

Assessment of serum level of CRP as an indicator of disease activity in pulmonary tuberculosis

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Abstract

Background: C-reactive protein (CRP) is an acute-phase reactant whose levels rise in response to interleukin(IL) 6-mediated pyogenic infections such as active TB. The present study was conducted to assess the serum level of CRP as an indicator of disease activity in pulmonary tuberculosis. **Materials & Methods:** 64 cases of pulmonary tuberculosis of both genders were enrolled. 2 ml blood was withdrawn from the patient and was sent for quantitative analysis to assess the CRP level. **Results:** There were 54% newly detected cases of pulmonary TB, 20% undergoing anti-tubercular treatment, 12% cured cases, 10% treatment defaulters and 4% treatment resistant. The mean CRP level (mg/dl) in the newly detected TB patients was found to be 52.4. Those undergoing anti-tubercular treatment had a mean CRP value of 42.4. CRP in patients who had completed their treatment were 4.5. Defaulters had a mean CRP of 65.3 and the treatment resistant had a mean CRP of 85.4. The difference was significant ($P < 0.05$). **Conclusion:** CRP levels are raised in tuberculosis and fall and attain normal values by the end of treatment.

Keywords: CRP, Resistant, Tuberculosis.

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Introduction

TB incidence remains high with over 9 million TB cases in 2013 alone. High-risk groups such as people living with HIV (PLHIV) shoulder a disproportionately heavy disease burden. The World Health Organization (WHO) now recommends systematic screening of high-risk groups, but the lack of an accurate yet simple screening tool is a key barrier[1]. A good screening test would rule-out TB in the majority of patients without disease (sensitivity $\geq 90\%$) and limit referrals for more costly confirmatory testing to patients with a high likelihood of having TB (specificity $\geq 70\%$). A test with these characteristics that is also low-cost and can be performed by front-line health workers has been ranked among the highest priority needs for TB diagnostics[2].

The high sensitivity requirement minimizes the proportion of TB patients missed by screening, whereas the moderately high specificity requirement limits referrals for more costly confirmatory testing such as Xpertw MTB/RIF and/or culture to patients with a high likelihood of having TB. A test with these characteristics that is also low-cost and which can be performed by frontline health workers has been ranked among the highest priority needs for TB diagnostics[3].

C-reactive protein (CRP) is an acute-phase reactant whose levels rise in response to interleukin (IL) 6- mediated pyogenic infections such as active TB[4]. Previous studies have consistently shown that CRP has high sensitivity for TB and that TB-associated increases in CRP levels are independent of HIV status. In addition, CRP can be measured from capillary blood using a low-cost point-of-care (POC) assay[5]. The present study was conducted to assess the serum level of CRP as an indicator of disease activity in pulmonary tuberculosis.

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Materials & Methods

The present study comprised of 64 cases of pulmonary tuberculosis of both genders. All were enrolled after obtaining their written consent. Exclusion Criteria was cases with extra pulmonary tuberculosis and secondary tuberculosis.

Data pertaining to age, gender etc. was recorded. 2 ml blood was withdrawn from the patient and was sent for quantitative analysis to assess the CRP level. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

Total- 64		
Gender	Males	Females
Number	40	24

Table 1 shows that out of 64 patients, males were 40 and females were 24.

Table 2: Patients characteristics

Cases	Percentage	P value
Newly detected cases	54%	0.04
Undergoing anti-tubercular treatment	20%	
Cured cases	12%	
Treatment defaulters	10%	
Treatment resistant	4%	

Table 2, Fig 1 shows that there were 54% newly detected cases of pulmonary TB, 20% undergoing anti-tubercular treatment, 12% cured cases, 10% treatment defaulters and 4% treatment resistant. The difference was significant ($P < 0.05$).

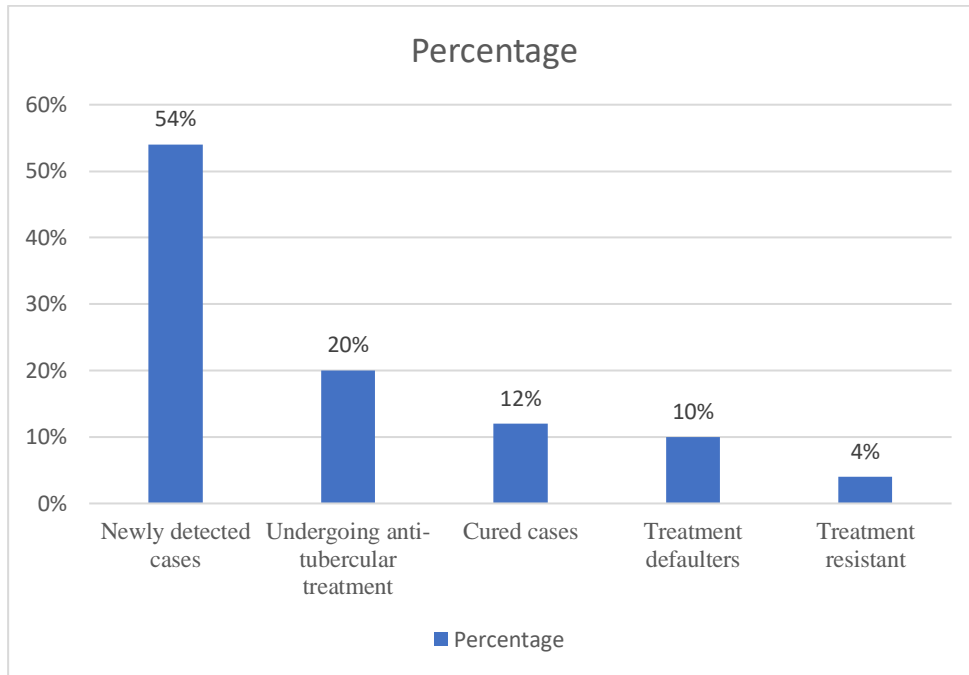


Fig 1: Patients characteristics

Table 3: CRP level in different TB patients

Cases	Mean	P value
Newly detected cases	52.4	0.04
Undergoing anti-tubercular treatment	42.4	
Cured cases	4.5	
Treatment defaulters	65.3	
Treatment resistant	85.4	

Table 3, graph II shows that mean CRP level (mg/dl) in the newly detected TB patients was found to be 52.4. Those undergoing anti-tubercular treatment had a mean CRP value of 42.4. CRP in patients who had completed their treatment were 4.5. Defaulters had a mean CRP of 65.3 and the treatment resistant had a mean CRP of 85.4. The difference was significant ($P < 0.05$).

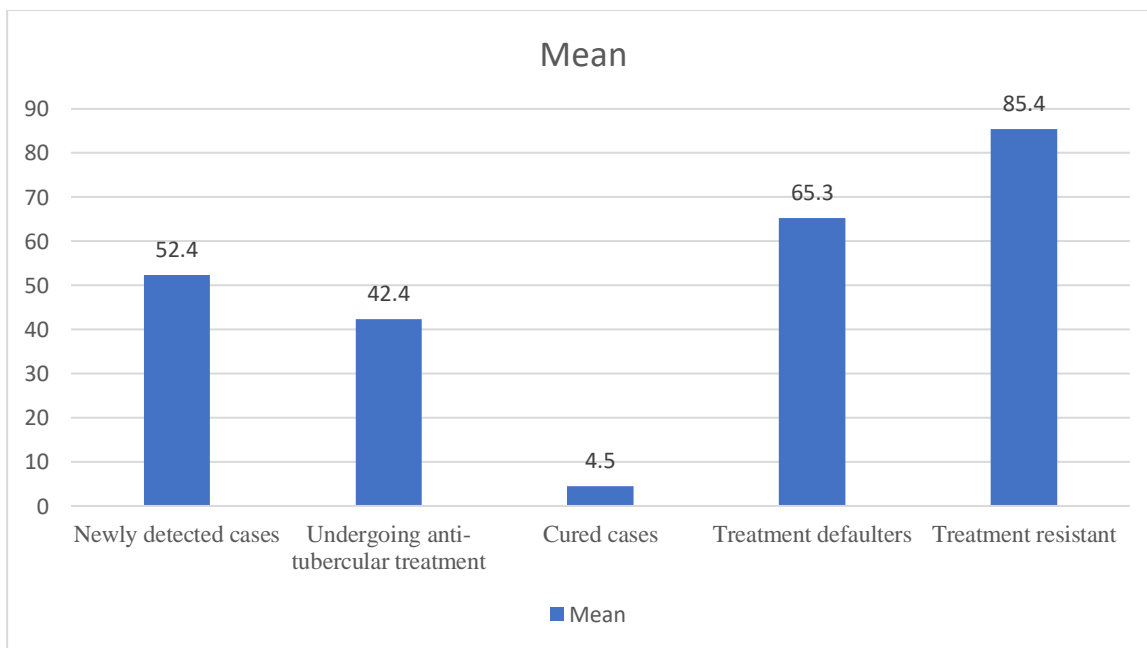


Fig 2: CRP level in different TB patients

Discussion

Current TB screening tools endorsed by the WHO are inadequate and include symptom assessment (cough ≥ 2 weeks for people without HIV or any of four symptoms suggestive of TB for people living with HIV) and chest radiography (CXR)[6]. A symptom-based approach to TB screening requires a priori knowledge of the patient's HIV status to be sufficiently sensitive and has poor specificity for active TB, particularly among key high-risk groups such as people living with HIV (specificity range:5–61%)[7]Although CXR is sufficiently sensitive and has higher specificity, it requires costly infrastructure and trained interpreters, both of which are often absent in lower-level health centers where most patients with symptoms suggestive of TB first present for care[8]. To facilitate scale-up of systematic screening of high-risk groups, there is an urgent need to identify an accurate and practical screening tool. As CRP is used mainly as a marker of inflammation and infection, measuring and charting CRP values can prove useful in determining the progress of TB and the efficacy of the anti-tubercular treatment[9]. Thus, the treatment regimen can be changed timely if the patient response to the drugs is inadequate, leading to not only early recovery but also prevention of Multidrug resistant Tuberculosis[10]. The present study was conducted to assess the serum level of CRP as an indicator of disease activity in pulmonary tuberculosis. In present study, out of 64 patients, males were 40 and females were 24. There were 54% newly detected cases of pulmonary TB, 20% undergoing anti-tubercular treatment, 12% cured cases, 10% treatment defaulters and 4% treatment resistant. Pansey et al[11] in their study 50 patients of tuberculosis we assessed and found 52% newly detected cases of pulmonary TB, 18% undergoing anti-tubercular treatment, 10% Cured cases, 16% treatment defaulters and 4% treatment resistant. The CRP level in the newly detected TB patients was found to be 51.22 ± 30.54 . Those undergoing anti-tubercular treatment had a mean CRP value of 43.29 ± 28.94 and it dropped as the course of treatment progressed. CRP in patients who had started treatment was 66.55 ± 17.22 and those who had completed their treatment were 23.87 ± 26.05 . The patients who had almost completed the treatment had a mean CRP level of 4.78 ± 4.34 . Defaulters had a mean CRP of 66.90 ± 22.66 and the treatment failure had a mean CRP of 87.37 ± 5.83 . We found that mean CRP level (mg/dl) in the newly detected TB patients was found to be 52.4. Those undergoing anti-tubercular treatment had a mean CRP value of 42.4. CRP in patients who had completed their treatment were 4.5. Defaulters had a mean CRP of 65.3 and the treatment resistant had a mean CRP of 85.4. Yoon et al[12] identified nine unique studies enrolling 1793 adults from out-patient (five studies, 1121 patients) and in-patient settings (five studies, 672 patients), 72% of whom had confirmed HIV infection. Among out-patients, CRP had high sensitivity (93%, 95%CI 88–98) and moderate specificity (60%, 95%CI 40–75) for active PTB. Specificity was lowest among in-patients (21%, 95%CI 6–52) and highest among out-patients undergoing TB screening (range 58–81%). There was no difference in summary estimates by HIV status. F C de Beer et al[13] from their study concluded that C-reactive protein levels decreased rapidly after initiation of treatment in the patients with post-primary tuberculosis without significant pulmonary destruction. Bajaj G et al[14] noticed that the elevated CRP levels fell significantly to $5.93 \mu\text{g/ml}$ after one month of treatment and by 3 to 6 months of treatment had fallen to normal values. The patients who had left the treatment in between, treatment defaulters, and the treatment resistant patients had higher

CRP values. The defaulters had a mean CRP of 66.90 ± 22.66 and the treatment resistant had a mean CRP of 87.37 ± 5.83 .

Conclusion

Authors found that CRP levels are raised in tuberculosis and fall and attain normal values by the end of treatment.

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