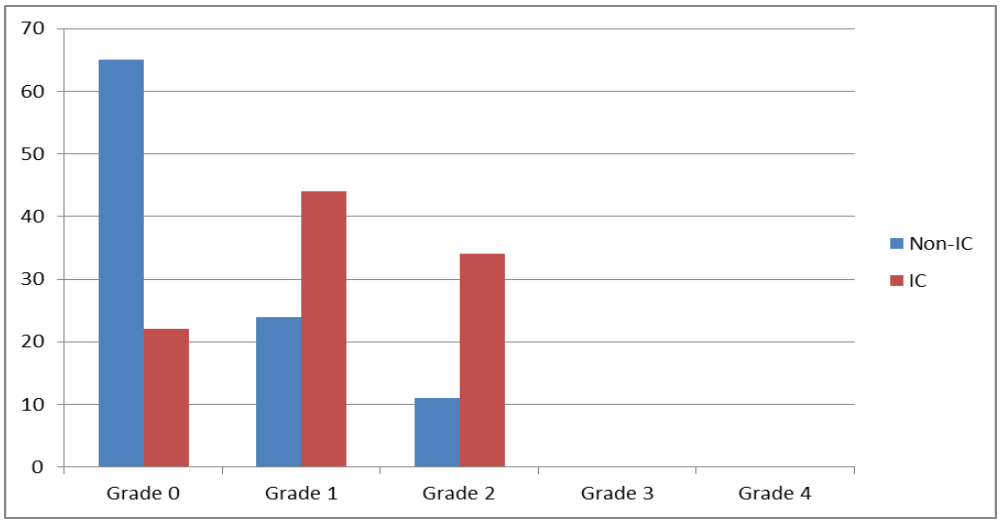

Figure 8(b): Bar diagram showing distribution of cases (%) according to ALP level.

Table 9: Showing presence of helminths in stool samples of patients (n=50)

Stool for OPC	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Absent	24	96	21	84	45	90
Strongyloides	0	0	2	8	2	4
Trichuris	1	4	1	4	2	4
Hookworm	0	0	1	4	1	2
Total	25	100	25	100	50	100
This table could not be analyzed since values in two categories are less than 5. Hence the data was presented as below for statistical analysis.						

Stool for OPC	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Absent	24	96	21	84	45	90
Present	1	4	4	16	5	10
Total	25	100	25	100	50	100

Above table shows Helminth was present in 16% immunocompromised patients. Strongyloides constituted maximum (8%) number of immunocompromised. Among the Strongyloides infested individuals mean CD4 was 25 with a range of 6 to 44. Stool for OPC and occurrence of HIV-TB coinfection were not found to be significantly related with each other. (Fisher's test, $p > 0.05$).

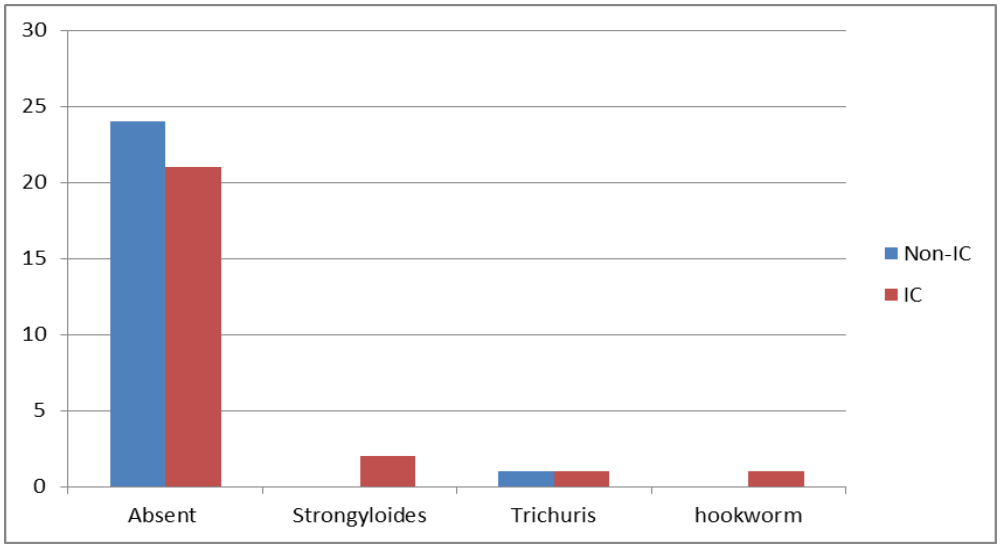

Figure 9: Bar-diagram showing presence of helminths in stool samples of patients.

Table 10: Showing distribution of cases according to type of tuberculosis (n=50)

Type of TB	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
PTB	7	28	2	8	9	18
EPTB	12	48	9	36	21	42
DTB	6	24	14	56	20	40
Total	25	100	25	100	50	100

Table 10 showing Extra-Pulmonary tuberculosis is the most common with 42% cases. Pulmonary and Disseminated tuberculosis were present respectively in 18% and 40% cases. Most common form was EPTB (48%) in Non-IC patients and DTB (56%) in IC patients.

Table 10a: Showing distribution of cases according to type of tuberculosis (n=50)

	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Pulmonary	7	28	2	8	9	18
Non-pulmonary	18	72	23	92	41	82
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.1383					
P value summary	Not significant					
Statistically significant?	No					

In IC patients Non-pulmonary TB is insignificantly correlated (Fisher's test, p>0.05)

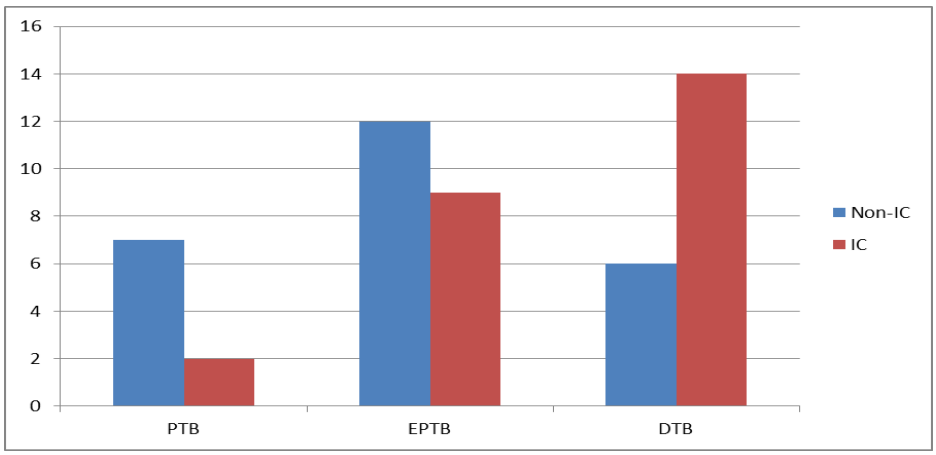

Figure 10: Bar-diagram showing distribution of cases according to type of tuberculosis.

Table 11: Showing distribution of cases according to site of EPTB (n=21)

	Non-IC(%out of 12)	IC (%out of 9)	Total (n)	Percentage%
LN	3(25)	4(44.44)	7	33.33
TBM	1(8.33)	3(33.34)	4	19.04
Abd	0	1(11.11)	1	4.77
Pleu Eff	8(66.67)	1(11.11)	9	42.86
Total	12	9	21	100

This table could not be analysed since value in one category is less than 5.

Table 11 shows that pleural effusion is most common (42.86%) amongst the EPTB followed by Lymph node Tb (33.33%) and TBM (19.04%).Pleural effusion(66.67%) is more common in Non-IC patients.TBM(33.34%) and Abdominal Tb(11.11%) is more common in IC patients.

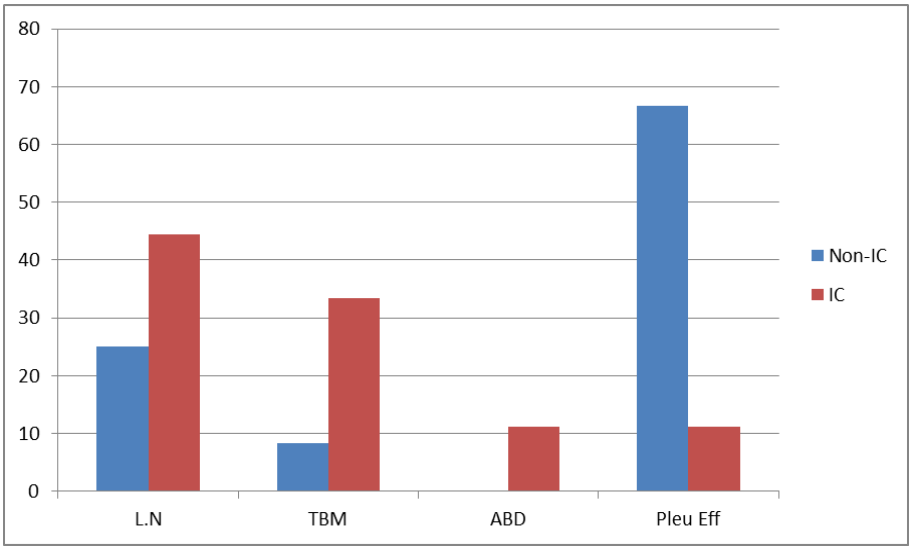

Figure 11: Bar-diagram showing distribution of cases (%) according to site of EPTB

Table 12: Showing distribution of cases according to site of DTB (n=20)

	Non-IC(% out of 6)	IC(% out of 14)	Total(n)	Percentage
PTB+Abd.	2(33.32)	3(21.43)	5	25
PTB+Pl.eff	0	1(7.14)	1	5
PTB+Pl.eff+LN	0	1(7.14)	1	5
PTB+Abd+LN	1(16.67)	0	1	5
LN+Abd	1(16.67)	6(42.86)	7	35
TBM+Spinal+Pl.eff	1(16.67)	0	1	5
Abd+Pl.eff	1(16.67)	2(14.29)	3	15
Pl.eff+LN	0	1(7.14)	1	5
Total	6	14	20	100

The above table shows that most common form of DTB in IC patient was LN+Abd (42.86%).Most common form of DTB in Non-IC patient was PTB+Abd (33.32%).

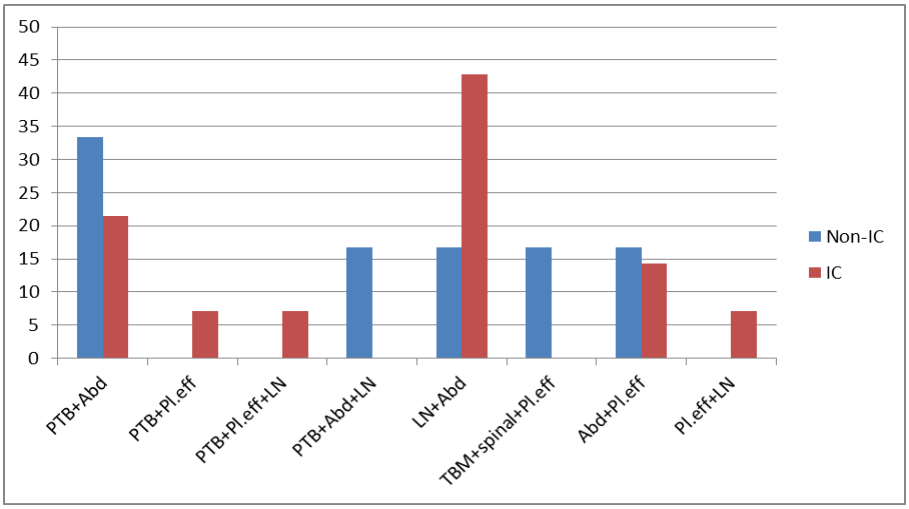

Figure 12: Bar-diagram showing distribution of cases (%) according to site of DTB.

Table 13: Showing distribution of cases according to Sputum positivity for AFB(n=50)

Sputum positivity for AFB	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Positive	6	24	5	20	11	22
Negative	19	76	20	80	39	78
Total	25	100	25	100	50	100

Table 13 shows sputum positivity was present only in 22% cases whereas most of the cases were sputum negative 78%.It includes all types of TB.80% of IC patients were sputum negative and 24% of Non-IC patients were sputum positive. There is no statistical difference of sputum positivity in AFB between immunocompromised and immunocompetent groups as per the result of Fisher's test ($p > 0.05$).

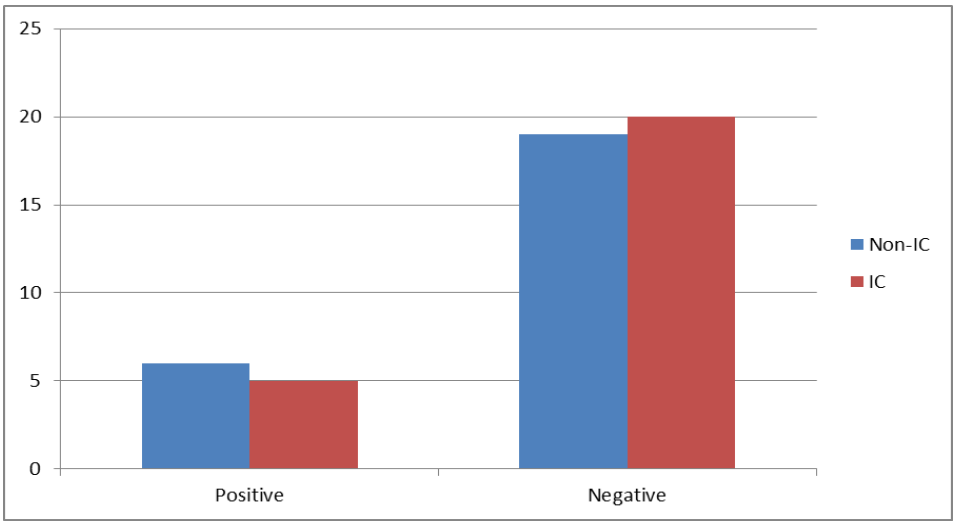

Figure 13: Bar-diagram showing distribution of cases according to Sputum positivity for AFB.

Table 14: Showing correlation of sputum positivity with CD4 count(n=25)

Sputum positivity with CD4 count	Positive		Negative		Total	
	Count	%	Count	%	Count	%
<200	5	20	16	64	21	42
200-350	0	0	3	12	3	6
>350	0	0	1	4	1	2
Total	5	20	20	80	25	50
This table could not be analysed since values in some categories are less than 5. Hence the data was presented as below.						

Sputum positivity with CD4 count	Positive		Negative		Total	
	Count	%	Count	%	Count	%
<200	5	20	16	64	21	84
≥ 200	0	0	4	16	4	16
Total	5	20	20	80	25	100

Table 14 shows that most of the sputum negative cases (64%) had CD4 count below 200cells/µl.20% of all cases are sputum positive and has CD4 count below 200cells/µl.Sputum positivity has no correlation with the CD4 count.($p > 0.05$)

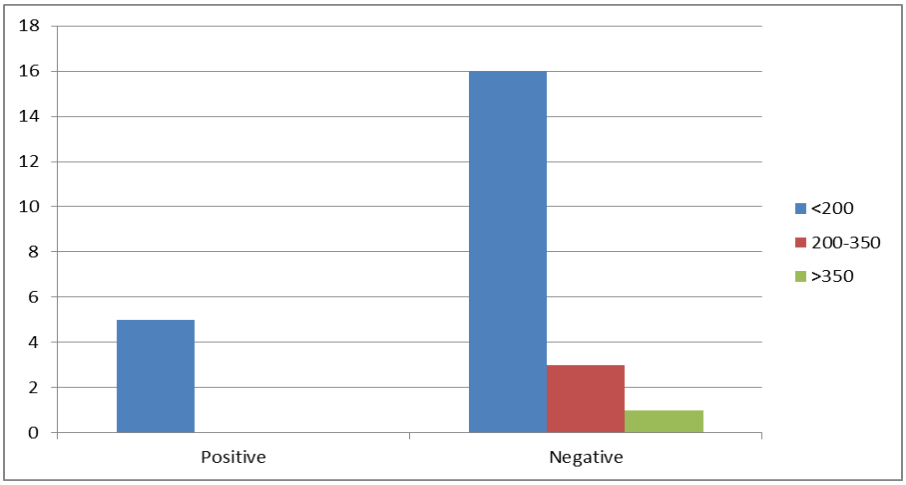

Figure 14: Bar-diagram showing correlation of sputum positivity with CD4 count

Table 15: Showing the Line Probe Assay Distribution (n=11)

Line probe assay	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Sensitive	5	83	4	80	9	82
Resistant	1	17	1	20	2	18
Total	6	100	5	100	11	100
Fisher's exact test: P value	1					
P value summary	Not significant					
Statistically significant?	No					

Above table shows that 82% sputum positive cases are sensitive to rifampicin and isoniazid in LPA while 18% cases are resistant to it. Resistance to rifampicin and isoniazid by line probe technique is 20% in IC patients and 17% in Non-IC TB patients. The resistance of isoniazid and rifampicin is not statistically significant in both Immunocompromised and Immunocompetent patients (Fisher's test, $p > 0.05$).

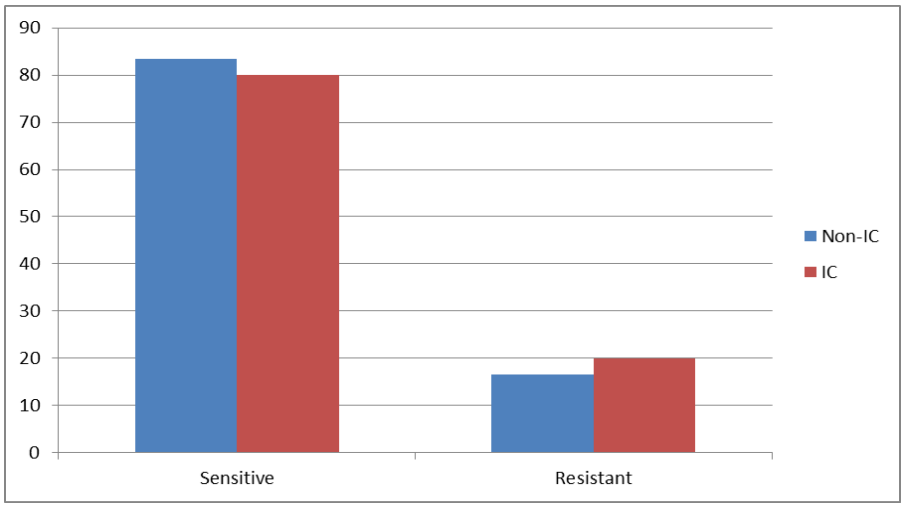

Figure 15: Bar-diagram showing distribution of cases (%) according to LPA method.

Table 16: Showing distribution of cases according to site of LN swelling (n=17)

	Non-IC(%out of 5)	IC(%out of 12)	Total(n)	Percentage%
Cervical	3(60)	8(66.67)	11	64.71
Axillary	0	2(16.67)	2	11.77
Supraclavicular	1(20)	0	1	5.88
Axill/Cer	0	1(8.33)	1	5.88
Cer/Sup	1(20)	0	1	5.88
Abdominal	0	1(8.33)	1	5.88
Total	5	12	17	100

Above table showing most common site being cervical lymph nodes (64.71%). Axillary, supraclavicular were present respectively in 11.77% and 5.88% cases. This includes both EPTB and DTB. Cervical lymphadenopathy (66.67%) is more common in IC patient. Cervical lymphadenopathy is present in 60% Non-IC patient.

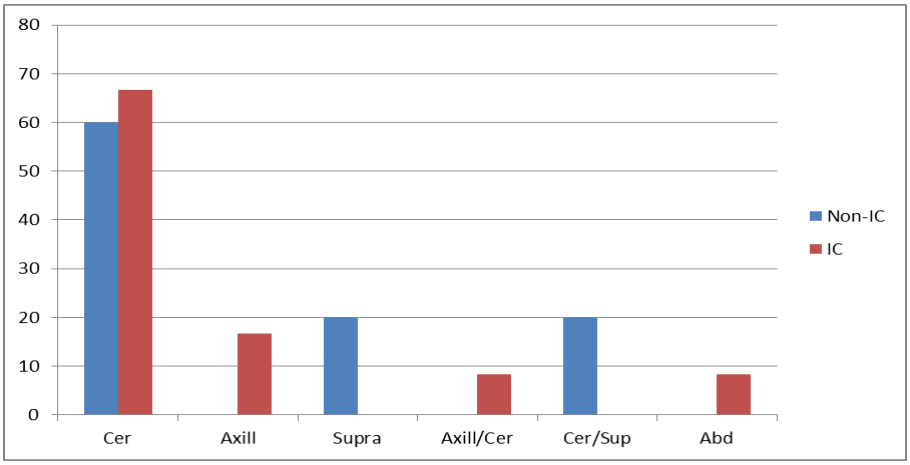

Figure 16: Bar-diagram showing distribution of cases (%) according to site of LN Swelling.

Table 17: Showing distribution of cases according to AFB positivity in FNAC (n=17)

	Non-IC(%out of 5)	IC(%out of 12)	Total(n)	Percentage%
Cervical	1(20)	4(33.34)	5	29.41
Axillary	0	1(8.33)	1	5.88
Supclavicular	1(20)	0	1	5.88
Abdominal	0	1(8.33)	1	5.88
Absent	3(60)	6(50)	9	52.95

Above table shows that 29.41% patients had AFB positive smears in cervical LN and majority of them are immunocompromised patients. Irrespective of immune status majority of the patients did not show AFB in smear (52.95%).

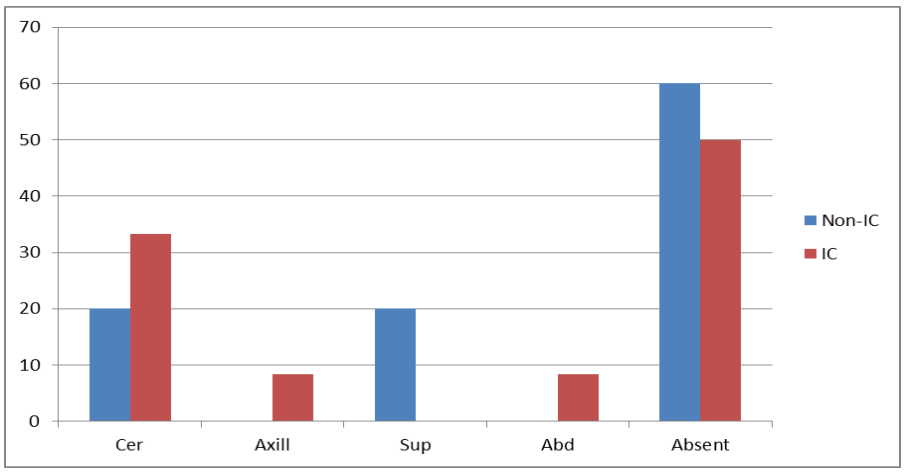

Figure 17: Bar-diagram AFB positivity in FNAC.

Table 18: Showing correlation of smear positivity (FNAC) with CD4 count (n=12)

	<200(% out of 12)	200-350(% out of 12)	>350(% out of 12)
Cervical	3(25)	1(8.33)	0
Axillary	1(8.33)	0	0
Abdominal	1(8.33)	0	0
Absent	6(50)	0	0

The above table shows that cervical(25%), abdominal (8.33%) and axillary (8.33%) smear positivity (FNAC) is present with CD4 count less than 200 cells/µl. Around 50% patients had negative smear(FNAC) with CD4 count less than 200cells/µl.

Table 18a: Correlation of FNAC with CD4 count.

FNAC smear positivity with CD4 Count	<200		≥ 200		Total	
	Count	%	Count	%	Count	%
Present	5	42	1	8	6	50
Absent	6	50	0	0	6	50
Total	11	92	1	8	12	100
Fisher's exact test: P value	1					
P value summary	Not significant					
Statistically significant?	No					

FNAC smear positivity has no significant correlation with CD4 count(Fisher's exact test ,p>0.050).

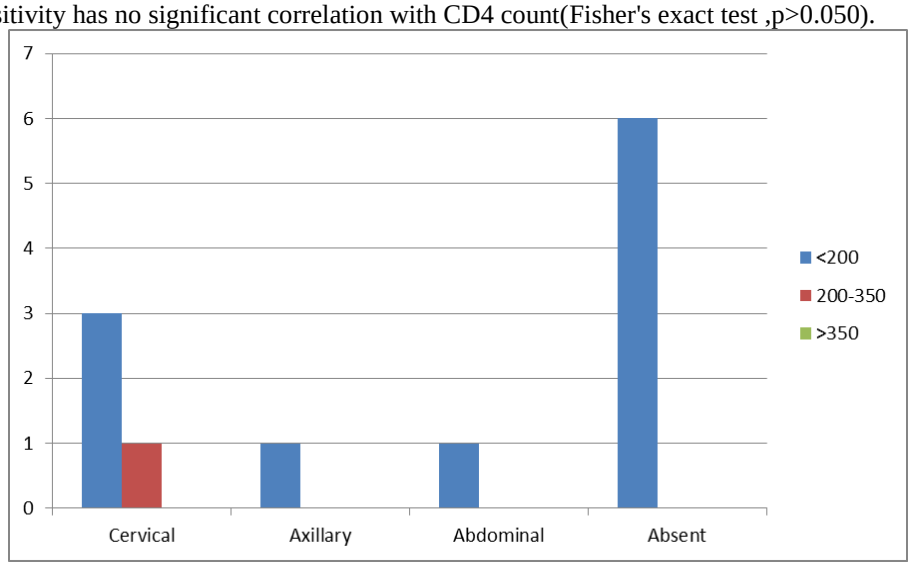

Figure 18: Bar- diagram showing correlation of smear positivity (FNAC) with CD4 count.

Table 19: Showing distribution of CD4 in IC patients(n=25)

	Total	Percentage%
<200	21	84
200-350	2	8
>350	2	8

Above table shows among the immunocompromised population 84% had CD4 count below 200 cells/µl and only 8% had CD4 count in the 200-350 cells/µl range.8% have CD4 more than 350 cells/µl. Range of CD4 cell count was 2 to 426 cells/µl. Mean CD4 was 122.16 cells/µl and S.D. and S.E. of mean were 99.41 and 19.88 respectively. Median CD4 count was 99 cells/µl.

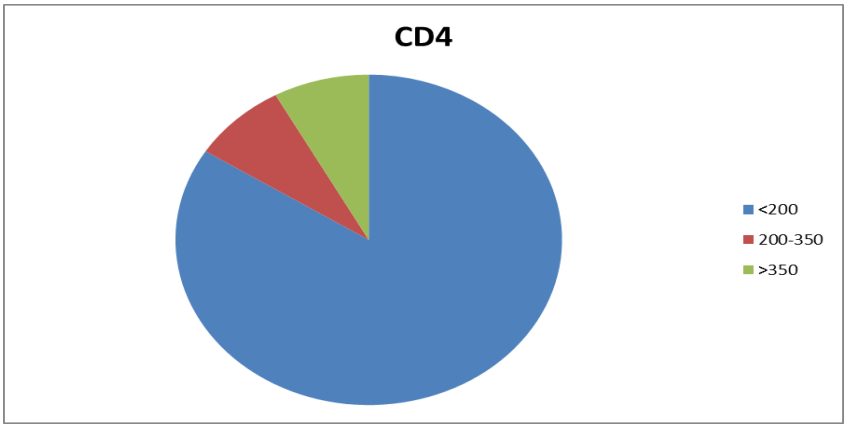

Figure 19: Bar-diagram showing distribution of CD4 in IC patients.

Table 20: Showing distribution of cases according to interrelation of CD4 counts with type of TB (PTB, EPTB, DTB) (n=25)

	No. of cases	Mean CD4 count(cells/µl)	Median CD4 count(cells/µl)	SD	SE of mean
PTB	2	29	29	21.21	15
EPTB	9	176.77	134	111.43	37.14
DTB	14	100.35	89	81.59	21.8

Above table shows mean CD4 count was maximum for EPTB and minimum with PTB (176.77 and 29 respectively).The range of CD4 count was 2 to 426cells/µl.

Table 20a: Showing correlation of PTB with CD4 count(n=25)

PTB	< 200		≥ 200		Total	
	Count	%	Count	%	Count	%
Yes	2	8	0	0	2	4
No	23	92	25	100	48	96
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.4898					
P value summary	Not significant					
Statistically significant?	No					

PTB shows statistically insignificant correlation with CD4 count (Fisher's test, p> 0.05).

Table 20b: Showing correlation of EPTB with CD4 count(n=25)

EPTB	< 200		≥ 200		Total	
	Count	%	Count	%	Count	%
Yes	6	24	3	12	9	18
No	19	76	22	88	41	82
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.4635					
P value summary	Not significant					
Statistically significant?	No					

EPTB shows statistically insignificant correlation with CD4 count (Fisher's test, p> 0.05).

Table 20c: Showing correlation of DTB with CD4 count (n=25)

DTB	< 200		≥ 200		Total	
	Count	%	Count	%	Count	%
Yes	13	52	1	4	14	28
No	12	48	24	96	36	72
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0003					
P value summary	Extremely significant					
Statistically significant?	Yes					

DTB is significantly more common in patients with CD4 count <200 cells/µl (Fisher's test, p< 0.05).

Table 21: Showing distribution of cases according to chest x ray findings(n=50)

Chest x ray findings	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Infiltration	4	16	5	20	9	18
Consolidation	7	28	0	0	7	14
Cavity	*0*	*0*	*1*	4	1	2
Pleural effusion	10	40	5	20	15	30
Normal	4	16	14	56	18	36
Total	25	100	25	100	50	100
This table could not be analysed since values in some categories are less than 5. Hence the data was presented as below.						

Chest X ray findings	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Abnormal	21	84	11	44	32	64
Normal	4	16	14	56	18	36
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0072					
P value summary	Extremely significant					
Statistically significant?	Yes					

The above table shows that most common finding in Chest X ray is Pleural effusion(40%) followed by consolidation(28%) and infiltration(16%) in Non-IC patients.56% of the Chest X ray were normal in IC population followed by pleural effusion(20%) and infiltration(20%).4% of IC patients had cavitatory lesion. Chest X ray findings were found to be related with presence of HIV-TB coinfection in patients. Non-IC group has significantly more chances of having abnormal chest X ray(Fisher's test, p <0.05).

Table21a: Showing distribution of cases according to consolidation in chest x ray(n=50)

Consolidation	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Yes	7	28	0	0	7	14
No	18	72	25	100	43	86
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.0096					
P value summary	Extremely significant					
Statistically significant?	Yes					

Consolidation is present significantly more in non-immunocompromised patients(Fisher's test, p< 0.05)

Table21b: Showing distribution of cases according to consolidation in chest x ray(n=50)

Pleural effusion	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Yes	10	40	5	20	15	30
No	15	60	20	80	35	70
Total	25	100	25	100	50	100
Fisher's exact test: P value	0.7252					
P value summary	Not significant					
Statistically significant?	No					

Pleural effusion is statistically not significant in IC and Non-IC patients (Fisher's test, p> 0.05)

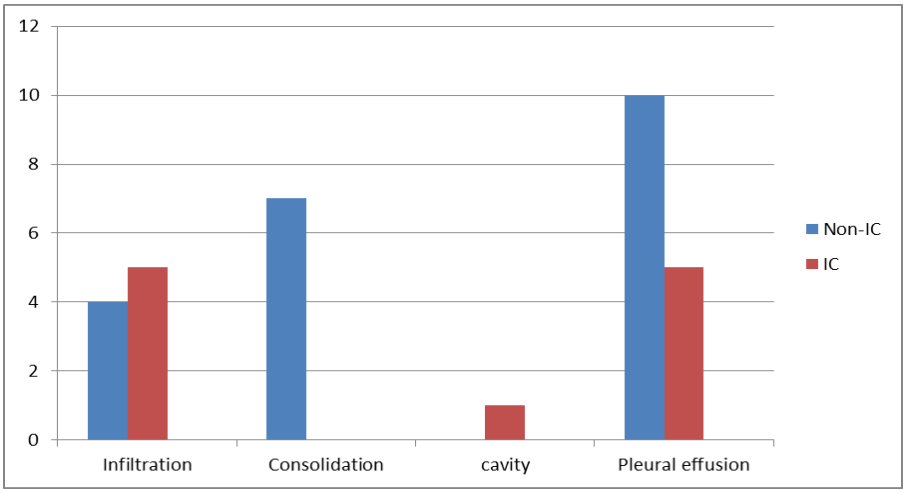

Figure 21: Bar-diagram showing distribution of cases according to chest X ray findings.

Table 22 : Showing distribution of cases according to chest X ray findings with sputum positivity(n=50)

	Non-IC		IC	
	Sputum +ve (% out of 6)	Sputum –ve (% out of 19)	Sputum +ve (% out of 5)	Sputum –ve (% out of 20)
Infiltration	2(33.33)	2(10.52)	4(80)	1(5)
Consolidation	4(66.67)	3(15.79)	0	0
Cavity	0	0	1(20)	0
Pleural effusion	0	10(52.64)	0	5(25)
Normal	0	4(21.05)	0	14(70)

The above table shows that 66.67% of sputum positive Non-IC patients had Consolidation on X ray and 33.33% patients had infiltration on X ray while 52.64% sputum negative Non-IC patients presented with pleural effusion.70% of sputum negative IC patients X ray was normal while 80% IC sputum positive presented with infiltration on Chest X ray. Consolidation was conspicuously absent in IC patients.

Table 22a: Showing distribution of cases according to chest X ray findings with sputum positivity in Non-IC(n=25)

Chest X ray findings in Non-IC patients	Sputum Positive		Sputum Negative		Total	
	Count	%	Count	%	Count	%
Abnormal	6	100	15	79	21	84
Normal	0	0	4	21	4	16
Total	6	100	19	100	25	100
Fisher's exact test: P value	0.5404					
P value summary	Not significant					
Statistically significant?	No					

Relation between Chest X ray findings and sputum positivity in Non-IC patients was found to be insignificant (Fisher's test, p >0.05).

Table 22b: Showing distribution of cases according to chest X ray findings with sputum positivity in IC(n=25)

Chest x ray findings in IC patients	Sputum Positive		Sputum Negative		Total	
	Count	%	Count	%	Count	%
Abnormal	5	100	6	30	11	44
Normal	0	0	14	70	14	56
Total	5	100	20	100	25	100
Fisher's exact test: P value	0.0087					
P value summary	Extremely significant					
Statistically significant?	Yes					

In contrast to the non-IC patients, IC patients showed statistically significant relation between their Chest X ray findings and sputum positivity. Patients having sputum positivity has a high chance of having abnormal chest X ray in IC group (Fisher's test, p <0.05).

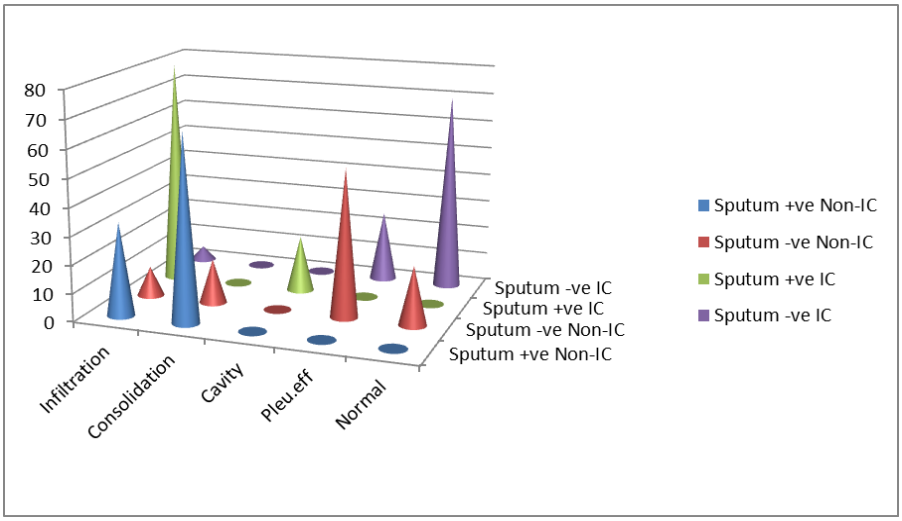

Figure 22: Bar-diagram showing distribution of cases (%) according to chest X ray findings with sputum positivity.

Table 23: Showing Chest X ray finding correlation with CD4 count in IC patients (n=25)

	<200(% out of 25)	200-350(% out of 25)	>350(% out of 25)
Infiltration	5(20)	0	0
Consolidation	0	0	0
Cavity	1(4)	0	0
Pleural effusion	3(12)	2(8)	0
Normal	12(48)	1(4)	1(4)

Table 23a: Showing Chest X ray finding correlation with CD4 count in IC patients (n=25)

Chest x ray findings& CD4 count	<200		≥200		Total	
	Count	%	Count	%	Count	%
Abnormal	9	36	2	8	11	44
Normal	12	48	2	8	14	56
Total	21	84	4	16	25	100
Fisher's exact test: P value	0.5165					
P value summary	Not significant					
Statistically significant?	No					

Above table shows that most common presentation was normal chest X ray(48%) when the CD4 count was below <200cells/µl followed by infiltration(20%). Chest x ray findings& CD4 count in IC patients were found to be insignificantly related with each other according to Fisher's test (p = 0.5165).

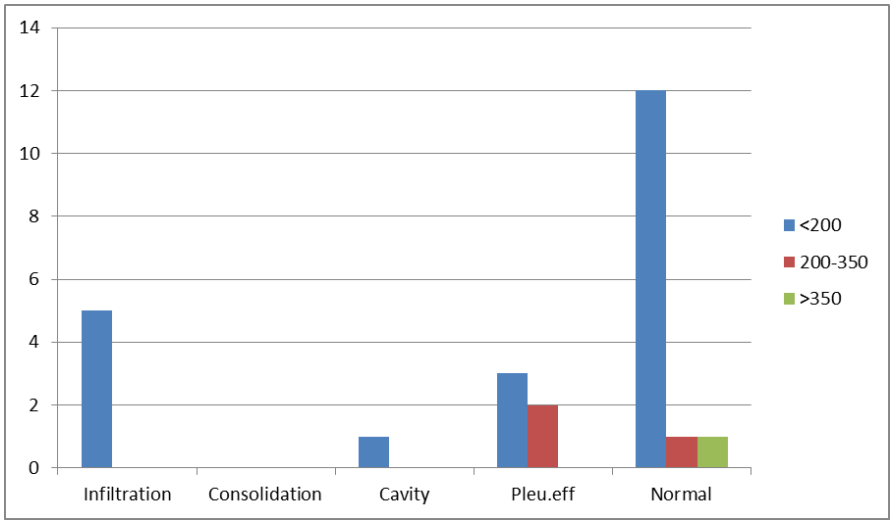

Figure 23: Bar-diagram showing Chest x ray finding correlation with CD4 count.

Table 24: Showing distribution of cases according to USG findings(n=50)

	Non-IC (%out of 25)	IC (%out of 25)	Total(n)	Percentage%
Pleural effusion	10(40)	5(20)	15	30
RPLN	0	1(4)	1	2
Hepatomegaly	3(12)	0	3	6
RPLN+Asc	1(4)	0	1	2
Hep+RPLN	1(4)	3(12)	4	8
HSM+Asc	0	2(8)	2	4
Hep+Asc	0	1(4)	1	2
HSM+RPLN	1(4)	4(16)	5	10
HSM	0	1(4)	1	2
Normal	9(36)	8(32)	17	34

(RPLN-Retroperitoneal lymph node; HSM-Hepatosplenomegaly; Hep-Hepatomegaly; Asc-Ascites)

Table 24a: Showing distribution of cases according to USG findings(n=50)

USG findings	Non-IC		IC		Total	
	Count	%	Count	%	Count	%
Abnormal	16	64	17	68	33	66
Normal	9	36	8	32	17	34
Total	25	100	25	100	50	100
Fisher's exact test: P value	1.000					
P value summary	Not significant					
Statistically significant?	No					

Above table shows that pleural effusion is more common in Non-IC(40%) as compared to IC(20%) patients. Hepatosplenomegaly + RPLN is more common in IC (16%) patients as compared to Non-IC(4%) patients. Relation between USG findings and disease condition (IC and non-IC) was found to be statistically insignificant according to Fisher's exact test (p = 1)

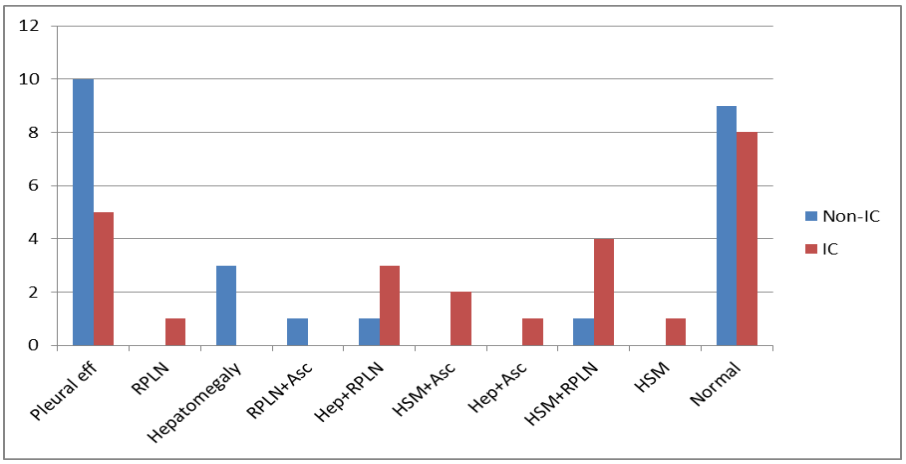

Figure 24: Bar-diagram showing distribution of cases according to USG findings.

Table 25: Showing USG finding correlation with CD4 count in IC patients (n=25)

	<200 (% out of 25)	200-350 (% out of 25)	>350 (% out of 25)
Pleural effusion	3(12)	2(8)	0
RPLN	1(4)	0	0
Hep+RPLN	3(12)	0	0
HSM+Asc	2(8)	0	0
Hep+Asc	1(4)	0	0
HSM+RPLN	4(16)	0	0
HSM	1(4)	0	0
Normal	6(24)	1(4)	1(4)

(RPLN-Retroperitoneal lymph node;HSM-Hepatosplenomegaly ;
Hep –Hepatomegaly;Asc- Ascites)

Table 25a: Showing USG finding correlation with CD4 count in IC patients (n=25)

USG findings&CD4 count	<200		≥200		Total	
	Count	%	Count	%	Count	%
Abnormal	15	60	2	8	17	68
Normal	6	24	2	8	8	32
Total	21	84	4	16	25	100
Fisher's exact test: P value	0.5700					
P value summary	Not significant					
Statistically significant?	No					

Above table shows that retroperitoneal lymph node, ascites+hepatomegaly and hepatosplenomegaly are seen at CD4 count less than 200cells/µl.Pleural effusion is most common finding if CD4 count is less than 350cells/µl. USG findings & CD4 count in IC patients were found to be insignificantly related with each other.

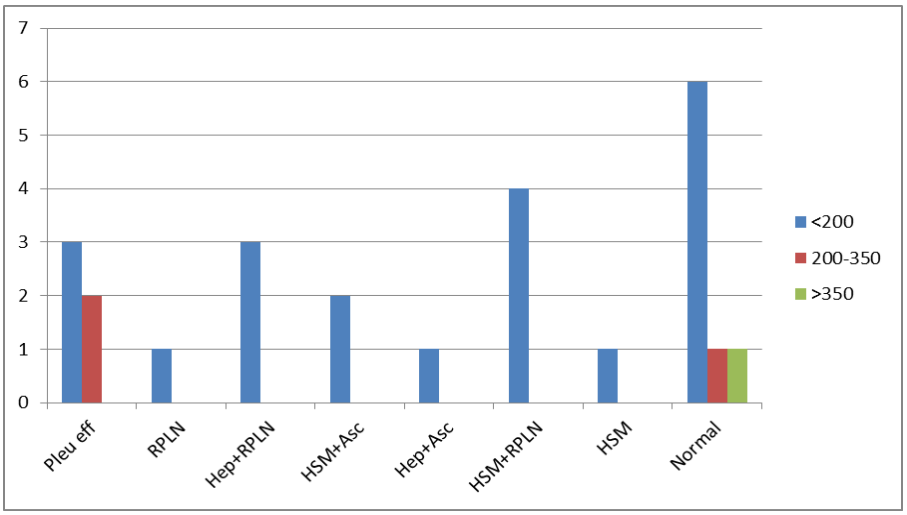

Figure 25: Bar-diagram showing USG finding correlation with CD4 count in IC patients.

DISCUSSION

This observational study has been done to show the spectrum of Tuberculosis, its' clinical presentation, smear positivity in sputum & lymph node FNAC among both Immunocompromised and Immunocompetent patients. We have also screened the positive sputum samples for INH & RMP resistance by line probe assay in both group. Total 50 patients of tuberculosis were taken (IC-25, Non-IC-25), according to selection criteria for this study. Patients were taken from indoor & outdoor of School of Tropical Medicine, Kolkata and Department of Chest Medicine, Medical College, Kolkata.

All data were collected, compiled and was subjected to suitable statistical analysis by using appropriate statistical methods. The computer software SPSS version 17.0 and Microsoft Office Excel 2007 were used for statistical analysis. Simple statistical tools like Mean, Median, Standard deviation, standard error of mean, Fisher's exact test: P value and chi-square test were used for calculation. Statistical analysis was done by two way ANOVA.

Age & Sex

In this study, most common age for Non-IC patients was 39-48 and for IC patients was 29-38. Mean Age was 35.08 in IC patients and 38.36 in Non-IC patients. The Median age was 39 for Non-IC patients and 37 for IC patients. The S.D and S.E of mean were 13.97 and 2.79 for Non-IC and 7.15 and 1.43 for IC patients respectively. Difference between distribution of patients in IC and non-IC groups was found to be statistically insignificant. Effect of age on the distribution of patients was found to be statistically significant.

In this study, 76% of patients in Non-IC group are males and only 24% are females. It also shows that 84% of patients in IC group were males and 16% were females. Male population constituted 80% of total patients compared to 20% female population. Gender and occurrence of HIV-TB co-infection were not found to be significantly. Lesser number of females may be due to under reporting, lesser sexual promiscuity among Indian females & lesser attendance of female patients in health care system.

In a study of *Carvalho BM.; Monteiro AJ.; Neto RJP.; Grangeiro TB.; Frota CC* et al[8] a total of 171 confirmed HIV/TB co-infected cases were reviewed, 139 of which were men (81.3%, p=0.0006) and 137 were between 27 and 49 years old (80.6%). The age of patients ranged from 16 to 78 years old.

Male gender, advanced age, not being married and low educational levels were all positively correlated with the risk of developing active TB.

Kerr-Pontes L.R.S., Oliveira F.A.S., Freire et al[9] and Henn L., Nagel F., Dal Pizzol F.et al[10] also reported that male gender was a high risk factor for developing active TB.

In addition, there were more men with registered cases of TB without HIV, at a ratio of 2:1 men to women.[11] It is not known whether the predominance in males was due to the lack of official records for women, due to differences in social behaviour or to poor health public services, or a combination of both.

In a study of *R. Prasad, J.K. Saini, R. Gupta* et al[12], majority (87%) of HIV seropositive and 59% of HIV seronegative patients belonged to the 21-40 years age group. This is sexually active age and also the most productive in one's life. Of all the HIV seropositive patients, 80.6% were males while, among HIV seronegatives, 69% were males. The striking male predominance noted in the present study has also been observed by other workers in India[13-16] and abroad.[17-19]

In a study *Abhijit Mukherjee, Indranil Saha, Anirban Sarkar, Ranadip Chowdhury et al*[20] among the total of 3605 Non-HIV patients, 2498 (69.3%) were male and 1107 (30.7%) were female with an overall male female ratio of 2.25:1. The proportion of male patients notified was significantly higher than females (Z=21.59, *P*<0.001). The mean ages of males and females were 43.7 ± 17.6 and 36.3 ± 16.9 years respectively with a significant difference (Student *t*-test=11.79, *P*<0.001).

In the below 20 years age group, the notification rates in both the sexes were similar. With increasing age the notification rate among males increased with the highest notification rates seen among males in the age group of 60 years and above.

Marital, Educational & Socio-economical status

In the present study, 74% of case population were married, 24% unmarried and 2% divorced. 80% of IC patients were married and 32% of Non-IC patients were unmarried.16% of IC patients were unmarried. Effect of marital status on prevalence of HIV-TB coinfection was found to be statistically insignificant. Also, 54 % were literate and 46 % were Illiterate. It also shows that 68% of Non-IC patients were Literate as compared to 40% IC patients. Literacy status and occurrence of HIV-TB coinfection were not found to be significantly related with each other. Illiterates are more exposed to HIV may be due to the fact that they are not using barrier contraceptives due to lack of knowledge.

Our study shows that 60% belongs to lower socio-economic class and 36% belongs to middle socio-economic class in the Non-IC patients.92% of the IC patients were from Lower socio-economic class. This may due the reason that due to social stigma patients of upper class usually avoid government sector hospital for treatment.Prevalence of HIV-TB coinfection was found to be significantly more in lower socioeconomic status.

In a study of *Shaikh Mohsin, Misra Shobha, Rakesh Shah Sunil Nayak* et al[21] for HIV patients 92% patients were literate. 87 % of HIV positive patients were married.

In the study of *Carvalho BM.; Monteiro AJ.; Neto RJP.; Grangeiro TB.; Frota CC* et al[8] for HIV patients the cases were mostly single (67.74%). The educational level of 146 patients, as well as household size (number of adults) and income were included in the study. Educational level is traditionally used as an indicator of socio-economic level. Patients with a lower educational level had a higher risk of developing TB (87.9%, p<0.0001, relative risk = 2.3633).

In a study of *Chengchao Zhou,Jie Chu, Jinan Liu* et al[22]A total of 314 confirmed smear positive PTB patients (Non-IC) were enrolled in a 2.5 months study period. The age of the study participants ranged from 15 to 70 years, with a mean age of 31.8 years. About 63% were the male. With regards to education, 19% were with primary education or illiterate, 40% with junior education and 41% with senior education and above. 45% of the respondents were single (never-married), while 52% were married, 4% divorced or widowed.\

In a **study by *Patel AK., Thakrar SJ., Ghanchi FD* et al[23] on HIV/TB co-infection there were 41 (82%) males and nine (18%) females. Thirty-eight patients (76%) were married (among** which four had second marriage), eight (16%) were unmarried, two (4%) were widow, one (2%) was widower, and one (2%) was divorced.

Occupation

In our study, most of the Non-IC male patients were farmer (26.31%) by occupation. It also shows that most of the IC male patients were farmer (23.80%) by occupation followed by drivers (19.04%) and Carpenters (14.28%). Most of the Non-IC female patients were housewife (66.66%) and most of the IC female patients were CSW (75%).

In a study of S *Shaikh Mohsin, Misra Shobha, Rakesh Shah Sunil Nayak* et al[21] for HIV patients,majority of female patients (80%) were housewives while majority of males were involved in high risk occupations like

truck driving, auto driving, call centre job, sales work etc.

In a study by *Patel AK., Thakrar SJ., Ghanchi FD* et al[23] on HIV/TB co-infection,thirty percent of patients were farmers while manual labourers and transport drivers accounted for 22% and 16% respectively.

Rural –Urban distribution

In this study, urban population (Kolkata) was 40% which was greater than any single rural or district population. This may be due to the fact that centre of study is in Kolkata so the patient staying nearby visit hospital more than those staying far away. But overall rural population shows 60% which was greater than the urban population. 36% of IC patients were from urban areas and 64% were from rural area.44% of Non-IC patients were from urban area and 56% were from rural areas.

In a study of *R. Prasad, J.K. Saini, R. Gupta* et al[12], among HIV seropositive patients, 16 (51.6%) belonged to urban areas and 15 (48.4%) were from the rural areas. Among HIV seronegatives, 549 (51.1%) belonged to urban areas and 525 (48.9%) were from the rural areas.

Religion

Our study shows that 72% of total case population were Hindu and 28% Muslim. 68% of Non-IC patients and 76% of IC patients are Hindu. Religion and occurrence of HIV-TB coinfection were not found to be significantly related with each other.This may be due to reflection of ratio of Hindu and Muslim within the population in this state.

Addiction

In our study, 26% had no addiction, 20% had addiction for alcohol only, 8% had addiction for tobacco only and 4% had addiction for Smoke + tobacco + alcohol. Other types of addiction such as injection drug, cocaine or ganja etc. cannot be elicited. 28% of IC patients were alcoholic and 28% were alcoholic + smoker. Most of the Non-IC patients were having no addiction (40%) as compared to IC patients (12%). Addiction and occurrence of HIV-TB coinfection were not found to be significantly related with each other.

In the study of *Arslan Ahmad Salam, Sana Rehman* et al[24], among 202 TB cases, 35(30.2%) males and 5(5.8%) females were addicted to tobacco, 4(3.4%) males were drug addicts and only 1(1.2%) female was drug addict. Eight (6.9%) males were addicted to both tobacco and drugs. Of the tobacco addiction 43(37.1%) males and 5(5.9%) females used cigarettes, 2(1.7%) males used sheesha and 7(6.0%) males and 2(2.4%) females used huqqa.The prevalence of smoking among patients with TB is generally high and the development of tuberculosis due to tobacco use is 54.2%. In the present study only 19.8% cases who had tuberculosis were addicted to tobacco. After tobacco addiction, cocaine and alcohol were the most common addictions in these tuberculosis patients.

Clinical Presentation

In this study, fever (90%) was the most common presentation. Cough (48%) and weight loss were present in 38% cases, shortness of breath (22%) and pain abdomen in 22% cases. Lymph node swelling and diarrhoea were present respectively 32% and 14%. Non-IC patients presented with cough(68%),SOB(32%),pain abdomen(8%),Lymph node(20%) as compared to 28%,12%,36%,44% in IC patients respectively. Cough was significantly present in Non-IC patients. SOB is not significantly related to immune status. Pain in abdomen is significantly present in IC patients. Lymph node swelling is not significantly related to immune status.

In the study of *Patel AK., Thakrar SJ., Ghanchi FD* et al[23] cough was the most common symptom present in 47 (94%) patients followed by fever, weight loss, and loss of appetite present in 43 (86%), 39 (78%), and 31 (62%) patients, respectively, while dyspnoea, chest pain, and haemoptysis were seen in 28 (56%), 10 (20%), and seven (14%) patients, respectively. The mean duration of the most common presenting symptom (cough) was 12 weeks while fever and weight loss had mean duration of about 14 and 12 weeks, respectively, at the time of presentation. Mean duration of anorexia was 15 weeks and for dyspnoea it was about 8 weeks. The average (mean) duration of symptoms at the time of presentation was 12.2 weeks, which is in overall suggestive of late presentation and contributing to the delay in the diagnosis of TB. The duration of illness in the present study ranged from 2 weeks to 2 years.

Anaemia

In this study,10% of male did not suffer from anemia (normal-Hb-M ≥13gm/dl,F≥12gm/dl), 14% male and 4% female suffer from mild anaemia (Hb-M- 11 to <13 gm/dl, F- 11 to <12 gm/dl), 28% male and 8% female suffer from moderate anemia (Hb-8 to <11 gm/dl), 28% male and 6% female suffer from severe anemia (Hb-<8 gm/dl). So majority of study subjects suffer from moderate anemia (WHO/NMH/NHD/MNM/11.1 & NRHM'13). Range of Hb was 3.1 to 11.3 in IC patients and 6.8 to 16.2 in Non-IC patients. Mean Hb for IC was 7.672 and for Non-IC it was 11.224.Median Hb for Non-IC was 11.5 and that for IC was 7.4 respectively. Above table shows that Non-IC males had mild anaemia, Non-IC females had Moderate anaemia, IC males had Severe anaemia and IC females also had severe anaemia respectively. The S.D.and S.E. of mean were 2.4 and 0.49 for Non-IC and 1.94 and 0.38 for IC patients respectively. Anemia and occurrence of HIV-TB coinfection were found to be significantly related with each other. IC group is significantly more anaemic than Non-IC group.

In a study by *Saathoff E, Villamor E, Mugusi F, Bosch RJ, Urassa W, Fawzi WW* et al[25] shows that overall 750

females and 1693 males participated in their study, of whom respectively 49% and 24% were co-infected with HIV-1 and TB. Haemoglobin levels were significantly lower in females than in males and in HIV-positive than in HIV-negative Tuberculosis participants. HIV-TB co-infection in this antiretroviral-naïve population was also associated with severe anaemia (haemoglobin < 85 g/l) in both women (prevalence ratio [PR] = 2.07, 95%CI 1.65-2.59) and men (PR 3.45, 95%CI 2.66-4.47).

LFT Change

Our study shows, 78% were hypoalbuminemic (<3.5 gm/dl), 22% had normal albumin levels (3.5-5 gm/dl). Albumin level was below 3.5gm/dl in IC patients (96%) as compared to Non-IC (60%). Range of albumin was 2.1 to 4.5 gm/dl in Non-IC while it was 1.9 to 3.7 in IC. Mean of albumin was 3.332 in Non-IC and 2.57 in IC. Median of albumin was 3.2 in Non-IC and 2.6 in IC respectively.The S.D and S.E of mean were 0.74 and 0.14 for Non-IC and 0.41 and 0.08 for IC patients respectively. The average Albumin of IC and Non – IC population is statistically significant. (p value-<0.0001,t value-4.5036). Effect of HIV-TB coinfection on albumin level was found to be statistically significant.

Our Study shows, 54% had normal globulin (2-3.5 gm/dl) and 44% had hyperglobulinemia (>3.5 gm/dl). It also shows that 80% Non-IC patients had normal globulin level and 72% IC patients had hyperglobulinemia. Range of globulin was 1 to 4.5 in Non-IC patient and 3 to 5.7 in IC patient. Mean of Globulin was 2.7 in Non-IC and 3.908 in IC respectively. Median of Globulin was 2.8 in Non-IC and 3.8 in IC patients. The S.D and S.E of mean were 0.78 and 0.15 for Non-IC and 0.74 and 0.14 for IC patients respectively. Effect of HIV-TB coinfection on globulin level was found to be statistically significant.

In the present study of *Salimuddin Aziz, Farida Agha, Tariq Zia Lodi*[26], 31 total number of patients with tuberculosis was studied. The total proteins, albumin were significantly reduced among patients with tuberculosis, and although the values of and alpha-2, beta and gamma were slightly high only gamma globulin was significantly increased when compared to the controls (P < 0.001). On comparison of sputum positive with negative cases similar results were obtained. Albumin/alpha-2 ratio was significantly lower amongst sputum positive but not amongst sputum negative cases. Even in sputum positive cases the values fluctuated considerably with wide over lapping of values.

Our study shows distribution of raise in liver enzymes (SGPT and ALP) as per Grade0(<1.25ULN),1(1.25-2.5ULN),2(>2.5-5ULN),3(>5-10ULN), 4(>10ULN).It shows that SGPT was 76% in gr0, 24% gr1in Non-IC patients and 22% in gr0,67% gr1,11% in gr 2 in IC patients . ALP was 65% in gr0, 24% gr1,11% gr2 in Non-IC patients and 22% in gr0, 44% gr1, 34% gr2 in IC patients. ULN for SGPT was 40 IU/ml & 130 IU/ml for ALP [Acquired Immune Deficiency Syndrome (AIDS) Clinical Trials Group (CTG)]. Range of SGPT was 12 to 98 IU/ml in Non-IC and 25 to 185 in IC patients with a mean & median of 40.16 and 36 for Non-IC and 75.76 and 60 for IC patients respectively. SD & SE of mean were 26.70 and 5.34 for Non-IC and 41.24 and 8.24 for IC respectively. Effect of HIV-TB coinfection on SGPT level was found to be statistically significant.

Range of ALP was 64 to 428 IU/ml in Non-IC patients and 100 to 625 IU/ml in IC patients with a mean & median of 174.2 and 124 in Non-IC and 357.68 and 345 in IC patients respectively. The S.D and S.E of mean were 96.78 and 19.35 for Non-IC and 132.9 and 26.58 for IC patients respectively. In contrast to the results of SGPT level, effect of HIV-TB coinfection on ALP level was found to be statistically insignificant.

In a study by *Dey SK, Ghosh I, Bhattacharjee D, A P, Jha S, Dasgupta A, Dey SK* et al shows[27],that the serum total Alanine Transaminase (ALT), Aspartate Transaminase (AST) and the Alkaline Phosphatase (ALP) levels were significantly higher in theHIV patients more so in the cases with the associated HIV-TB co infection. The subjects had lower serum total protein and albumin levels and altered albumin/globulin ratios.

So the results of other studies carried by different researchers in different part of the world more or less complies with the findings of my study with a very few exceptions.

Association with Helminth

Our study, shows Helminth was present in 16% immunocompromised patients. Strongyloides constituted maximum (8%) number of immunocompromised. Among the Strongyloides infested individuals mean CD4 was 25 with a range of 6 to 44. Stool for OPC and occurrence of HIV-TB coinfection were not found to be significantly related with each other.

In a study of Walson et al[28], of 1,541 HIV-1 seropositive individuals screened, 298 (19.3%) had detectable helminth infections. Among individuals with helminth infection, hookworm species were the most prevalent (56.3%), followed by *Ascaris lumbricoides* (17.1%), *Trichuris trichiura* (8.7%), *Schistosoma mansoni* (7.1%), and *Stongyloides stercoralis* (1.3%). Infection with multiple species occurred in 9.4% of infections.

Pattern of Tuberculosis

In this study, Extra-Pulmonary tuberculosis is the most common form of TB, found in 42% cases, then DTB(40%)& PTB(18%). Among Non IC EPTB is mainly pleural effusion, whereas among IC cervical lymphadenopathy is main form of extra pulmonary tuberculosis. DTB is more common among HIV infected patients, in fact it is the predominant form of this group.

In IC patients Non-pulmonary TB is insignificantly correlated.

In a study by *L. Aaron, D. Saadou, I. Calatroni1* et al[29], the association of pulmonary and extrapulmonary localisations occurs in 9–40% of cases. All varieties of extrapulmonary TB have been described in HIV-infected patients (bone marrow infiltration, and bone, hepatic, splenic, cerebral, vertebral, meningeal, spinal and kidney involvements). Isolated extrapulmonary localisations are described in 53–63% of TB cases in HIV infected patients, and more frequently in severely immunocompromised HIV patients than in HIV seronegative individuals.[129,130]

In the study of *Carvalho BM.; Monteiro AJ.; Neto RJP.; Grangeiro TB.; Frota CC* et al[8] among 171 HIV patients 47.37% have PTB, 42.11% have EPTB and 10.53% have DTB.

In the study of *Patel AK., Thakrar SJ., Ghanchi FD* et al[23] in HIV-TB co-infection only pulmonary TB (PTB) was seen in 20 (40%) patients, while only EPTB was seen in five (10%) patients (three − pleural, one − lymph node, one − CNS). Overall pulmonary involvement of TB was seen in 43 (86%) cases; extra-pulmonary involvement was seen in 30 (60%) cases while disseminated TB accounted for 25 (50%) cases. Out of 43 TB patients having pulmonary involvement sputum smear AFB was positive only in 11 (25.58%). Out of 11 sputum positive patients, six cases (54.55%) had 1+ positivity; two (18.18%) had 2+ positivity; two (18.18%) had 3+ positivity while scanty bacilli were seen in one (9.09%). Among 32 sputum negative cases, 20 patients had disseminated disease suggestive of late phase of immune-suppression, accounting for higher sputum AFB negativity.

In our study, pleural effusion is most common (42.86%) amongst the EPTB followed by Lymph node Tb (33.33%) and TBM (19.04%).Pleural effusion(66.67%) is more common in Non-IC patients.TBM(33.34%) and Abdominal Tb(11.11%) is more common in IC patients.

In our study, most common form of DTB in IC patient was LN+Abd (42.86%).Most common form of DTB in Non-IC patient was PTB+Abd (33.32%).

AFB in smear& MDR TB

This study shows sputum positivity was present only in 22% cases whereas most of the cases were sputum negative 78%.It includes all types of TB.80% of IC patients were sputum negative and 24% of Non-IC patients were sputum positive. Sputum positivity for AFB is not significantly related with HIV condition. There is no statistical difference of sputum positivity in AFB between immunocompromised and immunocompetent groups. Sputum positivity has no correlation with the CD4 count.

One (16%) patient from Non-IC and one (20%) patient from IC group was found to have MDR TB. On taking detail history of these patients it was found that the Non-IC patient had a history of taking incomplete ATD(around 2 mths) in the past for sputum positive PTB. He himself discontinued the medication due to vomiting. He was from Birbhum West Bengal and had no other significant history of contact. The other patient was IC gave a history of pulmonary Koch 10 yrs back (all documents missing) but according to history he took ATD from govt. sector for around 5 months and discontinued on his own. No other significant history from this patient. So both of them have history of taking incomplete ATD in past.

In a study of *R. Prasad, J.K. Saini, R. Gupta* et al[12], sputum smear positivity for AFB was recorded in 62.5% and 51.1% among HIV seropositive and seronegative patients of pulmonary tuberculosis, respectively. This difference was statistically not significant ($p>0.05$). Sputum positivity was more or less the same among HIV seropositive and HIV seronegative patients of pulmonary tuberculosis. Other studies[111-113,115] reported less sputum positivity among HIV seropositive patients. It has been shown that sputum smear is often positive in the early stages of HIV infection.[121]

In another study of *Christopher C. Affusim, Emeka Kesieme, and Vivien O.* et al[30], majority of the HIV patients coinfected with PTB had negative sputum smears (73.9%). Also as earlier stated, most of these PTB-coinfected patients had low CD4 count. The reason for this high frequency of negative sputum smears is unclear. However, the knowledge that gross reduction of immunity in HIV alters the usual pattern of presentation of comorbid conditions due to altered pattern of immune response may partly explain it.

This study shows that 81.82% sputum positive cases are sensitive to rifampicin and isoniazid in LPA while 18.18% cases are resistant to it. Resistance to rifampicin and isoniazid by line probe technique is 20% in IC patients and 16.67% in Non-IC TB patients. The resistance of isoniazid and rifampicin is not statistically significant in both Immunocompromised and Immunocompetent patients.

In another study of *Lukas Fenner, Sebastien Gagneux, Jean-Paul Janssens* et al[31] The proportion of patients with multidrug resistance was higher in HIV-infected patients compared to HIV negative patients (1.9% versus 0%) but this failed to reach conventional statistical significance ($p =0.07$ by Fisher's exact test).

Lymph node involvement

Our study shows that cervical lymph nodes (64.71%) being the most common. Axillary, supraclavicular were present respectively in 11.77% and 5.88% cases. This includes both EPTB and DTB. Cervical lymphadenopathy (66.67%) is more common in IC

patient. Cervical lymphadenopathy is present in 60% Non-IC patient.

In a study of *Robert Petrossian; Deepa R. Ovian,; William A. Agger* et al[32] lymph node tuberculosis constitutes 20-40% of extrapulmonary tuberculosis. TB lymphadenopathy in HIV negative individuals is usually not associated with constitutional symptoms (fever, malaise, weight loss, night sweats), however systemic symptoms are common in HIV infected individuals.Smears may be positive < 50% of the time but cultures are positive in up to 70% of individuals. In the majority of cases there are no general or systemic symptoms, however malaise and weight loss have been noted in 20 -43% of patients.[136] Two thirds of patients present with multiple lymph nodes and one third have bilateral lymph node involvement.

In another study by PR Gupta[33] tender lymphadenopathy, fever, weight loss and co-existing pulmonary tuberculosis are more common in HIV seropositive patients as compared to HIV seronegatives.

Our study shows that 29.41% patients had AFB positive smears in cervical LN and majority of them are immunocompromised patients. Irrespective of immune status majority of the patients did not show AFB in smear(52.95%).

In our study,cervical(25%), abdominal(8.33%) and axillary (8.33%) smear positivity (FNAC) is present with CD4 count less than 200 cells/µl. Around 50% patients had negative smear (FNAC) with CD4 count less than 200 cells/µl. FNAC smear positivity has no significant correlation with CD4 count.

In a study of *Pukar C Shrestha, SK Bhattacharjee, Badri M Shrestha* et al[34], the sensitivity of FNAC in the diagnosis of lymphadenopathy has been found to be 70.37 per cent irrespective of the specific disease. The low sensitivity might be due to the lack of experience in carrying out the procedure of FNAC on the part of the surgical trainee and also on the part of cytopathologists in the interpretation of the results. When analysed statistically, the sensitivity of FNAC in the diagnosis of lymphadenopathy irrespective of aetiology, was found to be 70.37 percent, specificity of 100 percent, predictive value for true positive cases was 100 percent and predictive value for true negative cases was 65.71 percent. When considered with specific diseases, sensitivity of FNAC in the diagnsis of TB was 69.76 %. In this study, the main cause of lymphadenopathy had been tuberculosis: 43/81 (53.08%) and the second commonest cause being reactive lymphadenitis 23/81 (28.39 %). The results are consistent with similar studies done by Sharma M.[35] and others.[36,37] A retrospective study done in Nepal has shown the prevalence of peripheral lymph node tuberculosis to be 66.3%, though no specific site of lymph node affection was mentioned[38]. A prospective study reported recently in Nepal has shown cervical lymph node tuberculosis as the commonest cause of peripheral lymphadenopathy affecting 62.8 percent of cases.[35] Similar study from Hong Kong had reported the prevalence of cervical lymph node tuberculosis as over 60 percent.

In our study, the immunocompromised population 84% had CD4 count below 200 cells/µl and only 8% had CD4 count in the 200-350 cells/µl range.8% have CD4 more than 350 cells/µl. Range of CD4 cell count was 2 to 426 cells/µl. Mean CD4 was 122.16 cells/µl and S.D. and S.E. of mean were 99.41 and 19.88 respectively. Median CD4 count was 99 cells/µl.

In a study by *Neelima Tirumalasetti & P. Prema Latha* et al.[39] The most common site of lymphadenopathy was cervical (left posterior cervical group) in 124 patients (81.04%), followed by axillary lymphadenopathy in 19 (12.4%).The distribution of cytological diagnosis of various HIV lymphadenopathies included tuberculous lymphadenitis in 54 cases (41.8%), which was the most common cytological diagnosis.CD4 counts in tuberculous lymphadenitis patients were found to be decreased with increased bacillary load.

CD4 count of HIV-TB patients

This study shows that mean CD4 count was maximum for EPTB and minimum with PTB (176.77 and 29 respectively).The range of CD4 count was 2 to 426 cells/µl. PTB is found in CD4 count less than 200.PTB shows statistically insignificant correlation with CD4 count. EPTB shows statistically insignificant correlation with CD4 count. DTB is more common in CD4 count less than 200 cells/µl. DTB is significantly more common in patients with CD4 count <200 cells/µl.

In the study of *Christopher C. Affusim, Emeka Kesieme, and Vivien O* et al[30], the mean CD4 count of the TB-coinfected population (150.5625 cells/µl) was significantly lower than that of the non TB-coinfected ones (276.3945 cells/µl).This is in keeping with the known pathophysiology of HIV and TB as the decreasing immune status (due to HIV infection) increases susceptibility to TB. A total of 181 patients (54.8%) were found to have CD4 count less than 201 and 104 patients (31.5%) had CD4 count between 201–499. The remaining 45 patients (13.6%) had CD4 count 500 and above. The mean CD4 count of the TB-coinfected population was 150.6 cells/µl, while the mean CD4 count of the patients without TB coinfection was 276.4 cells/µl.

In a study by *Sameer Singhal, S.N.Mahajan, S.K.Diwan, Abhay Gaidhane and Z. S. Quazi* et al[40], sputum smear positivity to negativity was almost 1:1 in CD4 count between 0-200 whereas it was 3:1 in cases of CD4 count above 200,which suggests that sputum positivity decreases as CD4 count decreases, but have almost equal proportion with sputum negativity in CD4 count below 200.

In a study by *Jones BE, Young SM, Antoniskis D, Davidson PT, Kramer F, Barner PF* et al[41],extrapulmonary tuberculosis was found in 30 (70%) of 43 patients with < or = 100 CD4 cells/microL, 10 (50%) of 20 patients with 101 to 200 CD4 cells/microL, seven (44%) of 16 patients with 201 to 300 CD4 cells/microL, and five (28%) of 18 patients with > 300 CD4 cells/microL (p = 0.02).

In another study *Ajay Jaryal, Rajeev Raina, Malay Sarkar, Ashok Sharma* et al[42], disseminated tuberculosis was only found in patient with CD4 count less than 200/cmm.

CXR finding

In this study, most common finding in Chest X ray is Pleural effusion(40%) followed by consolidation(28%) and infiltration(16%) in Non-IC patients.56% of the Chest X ray were normal in IC population followed by pleural effusion(20%) and infiltration(20%).4% of IC patients had cavitatory lesion. Chest X ray findings were found to be related with presence of HIV-TB coinfection in patients. Non-IC group has significantly more chances of having abnormal chest X ray. Consolidation is present significantly more in non-immunocompromised patients. Pleural effusion is statistically not significant in IC and Non-IC patients.

In a study of *R. Prasad, J.K. Saini, R. Gupta* et al[12], on the chest skiagram (PA view) upper zone involvement was less common (12.5% *vs* 54.7%,p<0.001) while middle zone (20.8% *vs* 6.7%, p<0.001) and lower zone (25% *vs* 7.6%, p<0.001) involvement were more common among HIV seropositive as compared to HIV seronegative patients of pulmonary tuberculosis. Cavitary lesions were less common (29% *vs* 36.1% p>0.05) while exudative lesions (45.25% *vs* 27.7% p<0.05) were more common amongHIV seropositive patients as compared to HIVseronegative patients. Mediastinal lymphadenopathywas also more common among HIV seropositives as compared to HIV seronegativepatients (9.7% *vs* 1.7% p=0.0016).

In another study of *Lukas Fenner, Sebastien Gagneux, Jean-Paul Janssens* et al[43] HIV-infected patients were less likely to have cavitary disease and more likely to have disseminated disease than HIV-negative patients.

In our study, 66.67% of sputum positive Non-IC patients had Consolidation on X ray and 33.33% patients had infiltration on X ray while 52.64% sputum negative Non-IC patients presented with pleural effusion.70% of sputum negative IC patients X ray was normal while 80% IC sputum positive presented with infiltration on Chest X ray. Consolidation was conspicuously absent in IC patients. Chest X ray findings and sputum positivity in Non-IC patients was found to be insignificant. In contrast to the non-IC patients, IC patients showed statistically significant relation between their Chest X ray findings and sputum positivity. Patients having sputum positivity has a high chance of having abnormal chest X ray in IC group.

In a study by *L. Aaron, D. Saadoun, I. Calatroni1*et al.[29] The clinical presentation differs according to the degree of immunity. Indeed, the classic picture of pulmonary TB is seen mainly in non-severely immunocompromised patients (CD4 > 200 cells/µl), and is secondary to a recent infection. Pulmonary involvement (70–93% of TB cases) is associated with cough, sputum and, more rarely, haemoptysis, thoracic pain and dyspnoea[123,124]. It should also be remembered that chest radiography is normal in 8–20% of TB cases despite the presence of M. tuberculosis in sputum.[123,125,126]

CD4 count & CXR finding in IC patients

In our study, most common finding was normal chest X ray(48%) when the CD4 count was below <200 cells/µl followed by infiltration(20%). Chest X ray findings& CD4 count in IC patients were found to be insignificantly related with each other.

In the study of *Akinbami AA, Adegboyega AO, Oshinaike OO*[44], majority i.e a total of one hundred and six consenting participants were recruited consecutively into the study, their blood samples were collected for CD4 count assay, and all the participants were sent for chest x ray in the radiology department.32 of 87 of those with normal chest-x ray had CD4 count <100 cells/µl while about half of the patients with pulmonary tuberculosis (5 of 13) had CD4 count >350 cells/µl.

In another study, patients with HIV co-infection may not have typical radiographic features of pulmonary tuberculosis. While patients with higher CD4 cells (>350 cells/µl) have radiographic abnormalities similar to their HIV negative counterparts, patients with immunosuppression often have minimal or atypical findings *Long R, Maycher B, Scalcini M and Manfred et al* 1991.[45] Diffuse pulmonary infiltrates/opacities are the dominant radiological presentation and cavitation is uncommon. Miliary pattern, mediastinal adenopathy and pleural effusion are more common and x-rays may be normal in 5-10% of HIV+ individuals - *Swaminathan S, Narendran G, Menon P A et al* 2007.[46]

In another study, females with sputum-positive pulmonary TB with HIV with CD4 of less than 200 had following findings: Infiltration was seen in 11 (55%), cardiomegaly in 5 (25%), lymphadenopathy in 4 (20%). Consolidation was observed in 3 (15%) and 2 (10%) had cavity. Normal X-ray was seen in one patient. CD4 of above 200 had 2 (40%) cavitatory and infiltration lesion each in chest X-ray. Pleural effusion and miliary mottling was seen among 1 (20%) each. In males with CD4 count of less than 200 with pulmonary TB showed consolidation in 11 (42%) followed by infiltration in 5 (19%). COPD was observed in 5 (15%). cavity, miliary, and pleural effusion were 3 (12%) each in number. CD4

of more than 200 had one (33%) each of consolidation, miliary, infiltration, and pneumothorax each.

USG finding

In our study, on USG pleural effusion is more common in Non-IC (40%) as compared to IC(20%) patients. Hepatosplenomegaly + RPLN is more common in IC (16%) patients as compared to Non-IC(4%) patients. USG findings & CD4 count in IC patients were found to be insignificantly related with each other.

In a study by *Jain R, Sawhney S, Bhargava DK, Berry M* et al[47], sonographic findings in all patients with abdominal tuberculosis included an echogenic thickened mesentery (> or = 15 mm) with mesenteric lymphadenopathy. Other findings were dilated small bowel loops in 38 patients, minimal ascites in 17, matted small bowel loops in five, and omental thickening with altered echogenicity in three.

CD4 count & USG finding in IC patients

In our study, retroperitoneal lymph node, ascites+hepatomegaly and hepatosplenomegaly are seen at CD4 count less than 200 cells/µl.Pleural effusion is most common finding if CD4 count is less than 350 cells/µl.

In a study of *Ajay Jaryal, Rajeev Raina, Malay Sarkar, Ashok Sharma* et al[42] the 87 patients included in our study, CD4 count was done in all the patients. Forty-three (49.43%) of them had CD4 cell count ≤ 100 cells/µl, 28 (32.18%) had CD4 cell count between 100-200 cells/µl and 16(18.39%)had CD4 count >200 cells/µl. Mean CD4 cell count was 123 cells/µl (in males 119 cells/µl and in females 129 cells/µl). Majority of patients with pulmonary and EPTB had CD4 count below 200 cells/µl (81.08% and 86.15% respectively). Sputum smear-positive pulmonary tuberculosis was reported in 31.81% patients. Majority of them had CD4 count below 200 cells/µl. Fifteen patients had disseminated tuberculosis and all of them had CD4 count below 200 cells/µl.

SUMMARY

- This observational study is to show the clinical and microbiological spectrum of Tuberculosis in Immunocompromised and Immunocompetent patients visiting the OPD and admitted in the Indoors of School of Tropical Medicine, Kolkata and Department of Chest Medicine, Medical college, Kolkata.
- Total 50 patients of tuberculosis (Non-IC-25 and IC-25) were in the study. Total Male (Non-IC-76%;IC-84%) and Female (Non-IC-24%;IC-16%).
- Majority of TB patients of Non-IC belong to 39-48 age group and IC patients belong to 29-38 age group.
- 80% of IC patients were married whereas 68% of Non-IC patients were married.
- 68% of Non-IC patients were Literate as compared to 40% IC patients.
- Majority Non-IC males were Farmer (26.31%) by occupation and females were Housewives(66.66%).Majority of IC patients were Farmer(23.8%) followed by drivers and carpenters. 75% females were Commercial sex workers by occupation in IC group.
- Majority of the patients were from rural area in both groups and belong to lower socio-economic condition.
- 72% of total case population were Hindu and 28% Muslim.
- 28% of IC patients were alcoholic and 28% were alcoholic + smoker whereas only 12% of Non-IC were alcoholic.40% Non-IC and 12% IC patients were having no addiction.
- Fever(90%) was the most common presentation in both groups. Lymphadenopathy(44%) is much more common in IC patients & cough(68%) is the most common symptom of tuberculosis among non-IC patients.
- Non-IC males had mild anaemia, Non-IC females had Moderate anaemia,IC males had Severe anaemia and IC females also had severe anaemia respectively.So majority of the IC patients had severe anaemia.
- Albumin level falls below normal in both IC and Non-IC group but is much more lower in IC patients.
- Hyperglobulinemia in LFT is mainly a feature of immunocompromised patient.
- Liver enzymes (SGPT and ALP) were raised in both groups but more in IC patients.It is raised mainly in Disseminated TB.
- Helminth was present in 16% immunocompromised patients. Strongyloides constituted maximum (8%) number of immunocompromised. Among the Strongyloides infested individuals mean CD4 was 25 with a range of 6 to 44.
- EPTB>PTB>DTB in all group of patients.In EPTB which is mainly pleural effusion among Non-IC group and cervical lymphadenopathy among IC group is found.DTB is more common in IC group.
- Pleural effusion is most common (42.86%) amongst the EPTB followed by Lymph node TB (33.33%) and TBM (19.04%).
- Most common form of DTB in IC patient was LN+Abd (42.86%).Most common form of DTB in Non-IC patient was PTB+Abd (33.32%).
- Sputum positivity was present only in 22% cases whereas most of the cases were sputum negative 78%. Only 20% of IC patients and 24% of Non-IC patients were sputum positive.
- Most of the sputum positive cases had CD4 count below 200cells/µl.
- 82% sputum positive cases are sensitive to rifampicin and isoniazid in LPA while 18% cases are resistant to it. Resistance to rifampicin and

isoniazid by line probe technique is 20% in IC patients and 17% in Non-IC TB patients.

- Most common site being cervical lymph nodes (64.71%) followed by axillary and supraclavicular. Overall cervical Lymph node is the most common site of involvement in TB in both groups.
- 29.41% patients had AFB positive smears in cervical LN and majority of them are immunocompromised patients.
- Cervical,abdominal and axillary smear positivity(FNAC) is present with CD4 count less than 200 cells/µl.
- Among the immunocompromised population 84% had CD4 count below 200 cells/µl, 8% between 200-350 cells/µl and 8% more than 350 cells/µl.
- Among the immunocompromised patients mean CD4 count was maximum for EPTB (176.77) and minimum with PTB (29).This opposite reflection of CD4 count may be due to small sample size.
- Most common finding in Chest X ray is Pleural effusion(40%) in Non-IC patients.56% of the Chest X ray were normal in IC population.
- Consolidation was most common chest X ray finding in Sputum positive Non-IC patient whereas infiltration is common in sputum positive IC patient.
- Among the IC group most common presentation was normal chest X ray when the CD4 count was below <200 followed by infiltration.
- USG pleural effusion is more common in Non-IC(40%) as compared to IC(20%) patients. Hepatosplenomegaly + RPLN is more common in IC (16%) patients as compared to Non-IC(4%) patients.
- Among the IC patients retroperitoneal lymph node,ascites hepatomegaly and hepatosplenomegaly on USG are seen at CD4 count less than 200cells/µl. Pleural effusion is most common finding if CD4 count is between 200-350 cells/µl.

CONCLUSION

- TB occurs in younger age in IC patients as compared to non-IC group.
- Overall rural population is greater than the urban population.
- Gender/marital status/literacy level /religion/addiction are unrelated to occurrence of TB in either group.
- Prevalence of HIV-TB coinfection is significantly more in lower socioeconomic status.
- Extra-pulmonary form is the most common type of TB while cervical lymph node is the most frequent anatomic site of involvement.
- Most common form of EPTB among non immunocompromised patients is pleural effusion whereas cervical lymphadenitis is most common form among HIV patients.
- Cough is significantly present in Non-IC patients.
- Pain abdomen is significantly present in IC patients.
- IC group is significantly more anaemic than Non-IC group.
- Hypoalbuminemia and hyperglobulinemiaare significantly more common in IC group.
- Non-alcoholic IC patients have significantly raised SGPT.
- There is no statistical difference of sputum positivity in AFB between the groups.
- In IC group sputum positivity has no correlation with CD4 count.
- There is no difference in occurrence of INH/Rifampicin resistance among the groups.
- In IC group FNAC smear positivity has no significant correlation with CD4 count.
- In IC group occurrence of PTB/EPTB does not vary with CD4 count range.However, DTB is significantly more common in patients with CD4 count <200/µl.
- Non-IC group has significantly more chance of having abnormal chest X ray.Consolidation is more common in this group.
- There is no correlation between chest X ray findings and sputum positivity in non-IC group.
- Patients having sputum positivity have a high chance of having abnormal chest X ray in IC group.
- Chest X ray findings in IC group have no correlation with CD4 count.
- USG abdomen findings are not significantly different among the IC and non-IC group.
- Weaknesses of this study include small sample size, small number of sputum positive pulmonary TB cases, non-availability of facility for AFB culture and molecular diagnostic markers for tuberculosis.

REFERENCES

1. "Tuberculosis Fact sheet N°104". World Health Organization. November 2010. Retrieved 26 July 2011.
2. "Tuberculosis". World Health Organization, 2002.
3. World Health Organization (2009). "Epidemiology". Global tuberculosis control: epidemiology, strategy, financing, 6–33.
4. World Health Organization (2011). "The sixteenth global report on tuberculosis".
5. Vyas K, Rathi P: Human immunodeficiency virus and abdominal tuberculosis-dual partners in crime. J Assoc physicians India, 1999; 47(3): 309.
6. UNAIDS/ World Health Organization. AIDS Epidemic Update. December 2007. Geneva: UNAIDS, 2007.
7. Lawn SD, Churchyard G. Epidemiology of HIV-associated tuberculosis. Curr Opin HIV AIDS, 2009; 4: 325-33.
8. Carvalho BM.; Monteiro AJ.; Neto RJP.; Grangeiro TB.; Frota CC.: Factors related to HIV/tuberculosis coinfection in a Brazilian reference hospital: Braz J Infect Dis vol.12 no.4 Salvador Aug. 2008.
9. Kerr-Pontes L.R.S., Oliveira F.A.S., Freire C.A.M. Tuberculose associada à AIDS: situação de região

do Nordeste brasileiro. Rev. Saúde Pública, 1997; 31(4): 323-9.
10. Henn L., Nagel F., Dal Pizzol F. Comparison between Human Immunodeficiency Virus Positive and Negative Patients with Tuberculosis in Southern Brazil. Mem Inst Oswaldo Cruz, 1999; 94(3): 377-81.
11. Holmes C.B., Hausler H., Nunn P. A review of sex differences in the epidemiology of tuberculosis. Int J Tuberc Lung Dis, 1998; 2(2): 96 104.
12. R. Prasad, J.K. Saini, R. Gupta, R.K. Kannaujia, S. Sarin, Suryakant, R. Kulshreshth1, V.L. Nag1 and A.K. Tripathi2; A Comparative Study of Clinico-Radiological Spectrum of Tuberculosis Among HIV Seropositive and HIV Seronegative Patients Departments of TB and Chest Diseases, Microbiology1 and Medicine2, K.G. Medical University, CSM Medical University, Lucknow, India.
13. Rajasekharan S, Uma A, Kamakshi S, et al. Trend of HIV infection in patient withtuberculosis in rural South India. Indian J Tuberc, 2000; 47: 223-26.
14. Deivanayagam CN, Rajasekharan S, Senthilnathan V, et al. Clinicoradiological spectrum of tuberculosis among HIV seropositives: A Tambaram study. Indian JTuberc, 2001; 48: 123-27.
15. Purohit SD, Gupta RC, Bhatura VK. Pulmonary tuberculosis and human immunodeficiency virus infection in Ajmer. Lung India, 1996; 14: 113-20.
16. Samuel NM, Almelu C, Jagannath K, Rajan BP, Detection of HIV infection in pulmonary tuberculosis patient. J Indian Med Assoc, 1996; 94: 331-33.
17. Bames PF, Bloch GF, Davidson PT, et al. Tuberculosis in patient with human immunodeficiencyvirus infection. N Engl J Med, 1991; 324: 1644-50.
18. Sundaram G, Mcdonald RJ, Maniatis T, Oleska J, Kapila R, Reiohmanm LB. Tuberculosis as a manifestation of acquired immuno-deficiency syndrome (AIDS). JAMA, 1986; 256: 362-66.
19. Pitchenik AE, Fertel D, Block AB. Mycobacterial disease: Epidemiology, diagnosis and prevention. Clin Chest Med, 1988; 9: 425-41.
20. Abhijit Mukherjee[1], Indranil Saha[2], Anirban Sarkar[3], Ranadip Chowdhury ; Lung India, Vol. 29, No. 2, April-June, 2012; 120-122 Original Article, Gender differences in notification rates, clinical forms and treatment outcome of tuberculosis patients under the RNTCP.
21. Shaikh Mohsin, Misra Shobha, Rakesh Shah Sunil Nayak. STUDY OF HIV POSITIVE CASES ATTENDI NG VOLUNTARY COUNSELING AND TESTING CENTRE OF BARODA – A GENDER PERSPECTIVE.
22. Chengchao Zhou,Jie Chu, Jinan Liu, Ruoyan Gai Tobe, Hong Gen, Xingzhou Wang, Wengui Zheng, Lingzhong Xu Adherence to Tuberculosis Treatment among Migrant Pulmonary Tuberculosis Patients in Shandong, China: A Quantitative Survey Study, mail Published., December 17, 2012 DOI: 10.1371/journal.pone.0052334.
23. Patel AK., Thakrar SJ., Ghanchi FD.: Clinical and laboratory profile of patients with TB/HIV coinfection: A case series of 50 patients. Lung India, 2011; 28(2): 93-96.
24. Arslan Ahmad Salam, Sana Rehman; Frequency and Type of Addiction Among Tuberculosis Patients PMRC TB Research Centre, Institute of chest Medicine King Edward Medical University, Lahore.
25. Saathoff E, Villamor E, Mugusi F, Bosch RJ, Urassa W, Fawzi WW.: Anemia in adults with tuberculosis is associated with HIV and anthropometric status in Dar es Salaam, Tanzania.: Int J Tuberc Lung Dis. 2011 Jul;15(7):925-32. doi: 10.5588/ijtld.10.0477.
26. Salimuddin Aziz, Farida Agha, Tariq Zia Lodi; Protein Electrophoresis in Tuberculosis (PMRC Research Centre, Jinnah Postgraduate Medical Centre, Karachi.)
27. Dey SK, Ghosh I, Bhattacharjee D, A P, Jha S, Dasgupta A, Dey SK.: Liver Function Profile Anomalies in HIV Seropositive Tuberculosis.: J Clin Diagn Res, 2013 Jun; 7(6): 1068-72. doi: 10.7860 /JCDR /2013 /5156.3047. Epub 2013 Jun 1.
28. Walson JL et al.: Prevalence and Correlates of Helminth Co-infection in Kenyan HIV-1 Infected Adults: PLOS-NEGLECTED TROPICAL DISEASES.
29. L. Aaron1, D. Saadoun2, I. Calatroni1, O. Launay2, N. Me´main2,3, V. Vincent3,4, G. Marchal3,4, B. Dupont1, O. Bouchaud2,3, D. Valeyre3,5 and O. Lortholary1,3; Tuberculosis in HIV-infected patients: a comprehensive review.
30. Christopher C. Affusim,1 Emeka Kesieme,2 and Vivien O. Abah3; The Pattern of Presentation and Prevalence of Tuberculosis in HIV-Seropositive Patients Seen at Benin City, Nigeria, Received 19 September 2011; Accepted 13 November 2011.
31. Lukas Fenner ,Sebastien Gagneux, Jean-Paul Janssens, Jan Fehr, Matthias Cavassini, Matthias Hoffmann, Enos Bernasconi, Jacques Schrenzel, Thomas Bodmer, Erik C. Böttger, Peter Helbling, Matthias Egger, Tuberculosis in HIV-Negative and HIV-Infected Patients in a Low-Incidence Country: Clinical Characteristics and Treatment Outcomes; PLOS journal, 0Published: March 30, 2012 http://dx.doi.org/10.1371/journal.pone.0034186.
32. CASE PRESENTATION: Robert Petrossian; Deepa R. Ovian, MD; William A. Agger, MD.
33. PR Gupta; Difficulties in managing lymph node tuberculosis Professor of Chest & TB, SMS Medical College, Jaipur., India.
34. Pukar C Shrestha SK Bhattacharjee Badri M Shrestha; Evaluation of fine needle aspiration cytology in the diagnosis of lymphadenopathy Department of surgery, Bir Hospital, Kathmandu.
35. Sharma M. Cervical lymph node tuberculosis: A clinico pathological evaluation. A thesis submitted for the degree of master of surgery, Tribhuan University, 1996.

36. Dasgupta A., Ghosh R.N., Poddar A. K. et al. Fine Needle Aspiration Cytology of Cervical lymphadenopathy with special reference to tuberculosis. Indian Medical Association Journal, 1994; 92(2): 44-6.
37. Prasad R., Garg S.K., Mukerji P.K., et al. Role of Fine Needle Aspiration Cytology in the Diagnosis of Lymphadenopathy. Indian Journal of Chest Diseases and Allied Sciences 1993. 35(1): 27-9.
38. Shrestha H. G. Extrapulmonary tuberculosis in Histopathological Specimens at T.U.Teaching Hospital, J. of Nepal Medical Association, 1989; 27(A): 9 - 17.
39. Neelima Tirumalasetti & P. Prema Latha ; Lymph nodes cytology in HIV seropositive cases with haematological alterations Department of Pathology, NRI Medical College, Chinakakani, Guntur, Andhra Pradesh, India Received October 31, 2012.
40. Sameer Singhal, S.N.Mahajan, S.K.Diwan, Abhay Gaidhane and Z. S. Quazi; Correlation of Sputum smear status with CD4 count in cases of Pulmonary Tuberculosis and HIV co-infected patients-A Hospital based study in a rural area of Central India. Received on 24.10.2010, Accepted after revision on 13.5.2011.
41. Jones BE, Young SM, Antoniskis D, Davidson PT, Kramer F, Barner PF. Relationship of the manifestations of tuberculosis to CD4 cell counts in patients with human immunodeficiency virus infection. Am Rev Respir Dis 1993; 148: 1292–1297.
42. Ajay Jaryal[1], Rajeev Raina[1], Malay Sarkar[2], Ashok Sharma; [1]Manifestations of tuberculosis in HIV/AIDS patients and its relationship with CD4 count 7[Th] OCTOBER, 2011.
43. Lukas Fenner1*, Sebastien Gagneux2,3, Jean-Paul Janssens4, Jan Fehr5, Matthias Cavassini6, Matthias Hoffmann7, Enos Bernasconi8, Jacques Schrenzel9, Thomas Bodmer10, Erik C. Bo¨ ttger11, Peter Helbling12, Matthias Egger; Tuberculosis in HIV-Negative and HIV-Infected Patients in a Low Incidence Country: Clinical Characteristics and Treatment Outcomes, for the Swiss HIV Cohort and Molecular Epidemiology of Tuberculosis Study Groups.
44. Akinbami AA[1], Adegboyega AO, Oshinaike OO, Adebola PA, Enabulele C, Dosunmu OA, Adediran A; Chest X- ray findings in HIV patients in relation to the CD4 count.
45. Long R, Maycher B, Scalcini M and Manfred J 1991 Chest roentgenogram in pulmonary tuberculosis patients seropositive for HIV type I; Chest, 99: 123–127.
46. Swaminathan S, Narendran G, Menon P A, Padmapriyadarsini C, Arunkumar N, Sudharshanam N M, Ramesh Kumar S and Chandrasekhar S 2007 Impact of HIV infection on radiographic features in patients with pulmonary tuberculosis; Indian J. Chest Dis. Allied Sci, 49: 133–136.
47. Jain R[1], Sawhney S, Bhargava DK, Berry M; Diagnosis of abdominal tuberculosis: sonographic findings in patients with early disease.