

**Original Research Article****Status of Serum Ferritin, C-Reactive Protein and Liver Function Tests in Pulmonary Tuberculosis**

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**Abstract**

**Objectives:** *The purpose of this study was to determine the serum level of biochemical parameters like serum Ferritin, Bilirubin, AST, ALT, ALP, total protein, albumin and CRP in pulmonary tuberculosis and its association with severity of disease.*

**Background:** *Present study is designed to estimate the biochemical parameters in pulmonary tuberculosis patients and healthy groups. The prevalence of pulmonary tuberculosis is higher in Hadoti region of Jhalawar (Rajasthan). Biochemical parameters are not only important for diagnosis purpose but also for prognosis and treatment.*

**Methods:** *50 patients of pulmonary tuberculosis and 50 healthy of control group were included and biochemical parameters i.e. serum Ferritin, Bilirubin, AST, ALT, ALP, total Protein, albumin and CRP were estimated by commercial kit method on fully Auto analyzer.*

**Results:** *Serum ferritin, bilirubin, AST, ALT, ALP and CRP were significantly higher ( $P < 0.001$ ). Total Protein, albumin were insignificant when the patients were compared with control group.*

**Conclusion:** *Determination of biochemical parameters is important in diagnosis and medical management of pulmonary tuberculosis.*

**Keywords:** *Pulmonary tuberculosis, Ferritin, C-reactive protein, AST, ALT, ALP, total protein, albumin.*

**Introduction**

Tuberculosis is an infectious disease and burden on society, occurring worldwide. World Health Organization described that the severity of global tuberculosis situation occurs mainly in social inequality, introduction of HIV infection and population aging<sup>1</sup>.

Iron homeostasis is maintained by Ferritin and acts on acute phase reactant and its increased value is correlated with both acute and chronic

inflammatory status<sup>2</sup>. Ferritin is used as marker of inflammatory response<sup>3</sup>. However serum C-reactive protein (CRP) plays an important role in systemic inflammation and is easily measured marker in Mycobacterium tuberculosis infection<sup>4</sup>. Liver function tests such as serum Bilirubin, AST, ALT, ALP, total protein and albumin are valuable clinical markers in pulmonary tuberculosis due to their deranged values<sup>5</sup>. Iron is required for growth of Mycobacterium tuberculosis. In present study,

determination of Serum Ferritin, CRP, Bilirubin, AST, ALT, ALP, total protein and albumin will be important in diagnosis, prognosis and medical management of pulmonary tuberculosis.

### Materials and Methods

Fifty cases of Pulmonary Tuberculosis and 50 cases of normal Healthy controls with standard protocols were followed and this was prospective research study.

Inclusion criteria were Clinical presentation, signs and symptoms, positive acid fast bacilli in sputum, radiological and cytological examination. The Exclusion criteria were Age <18yrs and >60yrs, extra-pulmonary tuberculosis patients, associated other clinical diseases such as carcinoma, chronic kidney disease, diabetes mellitus, heart and liver disease etc.

This study was conducted on the subjects coming to O.P.D. and I.P.D. in the department of T.B. and Chest, S.R.G. Hospital and Medical College, Jhalawar (Rajasthan).

Ethical permission has been taken from Ethical Committee of Jhalawar Medical College, Jhalawar (Rajasthan).

The age group in present study was between 18years to 60years of both males and females. Subject's biochemical parameters were estimated in hospital's Clinical Biochemistry laboratory.

Samples of tubersulosis patients were taken before the initiation of anti-tubercular treatment (ATT). Serum Ferritin was analyzed by Immunoassay analyzer (Chemiluminiscence) Maglumi 1000<sup>6</sup>. CRP was analyzed by Qualitative and Semi-Quantitative rapid latex slide test<sup>6</sup>. Bilirubin, AST, ALT, ALP were determined by Kinetic method of Backman Coulter AU680 fully Auto-analyzer. Serum total protein and albumin were estimated by commercial diagnostic kit method by auto-analyzer MIURA-500<sup>6</sup>.

Statistical analysis was done by SPSS (version 20.0) method.

### Results

The mean value of serum ferritin was significantly higher than healthy control group (<0.001). Bilirubin was found to be significant when compared tubercular patients with control group. Aspartate transaminase (AST) was significantly higher (<0.001), Alanine transaminases (ALT) and Alkaline phosphatases (ALP) was higher when compared in both groups (pulmonary tuberculosis and control) (<0.001). However total protein and albumin were found to be insignificant when pulmonary tubercular group was compared with control group. C-reactive protein (CRP) values were higher in patients group when compared to control group (<0.001).

**Table 1:** Biochemical parameters of Pulmonary Tuberculosis

S.N.	Parameters	Control group	Patient group	Significant P value
1.	Serum Ferritin	202.19 ± 41	291.93 ± 27.29	< 0.001
2.	Serum Bilirubin	0.89 ± 0.50	1.78 ± 1.23	< 0.001
3.	Aspartate Transaminase	30.11 ± 3.75	62.47 ± 6.98	< 0.001
4.	Alanine Transaminase	27.22 ± 5.50	50.13 ± 5.34	< 0.001
5.	Alkaline Phosphatase	103.72 ± 10.37	130.83 ± 11.44	< 0.001
6.	Total Protein	5.45 ± 2.80	5.09 ± 1.66	N.S.
7.	Albumin	4.57 ± 1.12	4.11 ± 1.29	N.S.
8.	C-Reactive Protein	4.72 ± 2.11	24.81 ± 10.5	< 0.001

< 0.001 = Significant; N.S. = Non-significant

## Discussion

In the present study it was found that level of serum Ferritin was higher in patients compared to healthy controls. Our study is similar to reported by other workers<sup>7,8</sup>. Concentration of Ferritin was increased in response to inflammation and without Iron status relationship. However according to Al-Omar and Oluboyede (2002), increased levels of macrophages and monocytes were found in Pulmonary tuberculosis<sup>9</sup>. Level of serum bilirubin was increased in patients group. Higher levels of serum bilirubin in pulmonary tuberculosis was due to its antioxidant property<sup>10</sup>. In our study, the concentration of Aspartate Transaminase (AST), Alanine Transaminase (ALT) and Alkaline phosphatases (ALP) were increased in patients of pulmonary tuberculosis as compared to healthy Control group. Our results are similar to studied by other researchers<sup>11,12</sup>. Higher levels of AST and ALT are indicator of liver damage in Pulmonary Tuberculosis<sup>11</sup>. Our study is similar to reports published in literature<sup>12,13</sup>. Total Protein and Albumin were found to be insignificant in our study, however in other studies hypoalbuminemia was reported in pulmonary tuberculosis<sup>14</sup>. In present study the level of C-reactive protein was increased significantly which is similar to reported by other studies<sup>15,16</sup>. CRP is associated with inflammatory response and pulmonary tuberculosis is an inflammatory disease<sup>17</sup>.

## Conclusion

In present study we observed that altered liver function tests, ferritin, CRP are important in diagnosis, prognosis and medical management of pulmonary tuberculosis.

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