**Original Article**

# Measurement of C-reactive protein in pulmonary tuberculosis patients without treatment and healthy individual

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## Abstract

**Objective:** To assess the C-reactive protein level in pulmonary tuberculosis patients without treatment and healthy individual.

**Methods:** A descriptive, cross sectional study was conducted from January 2016 to June 2016 among 50 pulmonary tuberculosis patients attending at Respiratory Medicine Department of the Dhaka Medical College Hospital and 50 healthy individuals, after obtaining requisite consent from the patients. Data were collected through the interviewing of the patients. The collected data were entered into the computer and analyzed by using SPSS (version 20.1) to assess the C-reactive protein level in pulmonary tuberculosis patients and healthy individuals. The study was approved by the institutional ethical committee.

**Results:** In a pool of 50 pulmonary tuberculosis patients without treatment and 50 healthy individuals, Serum CRP level (mg/l) were significantly higher ($p < 0.001$) in PTB than normal individuals.

**Conclusion:** Serum CRP level was significantly higher ($p < 0.001$) in pulmonary tuberculosis patients without treatment. So measurement of CRP level during pulmonary tuberculosis is an important diagnostic and prognostic tools.

**Keywords:** Tuberculosis patient, Serum CRP level.

## Introduction

Tuberculosis (TB) is a major public health problem in Bangladesh. Bangladesh ranks 6th globally in terms of the burden of TB on the population. According to the World Health Organization, around 350,000 Bangladeshi developed TB in 2013 and around 80,000 die from TB every year, which accounts for just under 9% of the deaths in Bangladesh every year. Hence, every hour, nine people die of TB in Bangladesh, despite an effective treatment being available.[1] Tuberculosis is caused by two organisms namely Mycobacterium tuberculosis and Mycobacterium bovis. It typically affects the lungs (pulmonary TB) but can affect other sites as well (extra pulmonary TB). It is characterized by persistent cough, difficulty in breathing, coughing up blood, general body weakness, loss of appetite, night sweats, fever, chills, unintentional weight loss etc. In 17th and 18th centuries, tuberculosis caused up to 25% of all deaths in Asia.[2] C-reactive protein is an inflammatory marker whose concentration increases with acute or chronic inflammation. It is produced by the liver in response to stimulation by cytokines such as interleukin-1 beta, interleukin-6, and tumor necrosis factor alpha. High-sensitivity measurement of CRP has been shown to add prognostic information at all levels of risk, but CRP has not been consistently shown to be an independent risk factor across all studies.[3] CRP is an acute-phase protein and nonspecific marker of systemic inflammation.[4]

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## Materials & method

A cross sectional study was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka from January 2016 to December 2016.

According to selection criteria 100 subjects were selected with the age ranging from 20 to 60 years and equally divided into two groups. Group-A was newly diagnosed pulmonary tuberculosis patients before receiving treatment in the TB center of Department of Respiratory medicine, Dhaka medical college hospital and Group-B was apparently healthy volunteers. The study parameters are serum CRP level, BMI and blood pressure. Departmental screening committee of Department of Biochemistry, Dhaka Medical College Hospital, Dhaka provided approval before conducting the study. There are no violations of moral and ethical norms during preparation of this research. Purposive sampling was adopted for collecting data. The interviews were held directly in the corridor just outside the Outpatient Department. The relevant information was entered into the predesigned proforma. The collected data were entered into the computer and analyzed by using SPSS (version 20.1).

**Result**

**Table I** shows that age (mean ± SD) and gender of PTB patients without treatment and healthy individuals. Study subjects were age & gender matched.

**Table-I: Age and sex of study subjects in different groups (N = 100)**

| | Group | | p value |
|---|---|---|---|
| | Group A (n=50) | Group B (n=50) | |
| **Age in years (Mean ± SD)** | 36.5 ± 9.28 | 37.2 ± 7.5 | 0.719 [a] |
| **Gender** | | | |
| Male n (%) | 28 (56.0) | 26 (52.0) | 0.722 [b] |
| Female n (%) | 22 (44.0) | 24 (48.0) | |
| | | | |

Group A: PTB patients without treatment
Group B: Healthy individuals
Level of significance $p < 0.05$
a = ANOVA test was done
b = Chi-square test was done

**Table II** shows mean ± SD of systolic BP and diastolic BP, there was no significant difference of SBP and DBP in between groups.

**Table-II: Blood pressure of study subjects in different groups (N= 100)**

| | Group | | p value |
|---|---|---|---|
| | Group A (n=50) | Group B (n=50) | |
| **Systolic BP in mm of Hg (Mean ± SD)** | 121.8 ± 17.5 | 120.3 ± 16.7 | 0.885 |
| **Diastolic BP in mm of Hg (Mean ± SD)** | 79.5 ± 14.5 | 78.1 ± 12.3 | 0.798 |

Group A: PTB patients without treatment
Group B: Healthy individuals
Level of significance $p < 0.05$
ANOVA test was done
Table III shows Mean ± SD of BMI was significantly lower in PTB patients without treatment and normal healthy individuals

**Table-III: BMI of the study subjects in different groups (N=100)**

| Parameter BMI in kg/m² | Group | | p value |
|---|---|---|---|
| | Group A (n=50) | Group B (n=50) | |
| Mean ± SD | 18.5 ± 2.8 | 23.4 ± 3.5 | < 0.05 |

Group A: PTB patients without treatment
Group B: Healthy individuals
Level of significance $p < 0.05$
ANOVA test was done
Table IV shows serum CRP level in study subjects. Mean ± SD of serum CRP level was significantly higher in TB patients without treatment than healthy individuals.

**Table-IV: Serum CRP level of the study subjects in different groups (n=100)**

| Parameter Serum CRP in mg/l | Group | | p value |
|---|---|---|---|
| | Group A (n=50) | Group B (n=50) | |
| Mean ± SD | 22.3 ± 4.8 | 0.6 ± 0.05 | < 0.001 |

Group A: PTB patients without treatment
Group B: Healthy individuals
Level of significance $p < 0.05$
ANOVA test was done

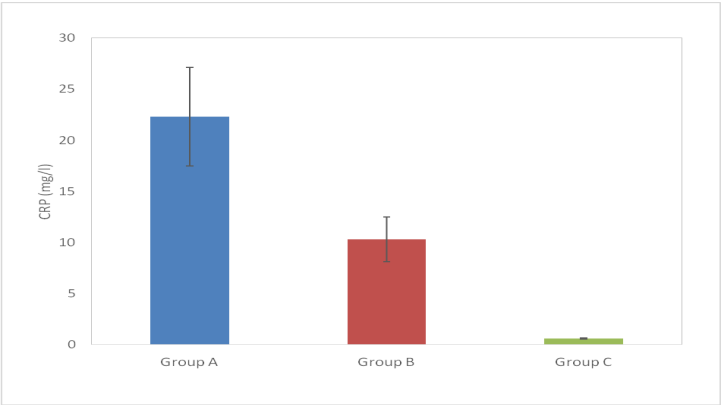


**Figure-I: Bar diagram of CRP level in different groups of study subjects.**

Group A: PTB patients without treatment, Group B: PTB patients with treatment, Group C: Healthy individuals

## Discussion

This cross sectional study was done on pulmonary tuberculosis patients in the Department of Biochemistry, Dhaka Medical College, Dhaka during the period of January 2016 to December 2016. A total of 100 subjects were selected according to the selection criteria. Among them, 50 PTB patients without treatment were included in group A and 50 apparently healthy individuals were included in group B. Serum CRP in mg/l, BMI (kg/m²) and blood pressure (mm-Hg) was measured. According to this study, mean± SD value of BMI in group A and group B were 18.5 ± 2.8 and 23.4 ± 3.5 kg/m² respectively. Mean BMI was significantly lower in PTB patients without treatment than that of normal healthy individuals. This finding was consistent with the cohort study.[5] They included 1557 study subjects where the aim was to find out the association of body mass index with timing of death during tuberculosis treatment. They concluded that for tuberculosis patients, body mass index less than 18.5 kg/m²is an independent predictor for early mortality within the first 8 weeks of treatment.

A case-control study was done to assess the body mass index and nutritional status in pulmonary tuberculosis patients. In this study 60 patients with active pulmonary tuberculosis and 60 controls was selected for study subjects. They concluded that there is a significant degree of nutritional depletion and weight loss in PTB patients than in general population.[6] There are some other studies have been done regarding BMI and PTB patients.[6] For Example, a cross-sectional study was done on 319 PTB patients[7] and another retrospective cohort study which include 1090 TB patients.[8] In both studies BMI was found significantly low in PTB patients. All of these observations establish that there was a significant degree of nutritional depletion and weight loss occurred in PTB patients. BMI is considered to be a useful technique for assessment of nutritional state of PTB. According to this study, mean ± SD of serum CRP level was 22.3 ± 4.8 and 0.6 ± 0.05 mg/l respectively in group A and group B. Mean serum CRP level was significantly higher ($p < 0.001$) in group A than that of group B, similarly comparative study was done to evaluate the correlation of CRP with activity and severity of pulmonary tuberculosis. In this study 44 patients treated for pulmonary tuberculosis (31 patients with elevated CRP> 50 mg/l against 13 patients having a CRP <50 mg/l) was selected for study subjects. They found elevated CRP level in PTB patients and conclude that CRP can be used as a marker of the activity and severity of tuberculosis and can predict the course of the disease.[9] A descriptive study was done to evaluate the C-reactive protein (CRP) in patients with pulmonary tuberculosis. This study includes 127 PTB patients, of which 76 (60%) were males and 51 (40%) were females and CRP was raised in 86 (67.7%) patients of pulmonary TB. They found elevation of CRP in pulmonary tuberculosis and a high CRP is clearly associated with more severe disease.[10]

## Conclusion

Assessment of serum C-reactive protein level helps to find out the severity and progress of tuberculosis. In our study, Serum CRP level was significantly higher ($p <0.001$) in pulmonary tuberculosis patients than healthy individuals.

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## Conflict of Interest

Authors declare no conflict of Interest.

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