

CORRELATION BETWEEN SERUM CALCIUM LEVELS AND SMEAR GRADING AMONG THE PULMONARY TUBERCULOSIS PATIENTS

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Abstract

Background: Tuberculosis (TB) is contagious and airborne. TB was one of the top 10 causes of death worldwide in 2017. It is also the leading killer of people with HIV and a major cause of deaths related to antimicrobial resistance.

Methods: Microscopically confirmed TB patients were included in the cases group and healthy individuals in the control group. Serum Ca was estimated by kit method, by auto analyzer. ANOVA and t- test was used to find the statistical significance.

Results: The mean serum Ca was 7.32 ± 1.22 mg/dl in TB and 9.41 ± 2.13 mg/dl in controls. The mean serum Ca levels were 7.22 ± 1.20 mg/dl, 7.14 ± 1.14 mg/dl, 7.12 ± 1.10 mg/dl and 7.06 ± 1.02 mg/dl respectively for scanty, 1+, 2+ and 3+; statistically the difference were not significant ($P > 0.05$) between the grades.

Conclusion: Hypocalcemia observed in pulmonary tuberculosis patients. No correlation was found between the mean serum Ca levels and grading.

Keywords: Calcium, TB, AFB.

Introduction:

Mycobacterium tuberculosis (MTB) complex, an acid fast bacillus (AFB) is the causative agent of tuberculosis (TB).¹ Tuberculosis (TB) is contagious and airborne. TB was one of the top 10 causes of death worldwide in 2017.² It is also the leading killer of people with HIV and a major cause of deaths related to antimicrobial resistance.

In 2017, there were an estimated 10 million new (incident) TB cases worldwide, of which 5.8 million were men, 3.2 million were women and 1

million were children. Eight countries accounted for 66% of the new cases: India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa. In 2017, 1.6 million people died from TB, including 0.3 million among people with HIV. Globally, the TB mortality rate fell by 42% between 2000 and 2017.³

The WHO-recommended rapid diagnostic test (WRD) for detection of TB and rifampicin resistance currently available is the Xpert MTB/RIF[®] assay. Of the 48 countries in at least one of the lists of high burden countries, 32 had

adopted national algorithms positioning the WRD as the initial diagnostic test for all people suspected of having pulmonary TB by the end of 2017. By the end of 2017, 68 countries reported having imported or started using bedaquiline, and 42 countries had used delamanid.³

Due to immunity, all MTB exposed individuals don't get TB. For optimum immunity, nutrition plays an important role. If the intake of nutrients is hampered, leads to deficiency and the individual prone for infections. In this regard, minerals also play an important role. But, the normal homeostasis mechanism regulates level of calcium (Ca).

Several investigators studied on level of serum Ca among the TB patients. But, we cannot find studies on correlation between levels of serum Ca and smear grading. With this, a study was undertaken to find the serum Ca levels and its correlation with smear grading among the PT individuals.

Material and methods

Study design: Hospital based case control study.

Study place: Department of microbiology and pulmonary medicine.

Sample size: 100 patients.

Sampling Method: Simple random sampling

Inclusion Criteria: Newly diagnosed PT patients

Exclusion Criteria: Individuals who are on anti TB treatment (ATT), previously treated cases, dropouts and defaulters were not included.

Data Collection: Collection of sputum samples, smear preparation, staining, screening under microscope was done as per the RNTCP guidelines. Serum Ca was estimated by kit method, by auto analyzer. The smears were graded using 100x oil immersion objective as per the RNTCP technical manual.

Data analysis: ANOVA test & unpaired t-test and chi-square test was used to find the statistical significance between the groups and also between the grades. ANOVA & unpaired t-test was used for quantitative data and chi-square test was used for qualitative data. P value of less than 0.05 was considered for statistical significance.

Results

Table 1: Age wise distribution

Age	Cases (n=50)	Controls (n=50)
Mean ±SD	39.6±6.8 Yrs	37.8±7.1 Yrs
p-value	0.198 (NS)	

The mean age in TB patients was 39.6±6.8 Yrs and controls was 37.8±7.1 Yrs.

Table 2: Sex wise distribution

Sex	Cases (n=50)	Controls (n=50)
Male	29	31
Female	21	19
p-value	0.684	

Male patients were more as compare to female.

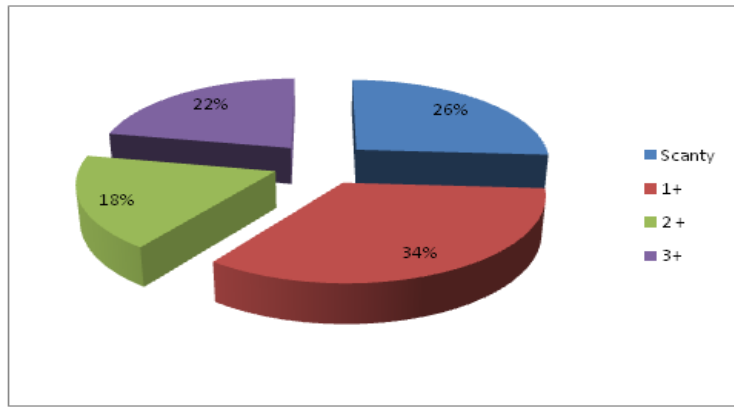


Figure 1: Microscopic finding wise distribution of cases

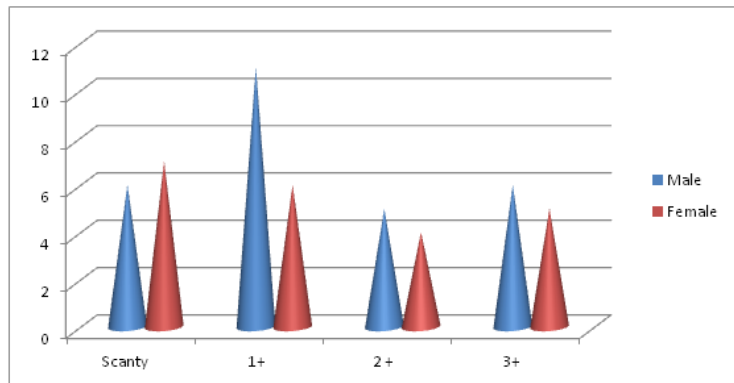


Figure 2: Sex wise distribution of patients

Table 3: Association between age and microscopic finding

Microscopic finding	Age (Mean±SD)
Scanty	37.2± 6.9 Yrs
1+	38.64± 7.08 Yrs
2 +	39.82± 7.84 Yrs
3+	39.14± 6.98 Yrs
p-value	0.645

The association between socio-demographic variable (age and sex) and microscopic finding was found stastically Insignificants. So these groups were comparable.

Table 4: S.calcium level in cases and controls.

S.calcium (mg/dl)	Cases (n=50)	Controls (n=50)
Mean ±SD	7.32±1.22	9.41±2.13
p-value	0.001 (HS)	

The mean difference in calcium level in cases and control was found highly significant.

Table 5: Association between S.calcium level and microscopic finding.

S.calcium (mg/dl)	Scanty (n=13)	1+(n=17)	2+(n=9)	3+(n=11)
Mean ±SD	7.22±1.20	7.14±1.14	7.12±1.10	7.06±1.02
p-value	0.981 (NS)			

Grade wise, the mean serum Ca levels were 7.22 ± 1.20 mg/dl, 7.14 ± 1.14 mg/dl, 7.12 ± 1.10 mg/dl and 7.06 ± 1.02 mg/dl respectively for scanty, 1+, 2+ and 3+ ; statistically the difference were not significant ($P > 0.05$) between the grades. These data shows that serum Ca levels were decreased with increase in the concentration of AFB in the sputum.

Discussion

TB is a disease seen among the poor people with low living standards. The prevalence of TB was reported to be more in male compared to female⁴. In our study also observed that the male female ratio was 1.38.

In the study newly diagnosed TB patients before initiation of ATT were included in the cases group, the mean serum Ca was 7.32 ± 1.22 mg/dl. In the control group, all were healthy individuals; never had TB. In the control group, the mean serum Ca level was 9.41 ± 2.13 mg/dl. In this study, hypocalcemia was observed among the TB cases and statistically the difference was significant between the groups ($P < 0.05$).

It is well known that alteration of serum Ca levels in various infections⁵. In one study from India, hypocalcemia was reported by the investigators, the mean serum Ca levels were 9.3 ± 0.46 mg/dl, 7.72 ± 1.02 mg/dl, respectively in the smear negative (SN) and SP individuals⁶. Whereas hypercalcemia was reported by Sharma et al. in another study from India⁷. But the investigators mentioned that hypercalcemia was reported in just 15.5% TB patients and the mechanism was reported to be unclear.

Grade wise, the mean serum Ca levels were 7.22 ± 1.20 mg/dl, 7.14 ± 1.14 mg/dl, 7.12 ± 1.10 mg/dl and 7.06 ± 1.02 mg/dl respectively for scanty, 1+, 2+ and 3+ ; statistically the difference were not significant ($P > 0.05$) between the grades. These data shows that serum Ca levels

were decreased with increase in the concentration of AFB in the sputum.

It was also reported in the literature that in the TB patients, with ATT, the serum Ca levels were turned to normal^{8,9}. With this information it is clear that MTB is the only cause for hypocalcemia.

Conclusion:

Hypocalcemia observed in pulmonary tuberculosis patients. No correlation was found between the mean serum Ca levels and grading.

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