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Application of Cancer Antigen 125 Test in Diagnosis of Pulmonary Tuberculosis

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Abstract

Objective: Cancer antigen125 (CA-125) test is the most frequently used biomarker for ovarian cancer, but according to some literatures CA125 test can discriminate active pulmonary tuberculosis from inactive cases in tuberculosis (TB) patients. Therefore the objective of this work was to further study application of CA-125 test in identification of active tuberculosis from inactive cases and for evaluation of response to anti-TB treatment.

Methods: Plasma CA125 of 30 patients with active tuberculosis cases (group 1), 19 cases with inactive tuberculosis (group 2) and 28 healthy subjects (group 3) was measured and compared. Measurement of CA-125 was done only once in group 2 and 3 but it was repeated in group 1 at two and six month of anti-TB treatment. Independent t-test was used to compare CA125 level between groups and paired t-test was used to compare CA125 level within group 1 at baseline, two month and six month of anti-TB treatment.

Result: Concentrations of CA-125 were 96.08 ± 122.23, 12.05 ± 12.57, 7.71 ± 8.12 U/mL (mean ± SD) in group 1, 2 and 3 respectively. Level CA-125 was significantly higher in group 1 than in other groups ($p < 0.001$); but there was no statistical significant difference between group 2 and group 3 ($p > 0.05$). Level of CA-125 in group 1 at six month of anti-TB treatments was not statistically significant difference to level in Group 2 and Group 3 ($p > 0.05$). Concentration of CA-125 in group 1 decreased significantly from 96.08 ± 122.23 to 22.24 ± 20.57 and 13.42 ± 10.35 U/mL ($p < 0.05$) at baseline, 2 month and 6 month of anti-TB treatment respectively.

Conclusion: This study result confirms that CA-125 test can be used to identify active tuberculosis from inactive cases and for evaluation of response to anti-TB treatment. This test can also be used for detecting tuberculosis activity in cases sputum examination cannot be performed and cases with negative sputum.

Keywords: Cancer antigen 125; Pulmonary tuberculosis; Active tuberculosis; Inactive tuberculosis; Anti-TB treatment

Introduction

Pulmonary tuberculosis (TB) is a contagious bacterial infection that attacks the lungs and spread to other organs. Globally, tuberculosis remains one of the leading causes of death and public health problems [1,2] despite dramatic improvements made in providing access to high-quality TB services. WHO estimates that about one third of all incident cases of active TB are not properly diagnosed or receive care of poor quality outside of national TB programs [3]. Among diagnosed cases, the delay of the result is often long [4,5]. Determination of disease activity of pulmonary tuberculosis is important for treatment [6]; but follow-up of the infection activity and response to therapy is not always easy to evaluate [7].

Bacteriological examination of sputum is the gold standard in diagnosis and follow-up of disease; but this procedure takes several weeks to know whether the patient is undergoing successful therapy or not. Identifying TB with diagnosis based on sputum-smear microscopy is effective in diagnosing highly infectious TB (sputum smear-positive TB in a person with a productive cough), but it is less effective in early

diagnosis for people with less pronounced symptoms [8]. Culture method is another methods used for diagnosing TB.

It is growth-dependent and takes six to eight weeks to produce the result, this long time limit the method to aid intermediate decisions on treatment [9]. Therefore screening for active TB is one of several possible interventions that can improve early detection of all forms of TB [10].

A cancer antigen125 (CA-125) is the most frequently used biomarker for ovarian cancer detection [11-13]. Although women with ovarian cancer often have an elevated level of CA 125, it could related to many conditions including malignancy of the lungs [14,15] breasts [16], colon [17], pancreas [18], and some non-malign conditions such as endometriosis [19], hepatic cirrhosis [20] or heart failure [21-23] pelvic inflammatory disease, or normal menstruation [14,15,17,24].

Carlson and his colleagues have reported that CA125 levels are elevated in patients with different condition like extra-pulmonary tuberculosis [24]. In clinical practice, it is difficult to discriminate active tuberculosis (TB) from inactive TB cases for commencing anti-TB therapy in a timely manner [25]. According to a reported by Yılmaz et al. CA125 level elevation in TB patients has shown nice sensitivity and specificity in discriminating active pulmonary tuberculosis from

inactive [26]. This shows CA-125 tests can be applied as useful marker in the differential diagnosis of active pulmonary tuberculosis. In this work CA-125 level of early identified active TB patients at base line (before starting anti-TB treatment) was measured and compared to treatment response at 2 month and 6 month of anti-TB treatment. The Level of CA-125 in active tuberculosis was also compared to CA-125 level in inactive tuberculosis and health groups.

Methods

The samples for this study were collected from St. Peter Specialized TB Hospital, Akaki and Kality Health Centers Addis Ababa and stored in a freezer at -80 degrees until analysis. The study participants were classified in to three groups. Group 1 includes 30 patients with active tuberculosis cases, Group 2 includes 19 cases with inactive tuberculosis and Group 3 includes 28 healthy subjects with non-TB pulmonary infection as controls. patients who has been diagnosed with cancer, females below 55 age, females who has been diagnosed with Pelvic inflammatory disease and patients receiving anti-TB treatment at recruitment or previously were excluded from this study.

In all cases tuberculosis had been confirmed by positive culture in sputum during sample collection. Measurement of CA-125 was taken in all three groups and repeated in Group 1 at two month and six month of anti-tuberculosis treatment. Electro-chemiluminescence (cabase 411, Roche) machine was used for CA-125 measurement.

Concentration of Plasma CA 125 in group1, group 2 and group 3 were measured and compared to each other. In group1 concentration of Plasma CA-125 was measured at 2 month and 6 month of anti-TB treatment and compared to before starting treatment. The SPSS version 20 software was used for all statistical analyses of the results. Independent t-test was used to compare CA125 level between groups and paired t-test was used to compare CA125 level within group1 at baseline, two month and six month of anti-tuberculosis treatment. A written informed consent had obtained from the study participants during sample collection and this study has obtained ethical clearance from Scientific and Ethics Research Office (SERO) of Ethiopian Public Health Research Institute (EPHI).

Results

Levels of Plasma CA-125 of the three studied groups were 96.08 ± 122.23, 12.05 ± 12.57, 7.71 ± 8.12U/mL (mean ± SD) for group 1, 2 and 3, respectively (Table 1).

Groups	Number of participant	CA 125 U/m l (mean ± SD)	P value
Group 1	30	96.08 ± 122.23	0.001
Group 2	19	12.05 ± 12.57	
Group 1	30	96.09 ± 122.23	0
Group 3	28	7.71 ± 8.12	
Group 2	19	12.05 ± 12.57	0.855
Group 3	28	7.70 ± 8.13	

Table 1: Values of Plasma CA 125 of the three studied groups

Level of Plasma CA-125 of group 1 at six month of anti-TB treatment, Group 2 and Group 3 were 3.43 ± 10.35, 12.05 ± 12.57 and 7.70 ± 8.13, respectively (Table 2).

Groups	Number of participant	CA 125 U/m l (mean ± SD)	P value
Group 1 at six month of anti-TB treatment	30	13.43 ± 10.35	0.708
Group 2	19	12.05 ± 12.57	
Group 1 at six month of anti-TB treatment	30	13.43 ± 10.35	0.408
Group 3	28	7.70 ± 8.13	

Table 2: Comparison of Plasma CA125 level of group 1 at six month of anti-TB treatment to group 2 and group 3

Levels of Plasma CA 125 in active TB patients were 96.08 ± 122.23, 22.24 ± 20.57 and 13.42 ± 10.35 at baseline, 2 and 6 month of anti-TB treatment respectively (Table 3).

Phase of anti-TB treatment	CA 125 U/mL (mean ± SD)	P value
Pre treatment	96.08 ± 122.23	0.002
Two month	22.24 ± 20.57	
Pre treatment	96.08 ± 122.23	0.001
Six month	13.42 ± 10.35	

Table 3: Comparison of Plasma CA 125 level in group 1 at Pretreatment to at 2 month and 6 month of anti-TB treatment

Discussion

Levels of Plasma CA-125 were statistically significant different among the three studied groups except between group 2 and group 3 (Table 1). Their values were 96.08 ± 122.23, 12.05 ± 12.57, 7.71 ± 8.12 U/mL (mean ± SD) in group 1, 2 and 3 respectively. Levels of Plasma CA-125 in active tuberculosis cases were significantly higher than in other groups (p<0.005). This result shows CA-125 test can be used in TB diagnosis as complimentary test. The significant difference between levels of plasma CA 125 of active and inactive tuberculosis cases shows CA 125 test can distinguish active tuberculosis from inactive tuberculosis. This result is similar to reports of Yilmaz and his coworkers [26], who reports Serum CA125 levels in active pulmonary tuberculosis higher than in healthy and inactive pulmonary tuberculosis groups. Kim and his coworkers also reports CA-125 levels in patients with active pulmonary TB cases are higher than in non-tuberculosis lung diseases [27].

As can be seen from Table1 there was no statistical significant difference between CA-125 level of healthy group and inactive tuberculosis group (p>0.005). This indicates that CA 125 test could not differentiate inactive tuberculosis from healthy subjects. Yilmaz et al. [26] also repot that CA 125 level increase in TB patients with active pulmonary tuberculosis but not in patients with inactive pulmonary tuberculosis.

As we can see from Table 2 there was no statistically significant difference between value of CA-125 of group 1 at six month anti-TB treatments to either group 2 or group 3 (p>0.05). This shows if the

patients cured from active-TB infection, their CA 125 level decreased to normal level. As can be seen from Table 3 CA 125 level in group 1 decreased significantly from 96.08 ± 122.23 to 22.24 ± 20.57 and to 13.42 ± 10.35 U/mL before treatment, at 2 month and 6 month of anti-TB treatments respectively. This show that CA-125 levels increase in patients with active pulmonary TB and decline to normal values during treatment; therefore this method can be used for the fellow up of the patients during treatments and to evaluate the efficacy of therapy.

Acknowledgements

Conflict of Interest

The authors declare that there is no conflict of interest.

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