

Laboratory Tests for Infective Endocarditis Among Patients Visiting Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal

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Abstract

Introduction Infective endocarditis (IE), a serious microbial infection of the endocardium, is a complex multifaceted disease that may affect any organ system. Diagnosis of IE is difficult due to atypical manifestations and frequent negative blood culture reports, some of other laboratory tests are equally helpful tools for the diagnosis purpose e.g. Hemoglobin level, Erythrocyte Sedimentation Rate (ESR) value, C-reactive protein (CRP) test, Rheumatoid (RA) factor test, Microscopic haematuria, Pyuria, Antistreptolysin 'O' (ASO) titre, White blood cell (WBC) count etc.

Objective This study aims at finding the accessory laboratory tests as supportive tools for diagnosis of IE.

Methods This research study was carried out from 30 October 2003 to 30 July 2004 in Shahid Gangalal National Heart Centre (SGNHC). During the study period, thirty four patients who were clinically diagnosed to have IE been included for investigation of hemoglobin level, ESR value, CRP test, RA factor, ASO titre, WBC count etc. from blood samples and microscopic haematuria and pyuria from urine samples respectively from each patient.

Results A total of 34 blood and 34 urine samples were tested in the laboratory. Hemoglobin level was found $9.7(\pm 1.12)$ gm percent and positive result of CRP test was found in (30/34) patients. ESR value was also detected higher (47.15 ± 17.26) in (31/34) patients. Positive result of RA test was observed only in (3/34) blood samples. WBC count at mean value was observed as $8,548(\pm 6023)/\text{mm}^3$ in total number of blood samples but out of 34, four samples were below and two were above the normal range of WBC count. ASO titre was higher ($e^{200}\text{IU/ml}$) in (7/34) cases. Microscopic haematuria and pyuria were also observed in (5/34), and (9/34) cases respectively in urinalysis.

Conclusion Measurement of hemoglobin level of blood, CRP and ESR tests are found most relevant among cases of IE and can also be used as supportive tools for the diagnosis of IE.

Key words Infective endocarditis, Hemoglobin, Erythrocyte sedimentation rate, Rheumatoid factor, CRP test, ASO titre.

Introduction

The term IE denotes infection of the endothelial surface of the heart. Although heart valves are commonly affected, the disease may occur within the septae defects or in the mural endocardium¹. Lazarus et al, (in 1646) first described the patients who died with endocarditis in France. IE is an uncommon disease and accounted 1 case per 1000

hospital admission with range of 0.16 to 5.4 cases per 1000 admission². Examinations from American Heart Association (AHA) placed the annual incidence of IE at 10,000 to 20,000 new cases in United States³. The incidence of community based studies ranges from 2 to 5 cases per 100,000 per annum. In a large British study, the underlying heart disease was

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rheumatic heart disease (24%), congenital heart disease (19%) and in same other cardiac abnormalities (25%). The remainders were not thought to have pre-existing cardiac abnormalities⁴. *Viridians streptococci*, *Staphylococci*, *Enterococci* and other unusual type of microorganisms are the causative organisms of IE. Vegetation is found in endothelial region of heart which could be observed in the Echocardiography investigation. Various other immunological phenomena could be observed in the case of IE e.g. RA factor, glomerulonephritis, Roth spot etc.

Keeping in view for these outcomes of IE, Duke's criteria are followed for diagnosis of cases of IE but it would be quite difficult to confirm the cases due to culture negative result in blood culture among cases of IE due to infection by fastidious slow growing microorganisms or patients received antibiotics before any blood culture performed or non-bacterial thrombotic endocarditis (NBTE) etc. and not specific clinical signs and symptoms manifestations. To avoid such difficulties for diagnosis of cases of IE, there are yet not determined anymore accessory laboratory parameters which are found most common among suspected cases of IE. So, this study has been carried out with the main aim to determine whether other laboratory tests such as hemoglobin level, ASO titre, ESR value, CRP test, WBC count, Microscopic haematuria, pyuria etc. for blood and urine analysis would be accessory as diagnostic tools for cases of IE.

Methods

This was conducted during the period (30 October 2003 – 30 July 2004), in which total of 34 patients were included in the study who were clinically diagnosed as definite cases of IE in Shahid Ganga Lal National Heart Centre, a tertiary cardiac referral

center, Bansbari, Kathmandu, Nepal. EDTA anticoagulated blood (1.5 ± 0.25 mg/ml) was used for measurement of hemoglobin level and total white Blood Cell count using a Coulter Counter (KV-21, Sysmex, Japan) within one hour of collection of blood samples. ESR value was measured by Wintrobe method using same EDTA anticoagulated blood sample. Latex particle coated with anti-CRP antibodies were used for CRP test by mixing with 50 μ l of patients' serum. Similar polystyrene latex particle coated with anti-RA antibodies and Streptolysin 'O' were used for RA test and ASO titre determination using 50 μ l of serum sample for each. Haematuria and pyuria were observed by microscopy from urine sample of each patient on same day of blood examination.

Result

A total of 34 blood and 34 urine samples were tested in laboratory. Hemoglobin level was found $9.7 (\pm 1.12)$ gm percent among anemic cases and positive result of CRP test was found in (30/34) patients. Four cases were at normal range (13-18 gm % in male & 11-16 gm % in female) for hemoglobin measurement and same number of cases was without agglutinations (negative result) in CRP test. ESR value was also detected higher (47.15 ± 17.26) in (31/34) patients in comparison to within normal range (0-10 mm/hr in male & 0-20 mm/hr in female) that observed in 3 patients. Positive result of RA test was observed only in (3/34) blood samples. WBC count was mostly found at normal range ($4,000-11,000/\text{mm}^3$) at mean value of $8,548 (\pm 6023)/\text{mm}^3$ in total number of blood samples but out of 34, four samples were below and 2 were above the normal range of WBC count. ASO titre was higher (>200 IU/ml) in (7/34) cases. Microscopic haematuria and pyuria were observed in (5/34), and (9/34) cases respectively in urinalysis. Results are summarized in table 1 given below.

Table 1: Laboratory tests & results among 34 cases of IE.

Test performed	Method used	Number of patients having normal test result & normal range of value.	Number of patients with not-normal value and mean (\pm) value observed.
1. Hemoglobin level measurement.	Coulter Counter Device	4 (13-18gm% in M & 11-16 gm% in F)	30 (9.7 \pm 1.12 gm %)
2. CRP test.	Latex agglutination test method	4 (-ve in normal)	30 (+ve in diseased)
3. ESR value determination.	Wintrobe Method	3 (0-10 in M & 0-20mm/hr in F)	31 (47.15 \pm 17.26mm/hr)
4. RA test.	Latex agglutination test method	31 (-ve in normal)	3 (+ve in diseased)
5. WBC count.	Coulter Counter Device	28 (4,000-11000/mm ³)	6 (7842 \pm 5634/mm ³)
6. ASO titre.	Latex agglutination test method	27 (<200IU/ml)	7 (all are e ^{>} 200IU/ml)
7. Microscopic haematuria.	Microscopy	29 (>RBC/HPF)	5 (not seen RBC)
8. Pyuria.	Microscopy	25 (>5 in M & >10 WBC/HPF in F)	9 (not seen WBC)

Note: M-male, F-female, +ve-positive result, -ve-negative result, WBC-White Blood Cell, HPF-High power field, RBC-Red Blood Cell, IU-International Unit,

Discussion

In our study all cases were anemic except four (i.e. 88.23 percent were anemic). The mean hemoglobin level of the anemic cases was found to be 9.7 (\pm 1.12) gm percent with similar result found as 9.3 gm percent by Pandit in 1999 in Nepal and 81 percent anemic cases found in 2003 in India by Garg et.al. ESR level was found elevated in 31 (91.17%) cases among 34 and mean ESR level among elevated cases was 47.15 (\pm 17.26) mm/hr which could be relevant to compare with the result found as 54.16 mm/hr by Pandit in 1999 in Nepal. RA factor test was found positive only in 3(8.32%) cases which didn't show strong occurrence chance for the cases of IE and this was not found similar in other study, as in 43.8 percent were with positive RA test result found by Pandit in 1999 in Nepal and 20 percent by Sadiq et.al. in 1998 in Pakistan. Presence of RA factor has been found to be related with increased level of incidence of normochromic normocytic anaemia which might also common among cases of IE, but our finding was not related with the previous findings of significant association of RA factor with IE. CRP test showed positive result among 30 cases (88.24%) which is the indication of active inflammatory condition. This significant correlation was already established between IE & positive CRP test result.

WBC count was abnormal in 6 cases (17.64%). This low number of abnormal WBC count may be due to most cases of sub-acute bacterial endocarditis in which mostly normal value of WBC count is found. Leucocytosis was found in 2 cases and leucopenia was found in 4 cases. Prolonged duration of diseases may result in leucopenia which may be in later stage of the diseases among cases of IE. ASO titre was found higher in 7(20.89%) cases. ASO test was found positive after infection by *Streptococcus Pyogenes* or group E or group G *Streptococci*. These finding may be relevant to explain that culture negative cases with positive ASO titre were probably infected or with recent history of infection by *Streptococcus Pyogenes*. But, those cases might also be related with other clinical conditions of the patients. Microscopic haematuria was detected in only 5 (14.70%) cases. Suspected cases of glomerulonephritis, also a complex sequence of IE was in only 2 cases out of 5 cases observed for haematuria, but it strongly argued with the finding of 54 percent cases of haematuria by Garg et.al. in 2003 in India. Pyuria was found in 9 (26.5%) cases which was higher in female in comparison to the male patients. Continuous monitoring the different laboratory tests including determination of

hemoglobin level, WBC count, RA factor test, ASO titre, ESR value, haematuria, pyuria etc associated with IE is required with standard protocol and need to evaluate their association by doing extensive research including large number of sample size. We propose to take it up in the near future.

Conclusion

Anemia, elevated ESR level, positive test for CRP are most significant among cases of IE. RA factor test, haematuria, pyuria, WBC count etc. are also equally important tools for describing the various clinical conditions of patients diagnosed as IE.

Acknowledgement

The authors thank to the members of following organizations for their valued kind co-operation during the study period; Central Department of Microbiology, TU, Kirtipur, Kathmandu, Nepal, Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal.

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