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## **LATENT PULMONARY TUBERCULOSIS; PREVALENCE IN YOUNG ADULT MALES ON MMR SCREENING**

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**ABSTRACT...** Objective: To assess the prevalence of latent pulmonary tuberculosis (TB) in young adults males on MMR screening. Design: Descriptive study Place and duration of study: The study was carried out at Combined Military Hospital Kohat from January 2004 to August 2005. Material and Methods: A total of 4000 freshly inducted recruits aged between 18-23 years were subjected to MMR using an Odalka camera. Individuals with suspicious findings had a standard chest radiograph taken and on confirmation of findings they were inoculated with tuberculin and readings of Mantoux test were recorded. Results: Out of 4000 MMR films, 2.15% were judged suspicious and standard chest radiographs were taken. 1.2% showed features suggestive of pulmonary TB. 0.175% showed non-tuberculous pulmonary findings and 0.05% showed cardiac lesions. 0.725 % chest radiographs were normal. 1.2 % suspected cases of pulmonary TB were investigated further with Mantoux test. 0.745% had strongly positive Mantoux test and were labeled as latent pulmonary TB. Conclusions: Pulmonary TB is a major health issue in our country. There is a high prevalence of latent pulmonary TB in our asymptomatic adult population. MMR is an effective and cheap method of early detection and should be considered for mass screening of our younger population on a larger scale.

**Keywords;** MMR, Latent Pulmonary Tuberculosis, Prevalence, Early Detection.

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### **INTRODUCTION**

Pulmonary TB is a major health problem in our country<sup>1</sup>. It has a long and insidious onset which is called latent tuberculosis<sup>2</sup>. At this stage eradication is easy but detection is difficult. Since pulmonary TB has traditionally been a radiological diagnosis, Mass Miniature Radiography was invented as a mass screening method in 1930s.

It is cost-effective and easy to use. In the armed forces all fresh recruits are screened for tuberculosis, among other diseases. In this study screening was done with MMR and its efficacy in TB detection and the prevalence of TB in this apparently healthy population group was assessed. All suspected cases were followed up with a large chest film and on persistence of findings further confirmation was sought with mantoux test.

**MATERIALS AND METHODS**

The study was carried out in Radiology Department CMH Kohat from Jan 04 to Aug 05. 4000 recruits aged 18-23 ,yrs underwent MMR examination in batches.

They were drawn from all parts of the country and had no specific racial or geographical pattern. All the cases were asymptomatic and those with a previous history of chest infection or a co-morbid disease were excluded.

A 70 mm Odalka (Siemens) MMR camera (Fig1) of 100 mA and 125 KV was used for imaging. All film rolls were manually developed and viewed on a magnifying projector (Fig 2). A high index of suspicion was kept and patients having any abnormal findings on MMR were subjected to a conventional chest radiograph for exclusion or confirmation.

Individuals with a normal chest X - ray were regarded as free from disease and excluded from further work-up.

Cases whose chest X-ray revealed features suggestive of pulmonary TB were labeled as suspected cases of latent pulmonary TB and underwent Mantoux test.

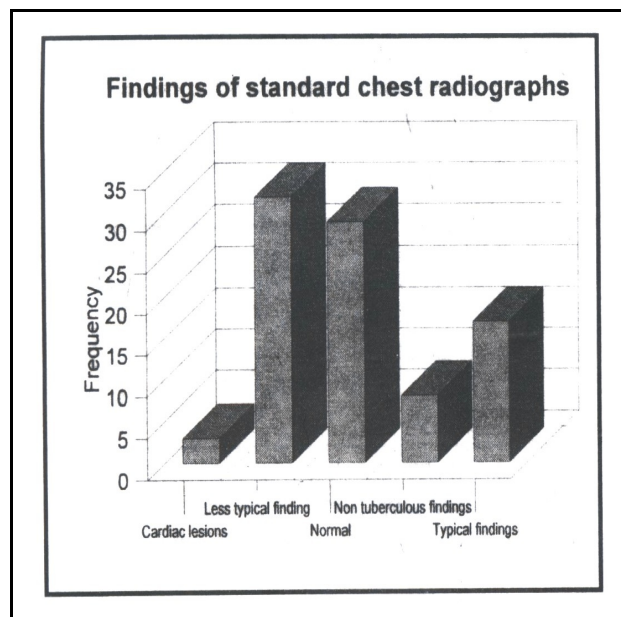
Those cases that had cardiac or non-tuberculous pulmonary findings were excluded from this study. Cases with strongly positive mantoux test (more than 20 mm induration at 72 hrs) were declared to be harbouring latent TB and were referred for treatment

**RESULTS**

Four thousands MMR images were taken over a period of 1.5 years. Out of these 4000 cases 86 (1.4%) were considered suspicious by the radiologist when viewed on the magnifying projector.

MMR				
Valid	Frequency	%age	Valid %age	Cumulative %age
Abnormal	86	2.2	2.2	2.2
Normal	3914	97.9	97.9	100
Total	4000	100	100	-

All these 86 cases were subjected to a conventional chest X- ray for confirmation. 29 chest X- rays were normal. 48 showed features suggestive of pulmonary TB and 7 showed non-tuberculous pulmonary findings like emphysematous bulla and broncho-genie cyst and 2 showed cardiac lesions.



Various radiological features indicative of pulmonary TB were seen. Among them some were typical features of the disease like cavitation, nodulo-striate/reticulo-striate opacities, enlarged hilum and pleural effusion while others were only suggestive such as apical pleural thickening, blunt CP angle, bronchiectasis and calcific foci.

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**LATENT PULMONARY TUBERCULOSIS**


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All these 48 cases underwent mantoux test. 19 had a strongly positive man toux test and were subsequently treated. Two cases with negative mantoux improved with simple anti-biotic course and the rest were declared old healed non-specific infection by the medical specialist.

Mantoux test was positive in all but 3 cases with

typical features of pulmonary TB and was positive in 6 who had only suggestive features of the disease.

Thus we found a prevalence of 0.475% for latent pulmonary tuberculosis in our young adult asymptomatic population.

FINDINGS ON CHEST RADIOGRAPHS				
Valid	Frequency	%age	Valid %age	Cumulative %age
Apical pleural thickening	5	5.8	5.8	5.8
Bronchiectasis	3	3.5	3.5	9.3
Bronchogenic cyst	2	2.3	2.3	11.6
Blunt cp angle	7	8.1	8.1	19.8
Cavitation	4	4.7	4.7	24.4
Calcific foci	10	11.6	11.6	36.0
Cardiomegaly	2	2.3	2.3	38.4
Wmphysematous bullae	5	5.8	5.8	44.2
Hilar enlargement	3	3.5	3.5	47.7
Normal	29	33.7	33.7	81.4
Nodulostriate shadows	3	3.5	3.5	84.9
Pleural effusion	2	2.3	2.3	87.2
Reticular/band opacities	7	8.1	8.1	95.3
Reticulostriate opacities	4	4.7	4.7	100
Total	86	100	100	-

MANTOUXTEST				
Valid	Frequency	%age	Valid %age	Cumulative %age
Negative	29	50.9	50.9	50.9
Not done	9	15.8	15.8	66.7
Positive	19	33.3	33.3	100
Total	57	100	100	-

**DISCUSSION**

WHO has declared TB a global emergency of this millennium<sup>3</sup>. It is the leading cause of death among adults due to a single infectious agent<sup>4</sup>. Early identification and diagnosis of cases of active TB are key to the effectiveness of control programs. However, maintaining a high index of suspicion for TB is crucial because diagnostic testing remains problematic.

Based on disease burden due to TB, 22 countries around the world, which are mostly developing countries, are labeled as high burden countries (HBCs). Surprisingly, more than 80% of the disease burden comes from the poor resource countries where TB control is poor and spending extremely inadequate.

This has been particularly true about the high burden country like Pakistan that is the focus of this research undertaking. In 1999 total estimated new cases of TB were 269 000 equivalent to 177 per 100 000 inhabitants and only 8% of the total cases have access to DOTS (supervised treatment strategy; short course) (WHO, 2002)<sup>4</sup>. Annually more than 50000 deaths are associated with TB in Pakistan (MOH, 2001 )<sup>5</sup>

The disease has a long latent period and an insidious onset. Early detection of the infection paves the way for easier treatment and reduced

morbidity and mortality. The need of the hour is to detect and eradicate it at its early and latent stage.

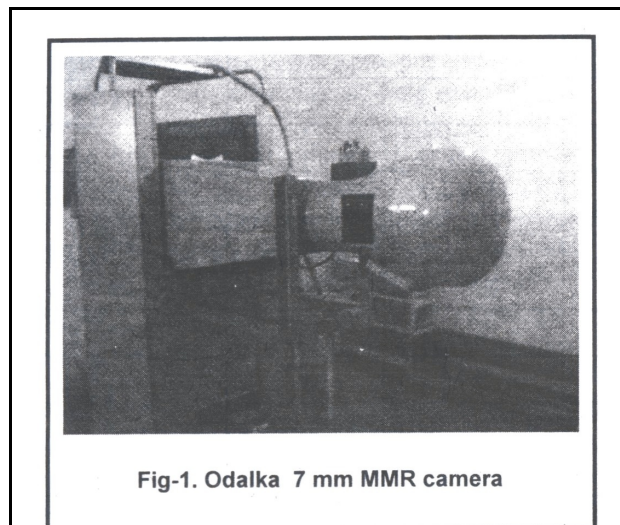


Fig-1. Odalka 7 mm MMR camera

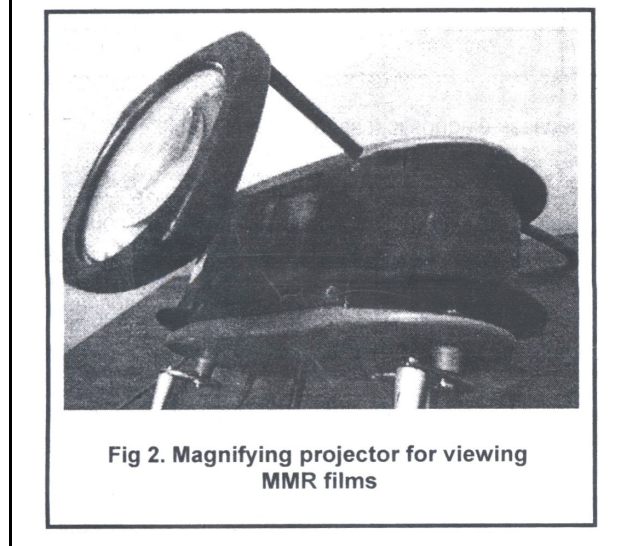


Fig 2. Magnifying projector for viewing MMR films

Intensive control efforts in Peru resulted in a 27 percent decline in the incidence of TB between 1991 and 2000 and a 70 percent reduction in deaths due to the infection<sup>6</sup>. An intensive control program in India begun in 1993, involving training health workers, active case screening, and treatment of identified cases, reduced deaths due to TB by 2001 by an estimated 200.0007. The program screened approximately 3.4 million patients and treated

800,000 with a treatment success rate of >80 percent.

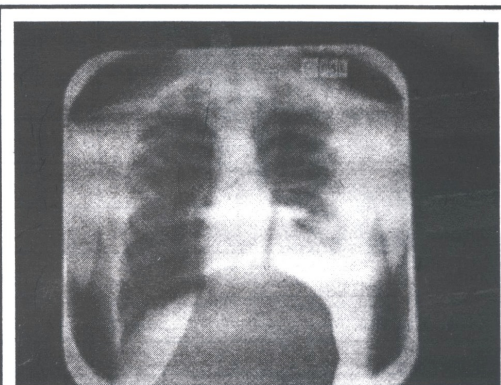


Fig 3. Left pleural effusion on MMR

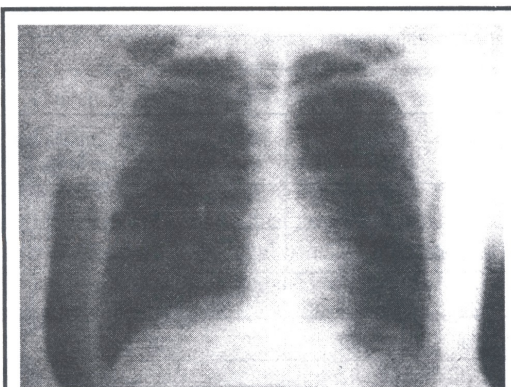


Fig 4. Reticulo-striate opacities in right mid zone with left prominent hilum on MMR

Epidemiological data on the prevalence of this disease in general population is scanty. An important aim of this study was to assess the prevalence of latent tuberculosis in our population. According to Ciftci et al the TB incidence of the armed forces is a reliable reflection of the rate in the whole population<sup>8</sup>

MMR was devised as an inexpensive, low radiation tool for mass screening. This is similar to general radiography except that dedicated x-ray equipment

specially designed for chest screening is used. The resultant x-ray film is 7 cm x 7 cm in size instead of the normal size of 35cm x 35cm or 35cm by 43cm. The film roll costs Rs. 3225 and can take 400 images. The cost per image comes to about Rs. 10 including processing. This method is by far more effective and easy to perform than sputum testing<sup>9</sup>. It is also quicker and a single camera can take 50 images per hour. The films are viewed on a projector for abnormal findings.

The system of tuberculosis (TB) case-finding by mass miniature radiography (MMR) was established and expanded for almost all Japanese citizens in the 1950s. Periodic mass screenings for schools, inhabitants, employees and institutions have been carried out. Among those aged over 25 years, the proportion of people screened by MMR was estimated to be 60.3%. However, the detection rates of TB cases by MMR have declined markedly compared with those in 1950s. As of 1998, the detection rate was 0.03 per 1,000 for school children and students, 0.06 per 1,000 foreemployees, and 0.16 per 1,000 for inhabitants<sup>10</sup>.

In our study, though of a much modest scale, 4000 young apparently healthy individuals were screened. They had fulfilled the selection criteria for armed forces and were for all practical purposes normal. Those who gave a previous history of chest infection were excluded from this study. The images were taken with an Odalka camera that is specifically designed for MMR. A total of 86 cases were considered suspicious on MMR by the radiologist. When large films were taken, 29 cases were declared to be normal. The reason for these cases appearing normal on large film was the high index of suspicion entertained by the radiologist.

Radiographic features of pulmonary tuberculosis - Pulmonary tuberculosis nearly always causes abnormalities on the chest film, although an endobronchial lesion may not be associated with a

radiographic finding. In addition, in patients with pulmonary tuberculosis disease and HIV infection, a normal chest film is more common than in persons with tuberculosis disease without immune suppression. In primary tuberculosis occurring as a result of recent infection, the process is generally seen as middle or lower lung zone infiltrate, often associated with ipsilateral hilar adenopathy. Atelectasis may result from compression of airways by enlarged lymph nodes. This manifestation is more common in children. If the primary process persists beyond the time when specific cell-mediated immunity develops, cavitation may occur (so-called "progressive primary" tuberculosis).

Old, healed tuberculosis presents a different radiologic appearance from active tuberculosis. Dense pulmonary nodules, with or without visible calcification, may be seen in the hilar area or upper lobes. Smaller nodules, with or without fibrotic scars, are often seen in the upper lobes, and upper-lobe volume loss often accompanies these scars. Nodules and fibrotic lesions of old healed tuberculosis have well-demarcated, sharp margins and are often described as "hard." Bronchiectasis of the upper lobes is a nonspecific finding that sometimes occurs from previous pulmonary tuberculosis. Pleural scarring may be caused by old tuberculosis but is more commonly caused by trauma or other infections. Nodules and fibrotic scars may contain slowly multiplying tubercle bacilli with significant potential for future progression to active tuberculosis. Persons who have nodular or fibrotic lesions consistent with findings of old tuberculosis on chest radiograph and a positive tuberculin skin test reaction should be considered high-priority candidates for treatment of latent infection regardless of age. Conversely, calcified nodular lesions (calcified granuloma) or apical pleural thickening poses a much lower risk for future progression to active tuberculosis

48 cases were considered suggestive of pulmonary

TB. Some of them had typical features of active TB, such as nodular and reticulo-strate opacities, cavity formation, enlarged hilum and pleural effusion. Mantoux test was positive in all but three such cases, two of which had nodular opacities and one had an enlarged hilum. Others had less typical findings like blunt CP angle, apical pleural thickening, bronchiectasis, calcific foci and few reticular or band like opacities suggestive of fibrosis. Mantoux test was positive in only 6 of them. Seven had non-tuberculous pulmonary lesions and included such incidental findings as emphysematous bulla and broncho-genic cyst. Two patients showed obvious cardiomegaly and were referred for echo-cardiography.

All these 48 cases with typical and less typical findings were given mantoux test which is a simple and reliable method of prediction. 11. In most MMR screening programs confirmation of the disease was sought by positive sputum AFB. This was not done in this study because it was not symptom-based and all cases had no history of cough or sputum. A positive skin test was a strong predictor of culture-confirmed TB as per hawaii screening experience<sup>12</sup>.

Nineteen cases had a strongly positive mantoux test and were declared to be suffering from latent pulmonary tuberculosis and treatment was started. Thus we found in our study a prevalence of 0.475% of latent tuberculosis in healthy young males.

My study was limited by the fact that only a certain age group and gender was selected. However, keeping in view our results, a much wider study including all age groups and segments of society should be undertaken to assess the incidence and prevalence of this disease in our country.

We found that MMR films have a reasonable clarity of image and when viewed by an experienced radiologist various small findings can be picked up

which can then be confirmed by large films. The low cost of the film and its quick and simple technique along with low radiation make it ideal for a mass screening program.

### **CONCLUSION**

The practice of screening in health care - that is, actively seeking to identify a disease or pre disease condition in people who are presumed and presume themselves to be healthy - is one that grew rapidly in last century. However pulmonary tuberculosis remains a major health problem in our country with a prevalence of 0.475% as per our study. MMR is quick, cost-effective and easy to perform thus making it ideal for a mass-screening program. We must change the public perceptions and expectations of screening and use MMR to try and find the unknown and infectious suffers from tuberculosis especially among our younger population.

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