Evaluation of Serodiagnosis of Tuberculosis in Comparison with Traditional Methods

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ABSTRACT

Tuberculosis is an enormous tool of morbidity and mortality. The vast majority of tuberculosis patients live in developing countries, where the diagnosis of tuberculosis relies on the identification of acid-fast bacilli on unprocessed sputum smears using conventional light microscopy. Microscopy has high specificity in tuberculosis-endemic countries, but modest sensitivity which varies among laboratories (range 20% to 80%). Thus, the development of rapid and accurate new diagnostic tools is imperative. Immune-based tests are potentially suitable for use in low-income countries as some test formats can be performed at the point of care. In the present study, the diagnostic value of 16-kDa and 38-kDa mycobacterial antigens was investigated in patients who were diagnosed as open pulmonary tuberculosis. The humoral immune response was analysed in a group of 60 TB patients, and in control group consisting of 15 healthy volunteers and 15 subjects with pulmonary diseases other than TB. The sensitivity, specificity, positive predictive value and negative predictive value of the test were determined at 45%, 93.3%, 93.1% and 45.9%, respectively. In conclusion, the ELISA test has a very good specificity and an acceptable sensitivity and positive predictive value. It is thought that it could be used in combination with other methods to increase diagnostic accuracy, especially for culture-negative tuberculosis cases, which are difficult to diagnose.

INTRODUCTION

Globally, tuberculosis (TB) accounts for approximately nine million new cases and three million deaths every year. Tuberculosis is a disease of poverty, with 90% of the cases occurring in developing countries. (1)

Some of the disadvantages of traditional diagnostic techniques such as detection of acid-fast bacilli (AFB) are the lack of sensitivity and the isolation and growth of the tuberculous bacillus in culture media are the length of time (sometimes growth takes several weeks). Recent molecular biology techniques have made it possible to diagnose TB in a few hours, but they are expensive and not readily available in most hospitals in developing countries. In addition, these molecular biology techniques have low sensitivity particularly in smear- and culture-negative patients with pulmonary TB. (2)

The search for rapid and reliable diagnostic tests for active TB based on the examination of sputum, blood and other clinical specimens has been the focus of a number of studies. In particular, the detection of TB by serological methods has been a subject of great interest, particularly with regard to patients who are unable to produce adequate sputum, and those who are sputum smear negative, or are suspected of having extrapulmonary TB. (3)

Assays based on immunological responses to M. tuberculosis are preferred to the current bacteriologic methods of TB diagnosis because they do not depend on the detection of mycobacteria only. In recent years, the detection of antibodies in clinical specimens is getting increasing attention because: (1) a strong antibody response is mounted during M. tuberculosis infection; (2) antibody detection does not require living cells, unlike assays based on cell-mediated immunity; and (3) serological methods for detection of mycobacterium tuberculosis antigens can be simple, rapid, inexpensive and relatively non-invasive. (4)

The 38 kDa antigen (also called antigen 5 or antigen 78) is a lipo glycoprotein antigen of M. tuberculosis. It is one of the most important antigens of M. tuberculosis. Assays based on immunological responses to M. tuberculosis are preferred to the current bacteriologic methods of TB diagnosis because they do not depend on the detection of mycobacteria only. In recent years, the detection of antibodies in clinical specimens is getting increasing attention because: (1) a strong antibody response is mounted during M. tuberculosis infection; (2) antibody detection does not require living cells, unlike assays based on cell-mediated immunity; and (3) serological methods for detection of mycobacterium tuberculosis antigens can be simple, rapid, inexpensive and relatively non-invasive. (4)

The 16-kDa antigen is a cytosolic regulatory protein (virulence factor); specific to the M. tuberculosis complex; and is essential for the survival of the bacilli in the hostile environment of the host, particularly during latency. The antigen is undetectable during exponential growth of M. tuberculosis, but it is...
overproduced during the stationary phase, as well as in adverse conditions, such as, oxygen deprivation, nutrition depletion, low pH or accumulation of toxic by-products. (4)

This study aims at comparison between traditional methods in TB diagnosis and a serodiagnostic method based on detection of IgG antibodies directed against specific mycobacterium tuberculosis antigens (38 kDa antigen & 16 kDa antigen) using a commercially available ELISA kit to evaluate its sensitivity and specificity.

SUBJECTS, MATERIAL & METHODS

The study was done at Microbiology & Immunology Department of Benha Faculty of Medicine from March (2011) to August (2012) on 60 patients attending the outpatient clinic of Benha chest hospital and inpatient Zagazig Chest hospital. The patients were selected according to the clinical, radiological and laboratory data that diagnose them as having open pulmonary tuberculous infection. Those with past history of TB, on antituberculosis treatment, HIV positive and new cases not willing for informed consent were excluded. 30 control subjects were included and consisted of (15) patients who were admitted to the hospital with pulmonary diseases other than TB. The diseases included were pneumonia, chronic obstructive pulmonary disease and bronchiectasis. In addition, (15) healthy voluntary blood donors who came for blood donation at the Blood Bank of Benha University Hospital and neither had history of any notable infection in the past 2 years, nor had symptomatic tuberculosis in the lifetime.

All patients under study were subjected to:
- **Full history taking** including age, sex, occupation, family and past history of tuberculosis and history of intake of antituberculosis drugs.
- **Clinical examination.**
- **Radiological examination:** plain x-ray (postero-anterior and lateral views).

**SAMPLES:**

Early morning sputum sample and blood samples were collected from shared patients and the control group and subjected to the following:

A. **SPUTUM SAMPLES:**

  I- **Decontamination and Concentration.**
  II- **Staining:** Ziehl Neelsen stained smear.

  III- **Culture:**
  1. Löwenstein-Jensen (LJ) medium: The isolated bacterial colonies were identified by:
     - Ziehl Neelsen stain.
     - Nitrate reduction test.
     - Niacin production test.
  2. **Manual Mycobacteria Growth Indicator Tube (MGIT).**

B. **BLOOD SAMPLES:**

They were used to detect IgG antibodies directed against specific mycobacterium tuberculosis antigens (38 kDa antigen & 16 kDa antigen) using commercially available ELISA kit (PATHOZYME TB COMPLEX PLUS, Omega Diagnostics).

**Methods:**

A- **Collection of the sputum samples:**

Early morning sputum sample was collected by asking the patient to cough deeply in a sterile wide screw capped container. Three successive early morning sputum samples can be collected if the first sample show negative staining results.

B- **Collection of the serum samples:**

A Sample of venous blood was withdrawn by empty vacutainer and allowed to clot and retract in a water path at 37° for 15-30 minutes. Then the clotted blood sample was centrifuged and clear serum was collected in an eppendorf tube and stored at –20°C till the time of testing.

C- **Decontamination and Concentration:**

Sputum processing by 4% NaOH method. (6)

D- **Staining:**

The smears prepared from the concentrated specimens were stained by Ziehl-Neelsen Staining technique according to (Darrow, 1948)(7). Smears were graded according to the number of AFB per microscopic field according to (American Thoracic Society, 1981)(8).

E- **Culture of sputum samples:**

After decontamination, liquefaction and concentration of the specimens; culture of sputum samples were carried on:

- **LJ media according to Kastle and Kubica**(9)

  The bacterial isolates were identified according to the following criteria:
  
  a. **Rate of growth:**
  
  The organisms that grow after 7 days incubation were considered slow growers. (10)

  b. **Niacin accumulation test:**
  
  A positive test for niacin was indicated by the appearance of a yellow color in the test culture and no color in the control tube.
c. Nitrate reduction test

A positive nitrate test was indicated by the appearance of a blue color in the top portion of the strip.

- Manual Mycobacteria Growth Indicator Tube (BBL MGIT) (Becton Dickinson, BD): 2 supplements were added to the MGIT tube before inoculation; BBL MGIT OADC enrichment (Becton Dickinson, BD) and MGIT PANTA antibiotic mixture (Becton Dickinson, BD)

The media were inoculated and read according to the manufacturer instructions. Incubated tubes were incubated at 37°C and examined daily in a 365nm wavelength UV light source for orange fluorescence up to 8 weeks of incubation. When a tube was found to be positive for bacterial growth, a portion of the tube content was removed and used to prepare two smears, one for ZN staining and one for Gram staining. If AFB were present in the ZN smear, the tube content was subcultured onto a slant of LJ medium. If organisms grew on subculture and were identified as M. tuberculosis, the BBL MGIT culture was considered a true positive. However, if AFB were not seen but the Gram stained smear showed other bacteria or fungi, the BBL MGIT culture was considered contaminated.

F- Serological test; the PATHOZYME-TB Complex Plus (Omega Diagnostics):

In the PATHOZYME-TB Complex Plus kit, the 38-kDa antigen, which is obtained by recombinant technology, is mixed with the 16-kDa recombinant protein. The test was performed according to the manufacturer’s instructions. In brief, diluted (1:50) serum was distributed in microtitre wells and incubated for 60 min at 37uC. Unbound serum was removed by washing with a buffer solution. The wells were subsequently incubated with peroxidase-labelled antihuman conjugate at 37uC for 30 min. After another wash cycle, peroxidase substrate tetramethylbenzidine containing hydrogen peroxide was added to the wells and the colorimetric reaction was prolonged for 15 min in the dark at 37uC until stop reagent was added. Absorbance values at 450 nm were recorded. Four standards (with 2, 4, 8 and 16 serounits/ml) were provided to generate a semi-log reference curve. Because the sera were diluted 1:50, the units extrapolated from the curve were multiplied by 50 to obtain serounits for result interpretation. According to the manufacturer’s instructions, a result was considered positive when the level of antibodies in a sample was higher than 200 serounits/ml. Absorbance of each well was measured, at 450nm, using STAT FAX-2100 Microplate Reader. Results were expressed as the number of serological units of specific IgG per mL.

**RESULTS**

There was no statistical significant difference between study and control groups as regards age and sex, table (1).

Table (1): Comparison between the study (tuberculous) and control group as regards age and sex.

<table>
<thead>
<tr>
<th>Age (mean ± SD)</th>
<th>TB cases (n=60)</th>
<th>Control group (n=30)</th>
<th>Test of significance</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36±11.7</td>
<td>38.5 ± 6.5</td>
<td>1.1</td>
<td>&gt;0.05 (0.27)</td>
</tr>
<tr>
<td>Sex (No/%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>20 /33.3%</td>
<td>8 / 26.7%</td>
<td>0.42</td>
<td>&gt;0.05 (0.52)</td>
</tr>
<tr>
<td>Male</td>
<td>40 / 66.7%</td>
<td>22 / 73.3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Out of the sixty studied patients; 40 (66.7%) were males and 20 (33.3%) were females. Their age ranged from 19-56 years. The highest rate of tuberculosis was 18 (30%) cases in the age group 25-34 years, table (2).

Table (2): Age group distribution of pulmonary tuberculosis in the studied patients

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>16</td>
<td>26.6%</td>
</tr>
<tr>
<td>25-34</td>
<td>18</td>
<td>30%</td>
</tr>
<tr>
<td>35-44</td>
<td>10</td>
<td>16.6%</td>
</tr>
<tr>
<td>45-54</td>
<td>10</td>
<td>16.6%</td>
</tr>
<tr>
<td>55-64</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>total</td>
<td>60</td>
<td>100%</td>
</tr>
</tbody>
</table>
As regarding the occupational distribution of the studied patients out of 60 studied patients 42 (70%) were manual workers, 12 (20%) housewives and 6 (10%) employers.

By analysis of the collected data from the TB cases and controls for some host-related factors for tuberculosis it was found that there is a significant statistical association between TB infection and smoking, positive family history& diabetes, table (3).

### Table (3): Host-related factors for tuberculosis: comparison of TB cases and controls.

<table>
<thead>
<tr>
<th></th>
<th>TB cases (60)</th>
<th>Control (30)</th>
<th>X²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes n(%)</td>
<td>No n(%)</td>
<td>Unknown n(%)</td>
<td>Yes n(%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>32 (53.3)</td>
<td>28 (46.6)</td>
<td>-</td>
<td>7 (23.3)</td>
</tr>
<tr>
<td>Family history of TB</td>
<td>17 (28.3)</td>
<td>43 (71.7)</td>
<td>-</td>
<td>2 (6.7)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>34 (56.7)</td>
<td>26 (43.3)</td>
<td>-</td>
<td>8 (26.7)</td>
</tr>
<tr>
<td>Anemia</td>
<td>11 (18.3)</td>
<td>27 (45)</td>
<td>22 (3.7)</td>
<td>2 (6.7)</td>
</tr>
<tr>
<td>Immunosuppressive ttt</td>
<td>2 (3.3)</td>
<td>58 (96.7)</td>
<td>-</td>
<td>4 (13.3)</td>
</tr>
</tbody>
</table>

All the collected sputum samples form the 60 patents with open pulmonary TB were positive for acid fast bacilli. All of them were positive when cultured on LJ media and 54 (90%) were positive by MGIT, while no growth occurred on LJ media from the control samples but 4 (13.3%) were positive by MGIT, table (4).

### Table (4): LJ culture and MGIT results of the sputum samples of the tuberculous and control groups

<table>
<thead>
<tr>
<th></th>
<th>LJ culture</th>
<th>MGIT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive n(%)</td>
<td>Negative n(%)</td>
<td>Positive n(%)</td>
<td>Negative n(%)</td>
</tr>
<tr>
<td>Tuberculous group (n=60)</td>
<td>60 (100)</td>
<td>0 (0)</td>
<td>54 (90)</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Control group (n=30)</td>
<td>0 (0)</td>
<td>30 (100)</td>
<td>4 (13.3)</td>
<td>26 (68.7)</td>
</tr>
<tr>
<td>Total (n=90)</td>
<td>60 (66.7)</td>
<td>30 (33.3)</td>
<td>58 (64.4)</td>
<td>32 (35.6)</td>
</tr>
</tbody>
</table>

The mean detection time on LJ media was 28.3 ± 6.3 and that of manual MGIT was 11.9 ± 3.2 and this difference is statistically significant, table (5).

### Table (5): Mean detection times of mycobacterium tuberculosis on LJ media and manual MGIT

<table>
<thead>
<tr>
<th></th>
<th>LJ media</th>
<th>MGIT</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection time (mean ± SD) (days)</td>
<td>28.3 ± 6.3</td>
<td>11.9 ± 3.2</td>
<td>18.01</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Out of the total sputum samples (90), 54 were positive by MGIT and LJ culture, 26 were negative by both, 4 were negative by LJ culture only and 6 were negative by MGIT only. Using LJ culture as the gold standard, the sensitivity and specificity of BBL MGIT were 90% and 86.7% respectively. Its Positive predictive value (PPV) was 93.1% and its Negative predictive value (NPV) was 81.3%, table (6).
Table (6): Results of manual MGIT versus LJ culture of the sputum samples of the tuberculous and control groups

<table>
<thead>
<tr>
<th></th>
<th>L.J culture</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases (n=60)</td>
<td>Control (n=30)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>MGIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>54</td>
<td>4</td>
</tr>
<tr>
<td>Negative</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>

Antibody levels against 38-kDa and 16-kDa mycobacterial antigens were detected higher than the cut-off level in the serum of 27 (45%) out of the 60 TB cases and in 2 (6.6%) of the control cases, table (7).

Table (7): Results of Pathozyme TB complex plus test (ELISA test) for both TB patients and control group.

<table>
<thead>
<tr>
<th></th>
<th>Seropositive n (%)</th>
<th>Seronegative n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculous group (n=60)</td>
<td>27 (45%)</td>
<td>33 (55%)</td>
<td>60 (100%)</td>
</tr>
<tr>
<td>Control group (n=30)</td>
<td>2 (6.6%)</td>
<td>28 (93.3%)</td>
<td>30 (100%)</td>
</tr>
</tbody>
</table>

Out of the 60 tuberculous cases 33 (55%) cases were seronegative (<200 U/ml), 20 (33.3%) cases were low positive (200-450 U/ml) and 7 (11.6%) cases were high positive (> 450 U/ml), figure (1).

From the 30 control subjects only 2 (6.6%) were seropositive (>200 U/ml) and 28 (93.3%) were seronegative (<200 U/ml), figure (2).

Figure (1): Values of antibody titres for 38-kDa and 16-kDa mycobacterial antigens in the sera of the studied TB cases (n=60) by the Pathozyme TB complex plus test (ELISA test)
Out of the total serum samples (90), 29 were seropositive and 61 were seronegative. Using LJ culture as the gold standard, the sensitivity and specificity of Pathozyme TB complex plus test were 45% and 93.3% respectively. Its Positive predictive value (PPV) was 93.1% and its Negative predictive value (NPV) was 45.9%, table (8).

Table (8): Results of Pathozyme TB complex plus test (ELISA test) versus LJ culture for both TB patients and control group.

<table>
<thead>
<tr>
<th></th>
<th>LJ Cases (n=60)</th>
<th>Control (n=30)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>ELISA</td>
<td>27</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>28</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>30</td>
<td>90</td>
</tr>
</tbody>
</table>

DISCUSSION

M. tuberculosis remains a major infectious cause of death in developing countries and has re-emerged in industrialized countries. TB control depends on the improved and early detection of the disease. Rapid identification of bacilli-positive patients, who are the most potent source of M. tuberculosis transmission in the community, is therefore highly recommended. Direct microscopic examination of clinical samples by Ziehl-Neelsen (ZN) staining technique is the most commonly used method for the rapid diagnosis of TB\cite{13}. However, its sensitivity is suboptimal, as ZN staining is unlikely to detect samples with <5000 bacilli/ml\cite{14}.

In addition, direct microscopic examination of ZN-stained smears is time-consuming, especially for low-loaded M. tuberculosis slides. The development of a simple and inexpensive test that compares favourably with conventional procedures in terms of sensitivity would...
In our study the mean detection times of mycobacterium tuberculosis from the sputum samples on MGIT was 11.9±3.2 days compared to 28.3 ± 6.3 days when using LJ medium. This difference in detection times is statistically significant (p<0.001). Many studies have demonstrated significantly reduced times for detection of mycobacteria with the use of liquid media rather than solid egg or agar based media. In a study done by Fadzilah et al. (17) for AFB smear-positive specimens, the mean times to detection were 11.5± 3.4 days with the MGIT, and 31.2± 5.8 days with LJ culture. For AFB smear- negative specimens, the corresponding times were 13.2± 5 days with the MGIT, and 35.3±5.3 days with LJ culture. The difference between BBL MGIT and LJ culture was statistically significant (p<0.0001). In a recent study done by Pérez-Porcuna et al. (18) the time of culture positivity in MGIT was a median of 14 days, 48 days for the LJ cultures, being 3-fold more rapid in the former than in the latter (P < 0.0001).

In the present study, using primary LJ culture as the gold standard, the sensitivity and specificity of BBL MGIT were 90% and 86.7% respectively. This agrees with other studies such as that done by Fadzilah et al. (17) where the sensitivity and specificity of the MGIT were 90% and 89.6% respectively. The sensitivity of MGIT in a study done by Chew et al. (19) was 93% and this is also concordant with our results.

Variations in specific antibody responses to mycobacterial antigens in different human populations may be linked to human leukocyte antigen-DR phenotype, and tests designed to detect responses to a single antigen could show important geographic variability and limited sensitivity (20). To overcome these problems, multiantigen tests have been developed (21). This combined use of antigens was found to be more useful in serodiagnosis as it maximizes the effectiveness of serodiagnosis, but it is not possible to detect all antibodies as well, as this could cause low specificity (22). Pottumarthy et al. (23) indicated that maximum sensitivity was obtained when seven tests were combined, but also that specificity fell to 55% in controls.

The test kit used in this study employed two different protein antigens (38- kDa and 16-kDa antigens) to detect an IgG response to M tuberculosis. The combinatorial use of the 38-kDa and 16-kDa antigens may increase the test sensitivity compared with the 38-kDa antigen alone (24). The 38-kDa antigen is the most frequently studied serological antigen and is also a core component in different commercial TB serological tests (25).

Forty five percent of the studied TB patients were seropositive for 38-kDa and 16-kDa antigens (table 14). Seropositivity for the 38-kDa and 16-kDa antigens together was found by Julian et al. (26) to be 31% in the smear-positive cases and by Imaz et al. (27) to be 58.8%. Beck et al. (28) detected antibodies against 16-kDa and 38- kDa antigens in 50.9% and 59% of samples of TB patients, respectively. This diverse antibody response to M. tuberculosis may be governed by human leukocyte antigen (HLA) types (29). Houghton et al. (30) pointed out that the frequency of recognition using the same recombinant 38-kDa antigen preparation ranged 35–82% with samples from smear-positive patients from four different geographical areas.

In this study the sensitivity and specificity of the Pathozyme TB complex plus were 45% and 93.3% respectively. This low sensitivity means that the ability of the test to detect those who are truly infected is low, while the high specificity means that the test ability to identify those who are truly negative (not having infection) is high. The high PPV (93.1%) indicates that positive results of tests can be used to confirm the diagnosis but the low NPV (45.9%) indicates that the test has no value in the exclusion of TB.

These coincides with previous studies which reported that the sensitivities of the ELISA technique based on detection of antibodies against 38-kDa and 16-kDa antigens were 59% (31) and 52.5% (22) and the reported specificities were 98% (31) and 93.33% (22).

Our results were also comparable to those found by Ben Selma et al. (15) where the Pathozyme TB complex plus showed a sensitivity of 43.5% and a specificity of 96.3%. Also Demkow et al. (32) reported a test sensitivity of 56%, and a specificity of 99%.

Meena et al. (32) reported that the specificities of the test reported previously coinciding (from 88–100%), but the reported sensitivities of the test vary (33–89%) for smear-positive TB patients and (16–54%) for smear negative TB patients. This variation could be depending on the phase of the disease and on the presence of mycobacteria in sputum; it was much higher in culture positive and in chronic cases. That could be connected to a higher antigenic load and to the persistent stimulation of the immune system (31). This explains the results obtained by Imaz et al. (27) where the sensitivities of the test were 29% in smear-
negative patients and 58.8% in smear-positive patients.

In a study done by senol, et al.\(^3\), the sensitivity, specificity, positive predictive value, and the negative predictive value of the Pathozyme TB complex plus were found to be 25%, 90%, 66.7%, and 60%, respectively. This low level of sensitivity and negative predictive value low could be explained by the involved study group who were children. The data from the literature indicate that none of the available serodiagnostic tests for TB have an adequate sensitivity and specificity under various clinical conditions to be useful for diagnosing TB in children.\(^3\)

**CONCLUSION**

Although MGIT is more costly and laborious, it has distinct advantages over the conventional LJ culture with respect to faster growth. It is safe, and simple to use and does not require exogenous gas or radioactive elements compared with other mycobacterial cultures. Nevertheless, due to LJ culture positive but BBL MGIT negative specimens, a combination of solid and liquid culture systems is still required for the highest recovery of mycobacteria from clinical specimens.

The ELISA test (Pathozyme TB complex plus) is simple, easy to perform, has a very good specificity and an acceptable sensitivity and positive predictive value. To replace culture, the ‘gold standard’ recommended by the WHO, the sensitivity and specificity of a satisfactory serological test should be higher than 80% and 95% respectively. So this test has a good specificity and a lower level of sensitivity than recommended. But this sensitivity is comparable to the compromised sensitivity of the direct microscopic examination of clinical samples by Ziehl-Neelsen staining technique (the most commonly used method for rapid diagnosis in limited resources labs). So, this test is useful in diagnosis, although its use alone is not recommended as a single tool to confirm or to rule out TB. It could be used in combination with other methods to increase diagnostic accuracy, especially for culture-negative tuberculosis cases and extrapulmonary TB which are difficult to diagnose.

**REFERENCES**


تقييم التشخيص المصلي للسل بالمقارنة مع الطرق التقليدية

أ.د. أحمد عمرو شفيق و/أ.د. محمد عبد الفتاح مرجان و/أ.د. سوسن عبد الرحمن يوسف و/أ.د. هدى حميدي أحمد

قسم الميكروبيولوجي والمناعة - كلية طب بها - جامعة بها

إن البحث عن طريقة سريعة وفعالة لتشخيص مرض السل أصبح محوراً هاماً في الدراسات وخاصة تلك الدراسات التي تتعلق بتشخيص الأشخاص المصابين كذلك الطرق التي تستخدم على البحث عن الأشخاص المصابين. إذن يصبح الحصول على عينات من الأشخاص المصابين من دون تأخير نتائج الأشعة المجرية سالبة أو تكون مختلطة للأشعة المجرية مهم جداً.

وتشمل الدراسة المقارنة بين الطرق التقليدية في تشخيص السل الروتيني وطريقة اختبار الأجسام المناعية لتشخيص السل (Pathozyme TB complex plus & ELISA) المرتبط بالأنزيمات (الزرا) المستخدمة في التشخيص.

تم إجراء هذه الدراسة على مرضى عدّ من مستشفى الصدر بينها ومستشفى الصدر بالزقاء وفحصت العينات بقسم الميكروبيولوجي والمناعة بكلية طب بها في الفترة من شهر مارس 2011 إلى أغسطس 2012. وقد تم تلقي الدراسات 60 مريضاً منهم 40 ذكر و 20 أنثى وتم تراشح مجموعهم في عمره بين 19 إلى 58 سنة. وقد تم اختبار الحالات المتبقيات على عدسة مشرقة في الدرن الزراعي على ضوء الأشعة السينية وال حين المصور للمريض. وتم استبعاد أي حالة خاصة بها بمرض سوي شبيه بالسل أو حديث يعاني من أي حالات مグラت أو مصابين بمرض الأورام أو أفراد الأدوية المعالجة للدرن أو رفضت المشاركة في الدراسة. كما ضمت الدراسة مجموعة من مرضى سريرية (الزرا) وتم جمع عينات من الأشخاص المصابين وتحديد حالة مرضي بالسل في كل الدراسة.

وقد حجزت الأشخاص المصابين بالصلب وتم رعى ملفهم لبدو من الأمراء في الصدر بالزقاء وتحديد حالة مرضي بالسل في كل الدراسة.

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