

Original article

Search for a low-cost screening test for female genital tuberculosis: A study in a tertiary care level hospital of West Bengal

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Abstract

Introduction: Genital TB is found in 19% of infertile women with increase in the prevalence and incidence of EPTB cases. Primary Infertility is a feature in 70% of cases presenting with pelvic tuberculosis which reflects abnormal tubal and endometrial function. A large number in the latter group may be in the early spectrum of the disease and if diagnosed early and treated with anti-tubercular drugs adequately, better outcome of fertility is expected. The present study was conducted to find out the sensitivity, specificity, positive predictive value and negative predictive value of different methods used for diagnosis of genital tuberculosis in females with infertility.

Methods: A cross-sectional observational study was conducted for two years in the Gynaecology OPD of Burdwan Medical College & Hospital, West Bengal involving 83 cases of suspected genitourinary TB. Menstrual blood samples on the first day of menstruation were collected for histopathology, bacteriology, culture in Lowenstein-Jenson Media, Rapid Antibody Detection Test and PCR amplified DNA detection of Mycobacterium tuberculosis.

Observations and Results with conclusion: Majority of the patients belonged to 21-24 years and the duration of infertility was found to be 3-4 years in majority. Comparing the result of sputum microscopy in respect to LJ culture as gold standard, sensitivity was found to be 90%, while the sensitivity of PCR and histopathology was much less.

It was revealed that smear microscopy had maximum sensitivity. Hence it can be performed for screening purpose in resource poor health set up even at PHC level.

Key words: Female genital tuberculosis, low cost screening test, tertiary care level hospital

Key note: Smear microscopy of menstrual blood for detection of M. tuberculosis can be performed as low cost screening test even at rural set up.

Introduction

Tuberculosis is a disease of great antiquity. Mycobacterium tuberculosis is a formidable pathogen. Tuberculosis still remains a worldwide problem, despite the fact that its causative organism was discovered more than 100 years ago (by Robert Koch in 1882) and effective anti-tubercular drugs have been invented decades ago. During 2013,

estimated 9 million people developed TB, which is equivalent to 126 cases per 1,00,000 population. The South east Asia Region accounts for 39 percent of global burden of TB in terms of TB incidence. It is still an important public health problem in India with an incidence of 171 per 1,00,000 population in 2015.¹ Considering the prevalence and incidence of Koch's in our developing country and the recently emerging

escalated status in the world scenario especially that of EPTB, as an impact of HIV/AIDS, a renewed look into prevalence of GTB and its relevance and contribution to female Infertility has gained importance. The presence of it is most often revealed by the investigation of childlessness and therefore is usually discovered in women aged 20 – 40 years. The demonstration of tubercular infection of the uterus and tubes varies with the prevalence of pulmonary tuberculosis in any community 15-20 years back. About 50% of GTB affected women give a history of extra genital infection, and a further number can recall, if questioned closely, contact with the disease in childhood and adolescence.² Currently available data reports that the prevalence of infertility in an unscreened population is 15% and incidence in screened population is 3%. GTB is found in 19% of infertile women and there is an increase in the prevalence and incidence of EPTB cases.³ Primary Infertility is a feature in 70% of cases presenting with pelvic tuberculosis and occurs even though the tubes are open. It then reflects abnormal tubal and endometrial function.² A large number in the latter group may be in the early spectrum of the disease and if diagnosed early and treated with anti-tubercular drugs adequately, better outcome of fertility is expected.

By reviewing literature, it was found that conclusive data on GTB is much in need.⁴ Taking into consideration, a worldwide rise in EPTB, a simple, cost effective pathological procedure to screen for GTB in menstrual blood not only can help in determination of its contribution to the pathophysiology of female Infertility but also detect it earlier and avert permanent damage to the genital mucosa and in addition it may help determine a 'till-now, possibly overlooked' burden of TB.

Aims & Objectives

The present study was conducted to find out the sensitivity, specificity, positive predictive value and negative predictive value of different methods used for diagnosis of genital tuberculosis in females with infertility.

Material & Methods

It was a descriptive study with cross-sectional design. The study was conducted for two years from April 2013 to March 2015. Gynaecology Out Patient Department of Burdwan Medical College & Hospital was used as study setting. Study population comprised of the women of reproductive age group attending the OPD for treatment of infertility. Inclusion criteria was Women unable to conceive within one year of unprotected sexual intercourse while exclusion criteria being infertile women in whom a routine screening USG identified congenital malformation / s of the Mullerian Duct, whose husbands had azoospermia and where the woman was suffering from malignancy, severe heart disease or any other severe systemic disease. Ethical clearance from the Ethical Committee of The University of Burdwan had already been taken at the beginning of the study. In the study total 83 cases of suspected genitourinary TB were included. Cases were included in the study consecutively.

Pre-tested, pre-designed questionnaire was used for collection of data. Data collection was done after obtaining informed written consent from the women. Menstrual blood was used as study material. Menstrual blood samples on the first day of menstruation, (in regularly menstruating women) were collected for histopathology , bacteriology (Ziehl-Neelson), culture in Lowenstein-Jenson Media, Rapid Antibody Detection Test (henceforth to be called Antibody Test) test and PCR amplified

DNA detection of Mycobacterium tuberculosis. Endometrium was obtained by Dilatation and Curettage for Histopathological examination in patients presenting with prolonged oligomenorrhoea or failure of withdrawal bleeding after progestogen use and the specimens were taken for study, as for menstrual blood.

Data were entered in MS Excel sheet and checked for accuracy. Analysis of data was performed to find out the sensitivity, specificity, positive predictive value and negative predictive value of different methods using statistical software SPSS version 16.0.

Observation & Results:

It was revealed that majority of the patients belonged to 21-24 years (62.65%) whereas only 2.4% were in 36-40 years age group. In majority of the cases the duration of infertility was found to be 3-4 years (50.60%) while least duration was found to be above 11 years (2.4%).

Smear microscopy detected 20 cases among 22 cases which were culture positive and failed to detect 40 cases out of 61 culture negative cases (Table no.1). PCR could detect 18 cases out of 22 culture positive cases and could not detect 3 cases out of 61 culture positives (Table no.2). Yield of histopathology was 14 cases out of 22 culture positives and could not diagnose 25 cases out of 61 culture negatives (Table no.3).

Comparing the result of sputum microscopy in respect to LJ culture as gold standard, sensitivity was found to be 90%, specificity 65.57%, positive predictive value 48.78% and negative predictive value as 95.24% (Table no.1). But the sensitivity of PCR in respect to culture was found to be 81.82% and 4.92% while positive and negative predictive value being 23.68% and 42.86% respectively (Table no.2). Use of histopathology resulted in 63.64%

sensitivity, 25% specificity, 28% positive predictive value and 60% negative predictive value (Table no.3). So it is evident that the present had maximum sensitivity, specificity and negative predictive value in case of smear microscopy.

Discussion

The present study was conducted to compare the efficacy of smear microscopy, PCR and histopathology, as compared to LJ culture taken as gold standard. It was done with the purpose of selecting a cost-effective screening test for female genital tuberculosis in OPD set up of rural health centers. It was revealed that smear microscopy had maximum sensitivity as compared to others. In a study by Banothu V et al revealed the sensitivity to be 40.1% while specificity was 100%.⁵ Another study conducted at Hyderabad revealed the sensitivity was less but specificity was more than the present study.⁶ Oberoi A et al found in their study of Z N stained smear examination, that sensitivity was much low (34.78%) and specificity was found to be 100% for MTB detection by SM.⁷ Positive and negative predictive value of smear microscopy were found to be 70% and 95% respectively in a study by R Rozatti et al.⁶

PCR was found in a study by Rozatti R to have more sensitivity ,specificity of , positive predictive value and negative predictive value than present study .⁶ Thangappa R B et al found that PCR had less sensitivity (57.1%) as compared to current study .⁸ Oberoi A found that the sensitivity of PCR was 73.9% and specificity was 99.29%.⁷ According to Negi S.S., et al., PCR test is more sensitive than Z N smear examination, LJ medium culture and BACTEC culture for diagnosis tuberculosis in pulmonary and extra-pulmonary clinical samples.⁹

A study in Hyderabad revealed more sensitivity and specificity of histopathology (82.3% and 84.6% respectively) as compared to the present study.⁶ In the same study positive and negative predictive value were also higher than present study.⁶ Sensitivity was found less but specificity, positive predictive value and negative predictive value were found much more in a study conducted in Delhi.¹⁰

Conclusion

As compared to different studies, the present study showed highest sensitivity and negative predictive

value of smear microscopy as compared to PCR and histopathology. Smear microscopy of menstrual blood can be performed for screening purpose in resource poor health set up even at PHC level. These findings may be useful for a developing country like India. However further study with larger sample size is suggested.

Table no 1: Sensitivity and specificity of Smear Microscopy. (n=83)

Smear	LJ Culture Positive	LJ Culture Negative	Total
Positive	20 (90.9%)	21 (34.43%)	41
Negative	2 (9.1%)	40 (65.57%)	42
Total	22 (100.0)	61 (100.0)	83

(Culture was taken to be the Gold Standard in the diagnosis of MTB)

Table no 2: Sensitivity and specificity of Polymerase chain reaction. (n=83)

PCR	L-J Media Culture Positive	L-J Media Culture Negative	Total
Positive	18 (81.81%)	58 (95.08)	76
Negative	4 (18.19%)	3 (4.92)	7
Total	22 (100.0)	61 (100.0)	83

(Culture was taken to be the Gold Standard in the diagnosis of MTB)

Table no.3: Sensitivity and Specificity of Histopathological examination. (n=83)

Histopathology	L J Media Culture Positive	L J Media Culture Negative	Total
Positive	14 (63.63%)	36 (59.01%)	50
Negative	8 (36.37%)	25 (40.99%)	33
Total	22 (100.0)	61 (100.0)	83

(Culture was taken to be the Gold Standard in the diagnosis of MTB)

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