Research Paper

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Comparative study of Throat Swab and Sputum smear examination for the detection of Mycobacterium Tuberculosis in suspected cases of Pulmonary Tuberculosis

Medical Science

KEYWORDS : Diagnosis, Throat swab, Pulmonary tuberculosis.

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ABSTRACT

Introduction :

Tuberculosis is a major public health problem. Sputum smear microscopy is initial, rapid and most widely used test for diagnosis of Pulmonary tuberculosis. We have undertaken this study to evaluate the yield of Throat Swab examination for the diagnosis of Pulmonary tuberculosis.

Aim :

To compare the throat swab examination with sputum smear microscopy for the diagnosis of Pulmonary tuberculosis.

Material and method :

During a period of 8 months, 498 patients with signs and symptoms suggestive of Pulmonary Tuberculosis were sent for sputum examination as well as throat swab examination. Two sputum samples and two throat swab sample were collected from each patient (one spot and one morning). The yield of sputum samples and throat swab sample were compared.

Results :

Out of 498 TB suspects, sputum smear approach could identify 111 patients where as Throat swab approach could identify 77 patients. Statistically significant difference was found in two approaches.($p<0.00001$)

Conclusion :

In the sputum producing patients, the throat swab examination results are not superior to sputum smear examination by microscopy. In the throat swab examination, the positivity grade depends on number of tubercular bacilli in sputum specimen.

Introduction:

Tuberculosis is a major global health problem. In 2001, an estimated 8.6 million people developed tuberculosis and 1.3 million people died [1]. Tuberculosis is the 3rd killer of people worldwide. It is one of the most important diseases in the world which has high morbidity and mortality. The etiological agent of this disease is a bacilli known as mycobacterium tuberculosis. Mycobacterium tuberculosis affects mostly the lungs causing Pulmonary Tuberculosis. It can affect any part of our body, but in most of the cases it affects the lung. The disease in the lung is commonly known as Pulmonary tuberculosis. If promptly treated by susceptible drugs, the disease is curable in virtually all the cases. It is usually transmitted through spread of air borne droplets infected with tubercular bacilli and these droplets are produced by patients infected with pulmonary tuberculosis. We generally diagnose the PTB through sputum smear examination. The diagnosis of Pulmonary tuberculosis by sputum smear microscopy is most convenient, most efficient, most reliable, and cost effective tool.

But in some circumstances the sputum microscopy appears to be difficult to carry out in those patients who do not produce sputum or in those who are much debilitated, semiconscious, or are in paediatric age group. Antitubercular treatment cannot be started only on the basis of radiological findings.

Our aim here is to compare the results of throat swabs with the sputum smear examination for the detection of mycobacterium tuberculosis for the confirmation of PTB to see whether the throat swab could be a alternative option in comparison to sputum smear examination.

Therefore it was planned to compare the efficacy of throat swab examination with sputum smear examination in the PTB suspects.

Material and methods :

This study was conducted in the Department of Pulmonary Medicine, Rohilkhand Medical College and Hospital, Bareilly. The Rohilkhand Medical College and Hospital is a tertiary care teaching hospital with well equipped state of art infrastructure and a well trained human resources. It caters mainly to the population of district Bareilly and adjoining areas. This study was approved by institutional ethical committee. Informed written consent was obtained from all subjects.

Source of data :

Sputum sample and throat swab sample were collected from 498 TB suspects presenting with a complaint of ≥2 weeks of cough and expectoration, and age of 15 year or above were included in the study.

Collection of Sputum sample :

After collecting the clinical history, the patient was explained the importance of submitting thick sputum rather than saliva. It was demonstrated that by taking three deep breaths, followed by a deep cough, a good quality sputum could be brought from the lungs [2]. The patients were explained to provide atleast 5 ml of sputum sample. The sputum samples were collected as per RNTCP guidelines. New unscratched slides were labelled with study numbers and used for smear preparation. The study numbers were covered with wrap around stickers before the microscopy. The stickers were removed by different person entering the results.

Collection of throat swab specimen :

For throat swab specimen, care was taken at various levels. First, the fresh sterilized piece of groom stick of about 10 inches was

used as the throat stick. Secondly, the non absorbent cotton which is rolled at one end of throat stick, should not be very much compressed and smooth. It should be rough because the infected specimen is generally very much slippery and hence may not stick to the cotton, if cotton is tightly rolled at the end of throat stick. The patient is initially asked to cough for 8 to 10 times continuously and while specimen is being taken, he should tilt his head on the back with mouth open, and the tip of the tongue to be held with a sterilized gauze piece. Then the throat stick is inserted in mouth on to the back till it reaches the throat. When it touches the throat surface, it has to be rotated clockwise or anti clockwise so that proper specimen sticks to throat swab. Care is taken of aseptic precautions. Out of two throat swab specimens, the first was the spot specimen and the other was the next day morning specimen when the patient is empty stomach.

Smear preparation :
A new unscratched glass slide was selected for smear preparation. Smear was prepared with sterile loop. A good smear is spread evenly, over a size of 2x3 cm and is neither too thick nor too thin. This was allowed to air dry for 15 to 30 minutes and fixed by passing it over a blue flame for 3 to 4 times [3].

Fluorescence staining :
This is done as per RNTCP manual for technician [3].

Statistical analysis :
Proportion of positive samples was compared using chi square test of significance.

Results :
498 TB suspects above the age of 15yrs. were included in the study, out of which 369 (74.09%) were male and 129 (25.9%) were female. 40 (8.03%) belonged to age group of ‹20 years followed by 175 (35.14%) belonged to age group 21-40 years, 214 (42.97%) belonged to 41- 60 years of age group and 69 (13.8%) belonged to age of ›60 years. (table 1)

Out of 498 TB suspects, sputum smear positive cases were 111 (22 %), sputum negative patients were 387 (78%), and throat Swab (TS) positive cases were 77. All of these TS positive 77 cases were from sputum positive 111 cases. (table 2)

Of these 111 sputum positive cases, 82 (74 %) were male and 29 (26 %) were female, and out of 77 TS positive cases 56 (73 %) were male and 21 (27 %) were female. (table 3)

Of the 498 TB suspects sputum positivity grade wise, age wise with sex wise and TS positivity grade wise, age wise with sex wise has been mentioned with various percentages in table 3.

Out of 111sputum positive cases, 44(39.6%) were 3+ followed by 39 (35.1%) were 2+ and 19 (17.11%) were 1+. Scanty sputum positive cases were 9 (8.1%).

Out of 77 throat swab positive cases, 3 (3.89%) were 3 + followed by 29 (37.6%) were 2 + and 40 (51.9%) were 1+. Scanty positive cases were 5 (6.49%).

On comparing grade wise sputum positive results with throat swab positive results, all 44 sputum 3+ positive cases were throat swab positive cases. Out of 39 sputum 2+ cases, 27 were throat swab positive. Out of 19 sputum 1+ cases, 5 were throat swab positive and of 9 scanty sputum positive cases, only 1 case was throat swab positive.

Discussion :
Pulmonary tuberculosis is a serious disease. The number of people who suffer from this disease is very high and is of high concern. Because a case of pulmonary tuberculosis is most infectious, so the need in these cases is to diagnose the disease as early as possible so that an early treatment can be started to restrict further spread of tubercular bacilli. As regards the diagnosis of pulmonary tuberculosis is concerned, there are many types of investigations available. But the sputum examination for acid fast bacilli by Zeihl Neelsen method or by the Fluorescence microscopy (both are equally effective) has been found to be the most convenient, easy to use, reliable, cost effective and most reliable. It has been regarded as the gold standard in the confirmation of pulmonary tuberculosis. But the shortcomings of this diagnostic technique is evident when in TB suspects, the cough is dry (unproductive) or the patient is unable to produce it, as in the cases of debilitated, unconscious/semiconscious patients and in the cases of children.

In our study, 498 TB suspects were included in the study. Out of 498, 111 (22%) were positive on sputum examination, and 77 (15.4%) were positive by TS examination. In other words we can say that 15.4% patient were positive both on sputum smear and on throat swab examination, and 78 % (387 cases) were negative on both.

Secondly it has been concluded that the positivity of throat swabs examination is highest in 3+ positive sputum positive cases and it decreases with the decrease of positivity grade of sputum.

Though the positivity rate in TS examination is inferior to sputum smear microscopy for AFB, but the throat swab examination for AFB can be tried in the TB suspects cases such as unconscious/ semiconscious patients, severely disabled bed ridden, paediatric age group, low GC, severely dehydrated cases having dry cough, who are unable to expectorate. The method is almost non invasive method and even a paramedical can be trained to collect throat swabs after a brief training and demonstration.

The medical literature is almost silent on throat swab method of collecting the sputum specimen from the throat by direct microscopy which is an easier and simple method of obtaining the specimen than from the laryngeal swab method :Velu S.et al(1961) reported a comparison of the result of bacteriological examination of the sputum and the sputum collected from a patient receiving the chemotherapy for PTB. The smear examination of the sputum yielded similar proportion of positive cases to the cases of the laryngeal swab culture.(4)

Thus, throat examination for AFB can be a good option where sputum is either not productive or non available. This is a preliminary study. However, as per this study the cases who remain undiagnosed due to unavailable or non productive sputum and go on transferring the disease to the healthy community can be detected and put on anti tubercular therapy.

The main advantages of TS examination can be summarized as follows—

- The TS examination can be performed in patients when non productive cough is present for more than 2 weeks and radiologically they are suspected case of Pulmonary TB.
- The patient who have cough with expectoration initially but stop expectorating because the medical practitioners have not taken care of sputum examination prior to the use of antibiotics.
- A TB suspect who is having dry cough but may be unconscious or semiconscious due to various reasons.
- It is a simple procedure and can be taught to any health worker.
- Chances of mixing with the saliva is almost nil to the spu-

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tum.

- A fair number of cases can be diagnosed by this method

The disadvantage of this method is that the positivity is low as compared to the sputum smear examination.

Thus, this study has shown that TS examination can be a option for the detection of acid fast bacilli in cases of Pulmonary tuberculosis.

Conclusion :

There are fair chances of TS positivity in sputum positive cases than in smear negative cases, and chances of positivity increase with the increase of grading of sputum smear. In the throat swab examination the positivity grade depends on number of tubercle bacilli in the sputum specimen. Though, in the sputum producing patients, throat swab smear examination is not superior to sputum smear examination by microscopy, the patients who do not expectorate can be benefitted to some extent by throat swab examination through direct microscopic examination or culture.

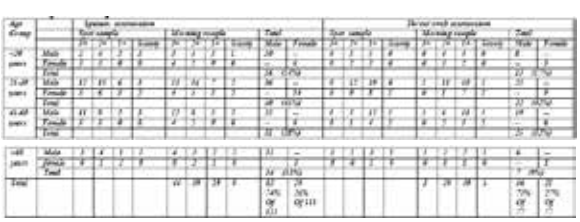
Table 1: Sociodemographic profile of study group

Parameter	No. of Patient (n=498)	Percentage
Age group		
‹20 years	40	8.03%
21-40 years	175	35.14%
41-60years	214	42.97%
›60 years	69	13.8%
Sex		
Male	369	74.09%
Female	129	25.9%
Area of Residence		
Rural	362	72.6%
Urban	136	27.3%
Education		
Literate	122	24.49%
Illiterate	376	75.50%

Table 2: Comparison of sputum smear and throat swab approach

Approach	Sputum smear microscopy (n=498)	Throat swab (n=498)	p value
No. positive	111 (22.28%)	77 (15.46%)	‹0.00001 (significant)

Table 3-- Distribution of sputum smear positive cases – age , sex and positivity wise



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