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Editorial

MEDICAL COLLEGES & RNTCP 'HANDSHAKE': FOUNDATION FOR THE FUTURE...

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"Where there is a will, there is a way"

India is a typical example of a developing country with a multitude of problems related to health, literacy and economics. However, as a nation, we need to understand that our economic productivity is directly linked to the health of our people; in fact health, literacy and economic progress are interdependent and should not be considered in isolation.

The impact of tuberculosis (TB) is greatest on the developing countries. It is estimated 99% of the deaths and 95% of all TB cases occur in the developing world. The majority of people afflicted with TB are in the economically active age groups¹. Though the fight against TB control in India has been a waxing and waning story of success and failure; finally there is light at the end of the tunnel due to the Revised National Tuberculosis Control Programme (RNTCP) or Directly Observed Therapy, Short-course (DOTS), as it is popularly called. We are already aware that World Health Organization (WHO) has adopted DOTS as the sheet anchor for "Stop TB Strategy" worldwide. Recently, phase II trial suggests that when gatifloxacin is used instead of ethambutol, the standard six-month regimen may be shortened to four months. This is the most advanced shorter TB treatment regimen presently in development and could be available to the public by the end of 2009, if it stands the test of scrutiny².

In India, over the years, TB control programmes had to be revised repeatedly due to various reasons: lack of communication by the health care provider to the patient about the total course of antituberculosis therapy (ATT) - patients stopped ATT after 1-2 months, once there was a feeling of well being-just like patients stop medicines for a self-limiting upper respiratory tract infection!; logistical and financial constraints of patients to procure ATT; lack of quality control on diagnostic facilities and anti-TB drugs; lack of audit, evaluation and administrative accountability in the previous programmes.

The reason for success of DOTS has been that all the above lacunae have been taken care of i.e. strong administrative and political will; good quality drugs and diagnostic facilities; directly observed therapy, which improves interaction with the patient; and very importantly ongoing auditing plus evaluation (i.e. not resting on the laurels of the initial success of the programme)³. Reviews of intervention studies in low and middle income countries suggest that the simple dissemination of written guidelines is often ineffective and supervision and audit with feedback is an important tool to improve health worker performance and optimize delivery of health care services⁴.

We also need to appreciate the fact that medical colleges (rather all educational institutions imparting medical/paramedical degrees/diplomas) need to act as a role model for the budding medical professionals who are the future health guardians of our society. In fact, it would not be an overstatement to say that the

success of all national health programmes depends on the appropriate knowledge and role-modeling indoctrinated in the future medical professionals during their training period. The aim of medical education in any progressive country is to train medical professionals for the benefit of society at large and not individual profit driven ventures.

Therefore, the integration of medical colleges in India with the DOTS programme is a natural corollary. In this direction, All India Institute of Medical Sciences (AIIMS) and Central Tuberculosis Division of Ministry of Health and Family Welfare in collaboration with WHO have taken the first step by initiating a nodal plan, which is being implemented all over India for the last 4 years. The medical colleges implementing DOTS in different states have been allocated to respective State Task Force (STF), which is supervised by Zonal Task Force (ZTF). The National Task Force (NTF) is the central nodal body overlooking the implementation of DOTS in medical colleges of the country. Already 4 national workshops for the involvement of medical colleges in RNTCP have been organized at AIIMS. In each workshop, a time bound action plan for STF/ZTF/NTF is formalized. The participants in the national workshops include faculty members from medical colleges; state tuberculosis officers; representatives from central tuberculosis institutes - the main aim being to promote a horizontal integration of the district health structure with the medical colleges³.

The successful integration of DOTS with medical colleges has been a good starting point which should be emulated for other health-related national control programmes; it also demonstrates that all problems have a solution if we have an honest will to solve them!

S.K. Sharma and Gautam Ahluwalia

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LEAVES FROM HISTORY - 24



K.N. Rao
(1907 - 1988)

Born in 1907, Dr. K.N. Rao was a doyen of the medical profession. He joined the Indian Medical Services in 1935. After short stints as Professor of Medical Jurisprudence, Vellore, Thoracic Surgeon and TB Adviser to Government of Madras, he worked as the Director of Medical Services, Andhra Pradesh from 1954-1963 and thereafter as Director-General of Health Services, Govt. of India till 1968.

Dr. Rao had to his credit several books published on Public Health and Medicine. Special mention may be made of his books on Medical Education, Nation's Health, Philosophy of Medicine, and India and World Health. Students of Public Health will recall his numerous lectures in various Universities. His papers on Surgical Treatment of Pulmonary Tuberculosis, Modified Thoracoplasty Operation and Tuberculosis Control and Role of General Practitioners are read with esteem and respect.

Dr Rao was Chairman of the Expert Committee of the W.H.O. on Tuberculosis in 1964, Chairman of the Executive Board of W.H.O. 1967-68, First President of World Federation of Public Health Association, Consultant in Medical Education of the WHO/PAHO for Latin America in 1968, W.H.O. Visiting Professor of International Health at the Toronto University and WHO Consultant in Medical Education in Sierra Leone in 1970. As an authority on Family Planning and Population Control, Dr. Rao contributed valuable papers for the guidance of the lay people and medical profession. He was a member of numerous Committees, Commissions and Councils in India and abroad, and was the recipient of coveted awards like Dr. P.N. Raju's Oration Award of the Association of Physicians of India and B.C. Das Gupta Oration Award of the Indian Public Health Association. Honorary L.L.D. was conferred on him by the Shree Venkateswara University, Tirupathy.

As Chairman of the Tuberculosis Association of India, while he was the Director General of Health Services, he did a great deal to expand the activities of the Association in various ways. He presided over the National Tuberculosis Workers' Conference in 1966. He initiated the compilation of a Text-Book on Tuberculosis and was its Chief Editor. For nearly 40 years, Dr. Rao served the cause of health, especially Tuberculosis with rare devotion, foresight and leadership. The Tuberculosis Association of India honoured him with its Gold Medal in 1971.

COURSE OF ACTION TAKEN BY SMEAR NEGATIVE CHEST SYMPTOMATICS: A REPORT FROM A RURAL AREA IN SOUTH INDIA

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Summary

Objective: To evaluate adherence to diagnostic algorithm of Revised National Tuberculosis Control Programme (RNTCP) and course of action taken by smear-negative chest symptomatics (CSs).

Method: Interviewing smear-negative chest symptomatics.

Results: Of the 423 smear-negative CSs interviewed, 85 (20%) were not prescribed antibiotics and only 133 (39%) received it for more than seven days. Of the 148 patients with persistence of symptoms, 83 (56%) returned for further investigations and only 39% were X-rayed. Main reasons for not returning were: 'not aware' or 'consulted another health provider.'

Conclusion: Strict adherence to diagnostic algorithm and proper counselling of patients are important for diagnosing smear-negative pulmonary tuberculosis (PTB) cases. [*Indian J Tuberc* 2006; 53:4-6]

Key words: Tuberculosis, diagnostic algorithm, smear negative

INTRODUCTION

Although detection and cure of smear-positive tuberculosis (TB) remains the foremost priority of a tuberculosis control programme, diagnosis and management of smear-negative TB cases cannot be overlooked. In recent years, smear-negative tuberculosis is being reported more frequently with HIV co-infection¹. If left untreated, 28% – 40% of smear negative chest symptomatics with an abnormal X-ray may develop active TB over a two-year period^{2,3}.

In the Revised National Tuberculosis Control Programme (RNTCP) of India, medical officers are trained to diagnose smear negative TB using a standardized protocol⁴. Chest Symptomatics (CSs), defined as cough of 3-weeks or more, with 3 sputum smears (SS) negative for acid-fast bacilli (AFB) should be prescribed a course of antibiotics for 7-10 days and asked to return for follow up examination, if symptoms persist. Chest X-ray should be done when patients with symptoms return for follow-up. If X-ray is suggestive of TB, the

patient is diagnosed to have smear-negative pulmonary tuberculosis (PTB).

We undertook a study in one tuberculosis unit of Tiruvallur district, Tamil Nadu to evaluate the course of action taken by smear negative symptomatics and adherence to the protocol for diagnosing smear-negative PTB cases in the RNTCP.

METHODOLOGY

A population of 580,000 was covered by 17 governmental primary health centres (PHCs) where out-patients voluntarily sought care for their chest symptoms. Three heavily utilized PHCs with microscopy facilities were selected for this study. All patients with cough of 3 weeks or more were referred for 3 sputum smear examinations.

We obtained the list of all smear-negative CSs during the period October 2001 to August 2002 from the laboratory registers. The three centres were visited sequentially. Approximately, one month after sputum examination, a trained health worker

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interviewed the patients at home using a structured questionnaire. Patients were asked about the number and type of tablets prescribed and the duration for which the drugs were prescribed. Patients, who had persistence of symptoms after the medication, were asked, whether they returned to the health centre for follow up and the type of investigations done. Patients, who did not go back, were asked about the reasons for the same.

RESULTS

Of the 423 patients interviewed, 85 (20%) were not prescribed antibiotics. Among the 338 patients who received antibiotics, only 133 (39%) received it for 7 days or more, 65 (19%) for 4-6 days and 140 (41%) for 1-3 days. We analysed the data according to PHCs and found that nearly 50% of patients were given antibiotics for ≥ 7 days in 2 centres while in the third centre (the centre with higher case-load), only 35% were given antibiotics, a statistically significant difference ($p= 0.04$). After the course of antibiotics, 190 (56%) patients reported that their chest symptoms subsided. Of the remaining 148 patients with persistent symptoms, 83 (56%) returned to the PHC. The proportion of patients who did not respond to antibiotics given for 1-3, 4-7 and >7 days were 45%, 44% and 38% respectively and the difference was not statistically significant.

Among 83 non-responders to antibiotics who returned, only 32 (39%) had a chest X-ray taken. Of the 51 patients who were not X-rayed on return, 39 belonged to the PHCs with X-ray facility and the remaining 12 were from PHCs without X-ray facility. Since the providers were not interviewed in this study, we do not have information as to why X-ray was not done for these patients.

Course of action by chest symptomatics

Of the 148 patients, whose symptoms persisted after antibiotics, 65 (44%) did not return to the PHC for follow-up. The reasons (multiple reasons) for not returning were: 37% consulted other providers, 25% did not know that they needed to return and 25% due to inconveniences such as pressure of work, loss of wages, etc. Among 85 patients who were not prescribed antibiotics, 81 had persisting symptoms and only 50% re-attended. Among those who did not attend, 59% consulted other providers.

DISCUSSION

The findings of this study indicate that the RNTCP diagnostic algorithm for smear negative pulmonary tuberculosis was not followed properly in this area. Antibiotics were generally not prescribed for 7-10 days, possibly because drugs are usually prescribed only for 2-3 days at a time at governmental

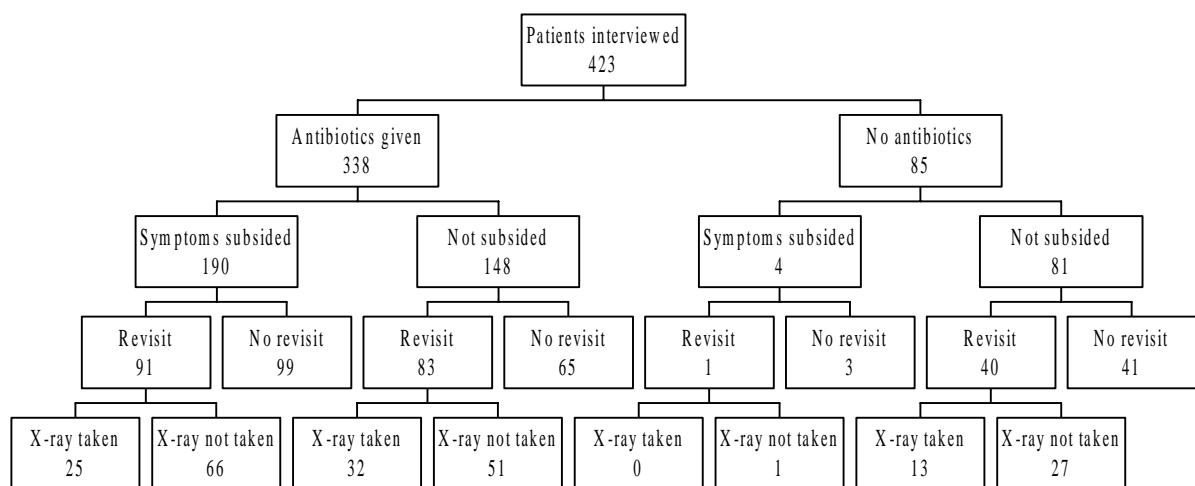


Fig.: Course of action taken by smear negative chest symptomatics in a rural area

health facilities. In the present study, antibiotics were given for 1-3 days to 41% of the patients. Inadequate antibiotic therapy may not alleviate the symptoms and patients may be erroneously started on treatment for tuberculosis. This could put unnecessary burden on the health system as well as the patients. Failure to respond to 7 to 10 days of antibiotics could be an additional indicator of smear negative PTB. Wilkinson⁵ reported that sensitivity of ZN smear for diagnosing smear negative culture positive patients rose from 61% to 80% when combined with a failed clinical response to antibiotic trial.

Chest X-ray has an important role in diagnosing smear negative PTB. In this study, a proportion of cases might have been missed due to non-availability of X-ray since only 39% were X-rayed among those who returned due to persistent symptoms. Harries et al⁶ reported that including X-ray in the four parameters, similar to RNTCP diagnostic algorithm, helped to diagnose smear negative patients.

In this study, only 56% of the smear negative symptomatics with persistent symptoms after a course of antibiotics returned within one month for further investigations. Thirty seven percent patients approached another health facilities and 25% did not know they had to return for follow-up.

Our study has the following limitations: Firstly, the results are based on patient interviews and their perceptions and recall capacity regarding the duration of antibiotics. Secondly, interviews were done only for patients who returned to collect sputum results. As patients selected themselves, it was a sample of convenience.

Our study underlines the importance of careful and regular supervision and monitoring to check adherence to diagnostic algorithm, which is crucial for optimal performance of RNTCP. The findings also emphasise the need for proper communication with patients and motivation by the health staff, especially Medical Officers. Also, there is a need to train private physicians on the national guidelines for diagnosis and

treatment so that when patients switch from one provider to another, they continue to get adequate care.

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ESTIMATION OF ANNUAL RISK OF TUBERCULOSIS INFECTION AMONG CHILDREN IRRESPECTIVE OF BCG SCAR IN THE SOUTH ZONE OF INDIA

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Summary

Objective: To estimate the proportion infected and compute Annual Risk of Tuberculosis Infection (ARTI) among children irrespective of BCG scar and compare with that among children without BCG scar.

Methodology: Tuberculin survey was conducted in south zone of India as a part of the nation-wide survey to estimate the ARTI in different parts of the country and ARTI was computed among children without BCG scar excluding children with BCG scar. In this exercise, the tuberculin test results of children with BCG scar and irrespective of BCG scar were considered for analysis and the results were compared.

Results: The prevalence of infection and ARTI estimated among children irrespective of BCG scar aged 1-9 years were 5.7% and 1.0% (95% C.I: 0.8-1.3) respectively. The corresponding figures among unvaccinated children were 5.9% and 1.0% (95% C.I: 0.7-1.4) respectively. The ARTI among children irrespective of BCG scar were similar to that among unvaccinated children.

Conclusion: Estimation of proportion of children infected and computation of ARTI using mirror-image technique could be undertaken among children irrespective of BCG scar among children aged either from 1-9 years or 5-9 years. [*Indian J Tuberc* 2006; 53:7-II]

Key words: Prevalence of infection, ARTI

INTRODUCTION

ARTI is an epidemiological index used to evaluate and monitor the tuberculosis situation in a community or country. It is derived from tuberculin surveys that measure the prevalence of tuberculosis infection. Conventionally, the estimation of this index is restricted to children without a Bacillus Calmette Guerin (BCG) scar. Usually, children with BCG scar are excluded from the analysis of prevalence of infection and subsequent estimation of ARTI. This is because BCG induces a tuberculin sensitivity causing cross-reaction with tuberculosis infection and complicates the interpretation of test results to identify natural infection with *Mycobacterium tuberculosis*¹. The tuberculin surveys have got many other limitations like standardization and administration of tuberculin vials, reading of the test results and cross-reaction with environmental mycobacteria. Still, the tuberculin skin test is the only routinely available and comparatively cheap

method of detecting individuals infected with *Mycobacterium tuberculosis*. With an increase in the BCG vaccination under the Universal Immunization Programme (UIP), it is difficult to obtain sufficient children without BCG scar for conducting a tuberculin survey. The interpretation of the results becomes difficult when the BCG vaccination coverage is very high. Moreover, the children without BCG scar may not be representative sample because these children may be different from BCG vaccinated children with respect to accessibility, awareness of health care and socio-economic status. It also includes a proportion of children vaccinated at birth that do not leave behind a scar and in another proportion the BCG scar wanes in due course². The ARTI estimated from test results among these children becomes difficult for interpretation. This report summarizes the results of estimating the ARTI from tuberculin test results among children irrespective of BCG vaccination included in the south zone of India as a part of the nationwide survey³

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conducted during 2000-2003 by National Tuberculosis Institute (NTI), Bangalore and Tuberculosis Research Centre (TRC), Chennai.

MATERIAL AND METHODS

The whole country was divided into four zones namely; north, west, east and south. A random sample of children aged 1-9 years was selected from each of these zones and the survey was conducted meticulously and rigorously following the guidelines². The tuberculin survey among children aged 1-9 years old was carried out in the south zone by TRC during 2000-02⁴. A total of about 53,000 children irrespective of BCG scar status were included in the survey. The estimation of sample size, study area, sampling procedure, data collection, analysis and interpretation of the data on test results among children without BCG scar and interpretation of the results are described in detail elsewhere⁴. The test results of children with BCG scar and those irrespective of BCG scar were considered for analysis in the present report. The prevalence of infection was calculated by weighted analysis using the mirror image method² after locating the mode in the right side of the frequency distribution of tuberculin test results of vaccinated children. ARTI was derived from the estimate of prevalence of infection and 95% confidence intervals were calculated for different estimates of ARTI.

RESULTS

A total of 52,951 children aged 1-9 years were registered for the survey. Among these, 32,744 (64%) had BCG scar. The mode was located at 19 mm as seen from the distribution of reaction sizes of these children (Fig. a). Same was the mode located in the distribution of reaction sizes among children without BCG scar and irrespective of BCG scar (Figs. b & c). The prevalence of infection and ARTI estimated in BCG vaccinated children aged 1-9 years were 5.4% and 1.0% (95% C.I: 0.8-1.2) respectively (Table). The corresponding figures among unvaccinated children were 5.9% and 1.0% (95% C.I: 0.7-1.4) respectively as already reported⁴. The prevalence among children aged 1-9 years irrespective of BCG scar was 5.7% with an ARTI of 1.0% (95% C.I: 0.8-1.3). The proportion infected was 2.9% corresponding to an ARTI of 0.9% for 1-4 year age group and 7.7% for 5-9 year age group corresponding to an ARTI of 1.0% (95% C.I: 0.8-1.3). It could be seen that the ARTI computed among children irrespective of BCG scar was similar to that among children without BCG scar.

The proportion infected among vaccinated children was 4.7% for rural and 6.8% for urban strata and the corresponding estimates of ARTI were 0.9% and 1.3% respectively. For male and female children, the prevalence of infection was similar

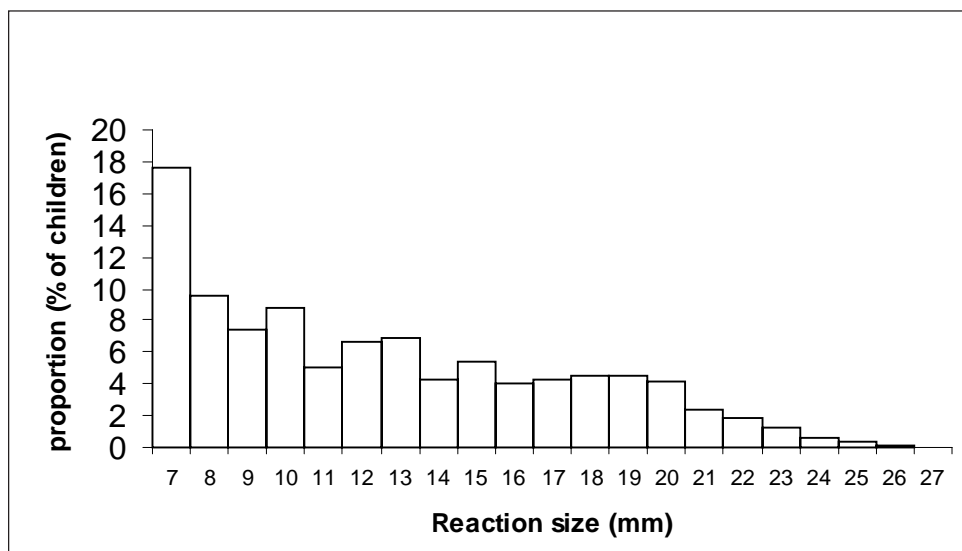


Fig (a) : Distribution of reaction sizes among children with BCG scar

namely; 5.1 % and 5.7% (ARTI: 1.0% and 1.1%) respectively.

DISCUSSION

The present study explored the possibility of estimating the ARTI among children irrespective of vaccination status and compared the findings with that among the unvaccinated children. The analysis showed that the tuberculosis infection was similar in all the groups, namely, unvaccinated, vaccinated and irrespective of vaccination status. In fact, tuberculosis infection among children refers to natural infection

with *M. tuberculosis* and hence is usually studied in unvaccinated children. When vaccinated children were also included, there could be a possibility of the skin test results contaminated by BCG induced tuberculin sensitivity. The possible contamination due to BCG vaccination in skin test results could be removed by applying mirror image method in estimating prevalence of infection and ARTI among children including those vaccinated. The analysis of the data showed that the proportion of children infected was 5.4% (ARTI of 1.0%) compared to 5.9% (ARTI of 1.0%) among the unvaccinated children aged 1-9 years using the mode at 19 mm on the right hand side of the frequency

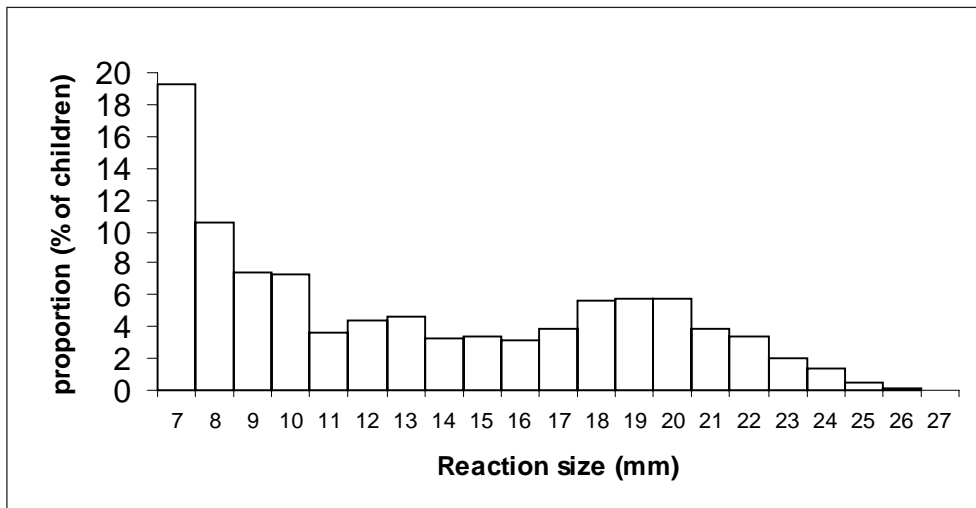


Fig (b) : Distribution of reaction sizes among children without BCG scar

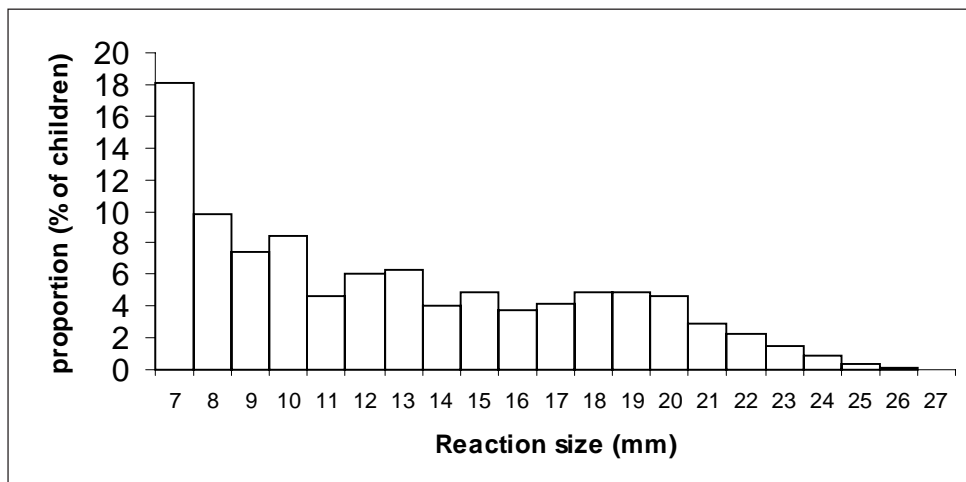


Fig (c) : Distribution of reaction sizes among children irrespective of BCG scar

Table: Prevalence of infection and ARTI among children without, with and irrespective of BCG scar

Age (in years)	Children without BCG scar		Children with BCG scar		Children irrespective of BCG Scar	
	P *(%)	ARTI (%)	P (%)	ARTI (%)	P (%)	ARTI (%)
1-4	2.3	0.7(0.5-1.0)	3.0	1.0(0.8-1.2)	2.9	0.9(0.8-1.1)
5-9	7.9	1.1(0.7-1.5)	7.3	1.0(0.7-1.2)	7.7	1.1(0.8-1.3)
1-9	5.9	1.0(0.7-1.4)	5.4	1.0(0.8-1.2)	5.7	1.0(0.8-1.3)

*Prevalence of infection.

Figures in parenthesis indicate 95% Confidence Interval.

distribution of reaction sizes. This distribution was not unimodal; might be due to the BCG induced sensitivity showing a decline with time⁵. Moreover, the proportion infected was not influenced by the extent of BCG coverage⁶. Also, natural infection takes place irrespective of whether the child was vaccinated with BCG or not. The data showed that the estimation of infection in BCG vaccinated children is independent of the BCG induced tuberculin sensitivity. A study⁷ on tuberculin sensitivity in BCG vaccinated children conducted by NTI showed that a large proportion of children with BCG scar did not develop a significantly high degree of tuberculin sensitivity and the effect of BCG induced sensitivity is insignificant if prevalence of infection is computed by mirror-image method. In another study⁸, NTI reported that under similar situation, the ARTI could be estimated among BCG vaccinated children. Of late, NTI has conducted another study⁹ among school children and substantiated the earlier findings that the estimated prevalence among children with BCG scar was similar to that among children without BCG scar and suggested inclusion of BCG vaccinated children for the purpose of computing ARTI. NTI¹⁰ has further analysed the data of the nationwide survey collected from the rural areas of the other three zones of the country namely; north, west and east and concluded that tuberculin surveys may be conducted irrespective of BCG scar status among children 5-9 years when BCG vaccination is given using Danish 1331 strain during infancy under UIP.

The present study included a very large sample size of about 53,000 children irrespective of BCG scar.

A large population of children is not required for estimation of ARTI if we combine children with and without BCG scar. The analysis was repeated by taking about 25% random sample of children irrespective of BCG scar status equivalent to size of the sample of unvaccinated children⁴. There was no difference in the prevalence of infection and ARTI compared to that among the total children studied (data not shown).

The prevalence of infection and ARTI were higher in urban children compared to that among rural children. This was similar to the findings in unvaccinated children already reported. There was no difference in the proportion infected among male and female children.

It should be borne in mind that the methodology of estimating children infected and the computation of ARTI is controversial and problematic¹¹. When ARTI is used to measure the trend, it does not depend strongly on the proportion of children with BCG scar. Locating the mode in the distribution and calculating the ARTI using the mirror-image method substantiate this further because this eliminates the contamination in the tuberculin test results due to BCG vaccination². In spite of the limitation of tuberculin survey, it remains an important epidemiological tool to assess the tuberculosis situation¹².

The findings of the analysis showed that in the event of non-availability of sufficient number of unvaccinated children (estimated

sample size) especially when the BCG coverage is relatively high, the ARTI could be computed by including children irrespective of BCG scar. In conclusion, our data provides strong evidence that BCG vaccinated children may be included for tuberculin surveys and ARTI may be estimated either from children aged 1-9 years or 5-9 years. These estimates are comparable to that estimated from unvaccinated children and may be used to evaluate and monitor the tuberculosis situation in the community. The current estimate of ARTI can be used as baseline information and compared to that of any future ARTI survey(s) to measure the impact of tuberculosis control programme in the area.

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ESTIMATING PROVIDER COST FOR TREATING PATIENTS WITH TUBERCULOSIS UNDER REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME (RNTCP)

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Summary

Background: The Indian tuberculosis control programme is the second largest health programme in the world. Sustaining this programme in India will require continued financial support, particularly for drugs and contractual personnel. In addition, the costs for diagnosis, supervision and salaries for regular programme personnel need to be sustained.

Objective: To measure unit provider cost for treating patients with tuberculosis.

Methods: All government health facilities situated in one tuberculosis unit (TU) of Tiruvallur district were visited in order to evaluate daily practice of TB diagnosis and treatment. We interviewed administrators in these health facilities to gather data on modalities for diagnosis, treatment and monitoring of tuberculosis patients. In addition, relevant financial records from all health facilities were scrutinised for data collection. The cost analysis was done for diagnosis, treatment and monitoring of TB patients treated under DOTS programme in the year 2002. For this study only the recurrent cost (not the capital cost) is considered, even though the programme puts in a lot of investment at the preparatory stage of the programme e.g. upgrading of labs and drugs stores, microscopes, motorcycles etc. Cost incurred on smear microscopy, chest X-ray and drugs were classified as direct cost. Indirect cost is calculated based on proportion of staff time for TB care delivery and for supervision of TB services. The exchange rate at the time study was 1\$=Rs 46.

Results: Unit cost for smear microscopy was estimated to be Rs 10/-; for radiography Rs 25/-; and drug cost for Category I Rs 392/-; Category I with extension Rs 495/-; Category II Rs 729/-; Category II with extension Rs 832/- and Category III Rs 277/-. Including other recurrent expenditures like salary, materials, and maintenance, the overall unit provider cost to treat a TB patient was Rs 1587/- for Category I, Rs 1924/- for Category II and Rs 1417/- Category III.

Conclusion: TB inflicts considerable economic burden on the overall health system. This information is vital for policy makers and planners to allocate adequate budget to the programme. [*Indian J Tuberc* 2006; 53:12-17]

Key words: Unit provider cost, DOTS

INTRODUCTION

The Revised National Tuberculosis Control Programme (RNTCP) of India is the second largest programme in the world and it is integrated with primary health care services¹. India has an extensive network of primary health centres (PHCs) and they are involved in all the public health programmes such as immunization, reproductive and child health programme, school health programme, tuberculosis and malaria control etc., in addition to treatment of minor ailments.

Information on the cost of providing health services is essential for good planning and management that leads to an efficient use of limited resources². However literature on cost analysis of health services in developing countries is scarce.

Various studies have reported the economic burden posed by tuberculosis on TB patients and the nation³⁻⁴. However unit cost incurred for providing care by the governmental health care system, which includes costs of diagnostic tests, drugs and service costs, has not been evaluated. In this study, we have attempted to estimate unit cost in providing care to TB patients.

MATERIAL AND METHODS

Setting

Tamil Nadu has 29 districts each covering populations ranging from 1.5 to 4.5 million. The District TB Centre (DTC) is situated at the district headquarters, with a District TB Officer (DTO) as the overall manager of the TB programme in

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the district. At the sub-district level, there is one TB Unit for every 500,000 population and designated microscopy centres (DMC) for every 100,000 population. Within a district, there are General Hospitals (GHs) at the district and taluk levels, block primary health centres each catering to 100,000 – 150,000 population, with 2-3 Primary Health Centres (PHC) within the catchment area of a block PHC. The PHC, the basic health unit caters to rural populations of about 30,000. Within the administrative control of the PHCs, there are sub-centres which cover a population of 5,000, and these are the most peripheral units of the governmental health delivery system in rural areas.

India's Revised National Tuberculosis Control Programme (RNTCP), an adoption of the internationally recommended Directly Observed Treatment Short course (DOTS) strategy, focuses on providing free quality sputum smear microscopy for diagnosis as well as quality drugs for treatment free of cost. This strategy also provides decentralized treatment services close to patients' residence under direct observation with the help of government health workers and community volunteers.

Study area

This study was conducted in a Tuberculosis Unit, covering a population of 580,000, of a rural district of Tamil Nadu (Tiruvallur), where RNTCP has been in place since May 1999. In 2002 the case detection was 84%, conversion rate 87%, treatment success was 75% and default rate was 15%.

Study design

Data collection

All the government health facilities, including sub-centres, situated in this TB Unit were visited and all records pertaining to the TB programme were examined. The following information was collected: staff salary, costs incurred for reagents, drugs, maintenance, stationery and fuel etc. Based

on the information collected, the following costs were estimated:

- personnel cost, including supervision and monitoring;
- cost of a drug regimen;
- cost of a sputum smear examination; and
- cost of a chest X-ray.

From these, we estimated the total cost for management of a tuberculosis patient

A profile of the government health facilities available, including microscopy centres, and the list of health personnel involved in health care, was collected. Out-patient attendance data of the year 2002, number of chest symptomatics identified, number of sputum microscopy examinations performed and number of TB patients diagnosed and started on treatment in the above area, was collected.

Information on the various activities of the health staff was collected. This included the time spent on various field activities by the staff. On the basis of proportion of time spent on TB patients for diagnosis and treatment, staff costs were determined.

Medical officer screens all persons attending Outpatient Department and selects the TB suspects. For each TB suspect identified, he spends 5 minutes for eliciting history of complaints and for ordering of 3 sputum examinations. During 2nd visit he spends 10-15 minutes to scrutinize the smear results and for eliciting history of previous Anti TB Treatment, categorization, health education and for starting treatment card. If patients default 2-4 hours are spent for visiting patients' house. For weekly review all patients started on RNTCP regimen 1 hour is spent. Every month 4-5 hours are spent for preparation of monthly programme management report and quarterly report. Laboratory Technician spends 30% of his time for TB work.

Type of cost calculated

Only financial costs were considered, including costs associated with tuberculosis services and those costs which vary with output levels.

Variable costs shared or joint costs were calculated using proportional time allocation (proportion of staff time). Capital costs were not included in this study.

Following definitions were used to calculate the costs

Cost: The value of resources used to produce something, including a specific health service or a set of services

Total cost: Total cost is sum of direct and indirect costs.

Costs incurred on smear microscopy, chest X-ray and drugs were classified as direct cost. Indirect cost was calculated based on proportion of staff time for TB care delivery and for supervision of TB services. The prevailing exchange rate at the time of study was 1\$=Rs 46.

Unit Cost: A unit cost is a simple average or the cost per unit of outcome (i.e. is an indicator of efficiency). The basic calculation of a unit cost is average cost per patient treated:

$$\text{Unit Cost} = \frac{\text{Total cost for tuberculosis services}}{\text{Total tuberculosis patients registered for treatment}}$$

RESULTS

The profile of health facilities, the staff pattern and the case finding activities of the TB control programme are described in Table 1. There were 15 Primary Health Centres, 2 Government Hospitals, 12 centres offering microscopy facilities and 120 treatment centres. The health personnel available for tuberculosis treatment in this area were 48 Medical Officers (MOs), 12 Laboratory Technicians (LTs), 117 Health Visitors (HV)/ Staff Nurse/ Health Assistant/Multipurpose Health Supervisor, 102 Multi-Purpose Health Worker, 1 Senior Treatment Supervisors (STS) and 1 Senior Tuberculosis Laboratory Supervisor (STLS).

In the year 2002, number of chest symptomatics examined were 5717 and 892 TB patients were detected. For these patients the unit cost was estimated, including cost for follow-up sputum microscopy.

The unit costs for tests done for TB diagnosis, anti TB treatment drug boxes and staff salary are given in Table 2. The unit cost for sputum smear microscopy was Rs 10/- and for radiography Rs 25/-. The cost of drugs for category I Rs 392/-; category I with extension Rs 495; category II Rs 729/-; category II with extension Rs 832/- and

Table 1: Profile of health system and tuberculosis case finding in one TU of Tiruvallur district of Tamil Nadu

Health facilities	
PHCs	15
Government Hospitals	2
Microscopy centres	12
Treatment centres	120
Health personnel	
Medical Officers	48
LTs	12
HV/Staff nurses/Health assistants/Multipurpose health supervisors	117
Multi purpose health workers	102
Anganwadi workers	1 047
STS	1
STLS	1
Case finding	
Total outpatients	625696
Chest symptomatics	5717 (1%)
Tuberculosis Patients	892 (0.1%)

category III Rs 277/-.

The proportion of time spent for TB services by different health personnel ranges from 100% for personnel working in the district TB centre to <10% for health visitors working in the field. Laboratory

technicians spend 30% of their working time for TB services. Cost for personnel for complete treatment of a patient was estimated as follows: Medical Officer Rs 116/-, Laboratory Technician Rs 54/-, STS Rs 129/-, STLS Rs 183/-, Health visitor Rs 187/-, Supporting staffs (Nurse, Pharmacist, Assistant,

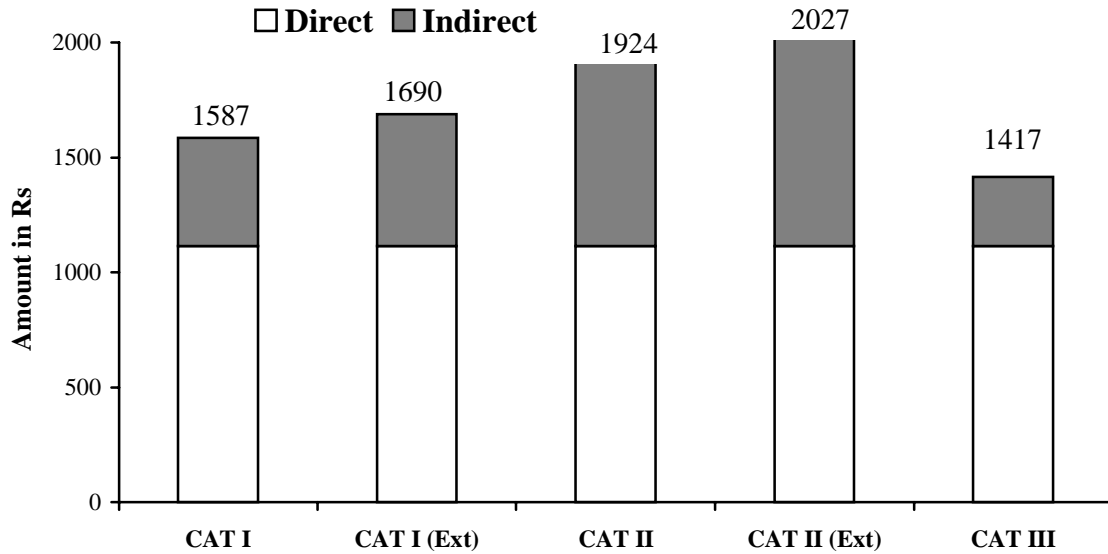


Fig. 1: Unit provider cost (direct and indirect) to treat a tuberculosis patient under RNTCP.

Table 2: Unit cost for tests, drugs and personnel for tuberculosis treatment in one TU of Tiruvallur district of Tamil Nadu

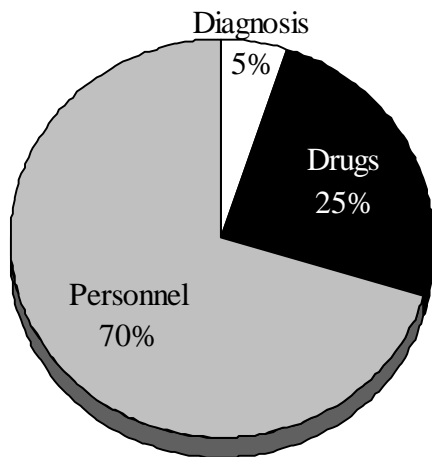


Fig. 2: The proportion of cost spent for diagnosis, drugs and personnel to treat a TB patient

Cost	Rs
For one smear examination	10
one radiograph	25
For regimen	
Category I	392
Category I (with extension)	495
Category II	729
Category II (with extension)	832
Category III	277
For personnel	
Medical Officer	116
Laboratory Technician	54
Health visitor	187
Supporting staff	161
DTC	284
STS	129
STLS	183

Menial staff, Watchman) Rs 161/- and for all the DTC staff together (MO, HV, Pharmacist, Radiographer, Assistant, Hospital worker, Sanitary worker, Lab Technician and Driver) Rs 284/-.

Thus, the overall (direct and indirect) unit provider cost to treat a TB patient was Rs 1587/- (Rs 1114 + Rs 473) for category I, Rs 1924/- (Rs 1114 + Rs 810) for category II and Rs 1417/- (Rs 1114 + Rs 303) category III (Figure 1). Of the overall unit provider cost, about 70% was spent on personnel, 25% on drugs and 5% on diagnosis (Figure 2).

DISCUSSION

The main finding of the present study is that the overall unit provider cost per patient treated under national TB control programme in this area ranged from Rs.1400/- (\$30) to Rs.2000/- (\$43) according to the category of treatment. For this calculation, the costs of the drugs and investigations and the salaries of staff (shared costs) were included. Similar findings were reported in a WHO report from India in 2004 on cost and cost effectiveness of public private mix, which found that the average cost per patient successfully treated to be around US\$30-40 when only public sector costs were considered⁵. However, this figure was considered to be low by international standards. Similarly in an earlier study conducted prior to RNTCP implementation, the cost of health services provided at PHC to diagnose a TB patient was Rs 1350/-².

Of the overall unit provider cost of Rs 1400/- (\$30), around 70% of the costs were spent on personnel salaries etc and around 25% on drugs. Similarly, a study from Thailand showed that even though the costs of drugs used in 3 short – course regimens were lower than the cost of the standard regimen, from the provider perspective, the total provider costs were 'the highest due to the highest routine service costs as a cost of providing care is not limited only to drug costs but also includes other services costs⁶. One of the ways of reducing costs for curative care suggested in an earlier report was to substitute the better-paid medical officers by lower paid paramedical staff as the TB control programme is integrated with the primary health care service and is decentralized up to the community (WHO

document)⁸. But in our study, we observed that the cost spent on personnel was distributed among various group of workers and this suggestion may not be applicable to the existing set up.

Cure of infectious TB patients is, currently, the best form of prevention. The DOTS strategy has shown to increase the successful treatment outcomes of TB treatment from below 50% to over 80%. Ravindra Dholakia reported that if the Indian government spent even \$200 million per year on effective DOTS implementation, the tangible benefit to Indian economy would be worth at least \$750 million per year⁴.

Our estimates demonstrate that the adoption of DOTS by the TB control programme is cost effective as DOTS achieves the lowest cost per person treated compared to the estimated costs reported earlier² and the greatest effectiveness with regards to lives saved and relapses avoided. In particular, avoiding relapse has potentially important public health implications, due to the reduction of cases of TB with subsequent reduction of provider cost associated with relapse. One of the major benefits of effective treatment is the prevention of further transmission. A study done in Indonesia showed that every dollar invested on TB control can give a return of at least \$55 over 20 years⁷. The World Bank has hailed DOTS as "one of the most cost effective interventions available"⁸. Country studies in the early 1990s from Malawi, Mozambique and Tanzania showed the cost of TB interventions ranging from \$19-52 per life saved. However drug costs were up to four times higher at that time. Today the DOTS drug package can be purchased for as little as \$10⁹. This means that investing in TB control will immediately save lives,. Over time, TB control will also "turn a profit" as it reduces the disease burden on society.

In 1997, we undertook a study to measure the socio economic impact of TB on patients and their families³. Based on the findings of the study, projections were made on economic burden caused by TB in India. It was estimated to be more than Rs 13000/-crores (\$3 billion) per year including loss of wages incurred by patients an account of TB. The patients spent more than Rs 645/- crores (\$180 million) on private TB care¹⁰. With the DOTS strategy, more patients are getting

diagnosed early, sputum conversion occurs early and 8 out of 10 patients started on treatment are cured by 6-months⁸. This means that the number of workdays lost will be reduced, which will reduce the economic burden to the country.

Limitations of the study

The costs have been estimated only for out patient care and do not include cost incurred for inpatient care. Another major limitation of this study was that capital costs were not included in estimation of the cost. We have not included the expenditure for incentives provided and the time cost for the community volunteers by the programme, as this has not been the practice in the study area. Thus, ours may be an under estimate.

CONCLUSION

To conclude, the provider cost is considerable for management of TB patients and inflicts considerable economic burden on the overall health system. The overall unit provider cost per patient treated under national TB control programme in the study area ranged from Rs1400/- to 2000/- (US \$ 31-44) according to the category of treatment. The cost for drugs is about 25% and the cost of personnel around 70%. The policy makers and planners must accord TB control a high priority and allocate adequate resources, both human and financial, to ensure effective implementation of the DOTS strategy. This will prevent deaths due to TB, promote economic development, reduce ill health and enhance the quality of life of people in India.

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HOW EFFECTIVE ARE SHOPKEEPERS AS DOT PROVIDERS? A STUDY UNDER RNTCP IN BANGALORE MAHANAGAR PALIKE, KARNATAKA*

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Summary

Introduction: Having consistently achieved a success rate of more than 85% in the Revised National TB Control Programme (RNTCP) implemented areas of the country, it is time to expand the coverage with greater involvement of the community. Against this backdrop, it was decided to conduct a study using “shopkeepers” as Directly Observed Treatment (DOT) providers under RNTCP in Bangalore Mahanagara Palike (BMP).

Objectives: To study the feasibility of using shopkeepers as DOT providers, their strengths & weaknesses and effectiveness in terms of success rates.

Methodology: All new smear positive (NSP) and X-ray active cases diagnosed from the six (6) TUs and the MCs attached to it under BMP were offered treatment facility through DOT Provider till 300 patients were enrolled. The intake criterion was by purposive sampling technique. The period of intake was from April 2002 to June 2003 and during this period, the total number of patients diagnosed and registered for treatment from whole of BMP was 2009 NSP and 1371 X-ray active cases. Following the diagnosis, the Health Supervisors (HS) of National Tuberculosis Institute (NTI) and Senior Treatment Supervisors (STS) of BMP identified the potential shopkeeper in consultation with the eligible patients attending the health facilities.

Result: During the process of purposive sampling, 300 patients were enrolled for treatment through DOT provider while 49 patients refused and opted treatment from Health Facility which served as control for comparing the outcome. Among the 300 patients who were enrolled for treatment through shopkeeper, 224 (74.6%) were NSP and 76 (25.3%) were X-ray active. Of the 49 (13.75%) patients who refused and opted for treatment from the Health facility, 40 (81.6%) were NSP and 9 (18.4%) were X-ray active. Out of 300 patients who opted for treatment from shopkeepers, 244 took treatment continuously and their success rate was 89.3%, the patients who refused to take treatment from shopkeepers the success rate was 90% and for those who registered & took treatment from BMP during the period of the study (excluding cases treated under shopkeepers) it was 84.8%. Success rate for 224 New Smear Positive cases who initially started treatment with shopkeeper was 81%.

Conclusion: Shopkeepers can be used as DOT providers because of their accessibility, availability being less time consuming and the place being convenient to the patients. Shopkeepers are an example of persons drawn from the community who can play a complementary role as DOT providers. No major problem was encountered during the treatment through shopkeepers.

[*Indian J Tuberc* 2006; 53:18-26]

Key words: DOT providers, Community Volunteer, Treatment Outcome

INTRODUCTION

The concept of Directly Observed Treatment Short course (DOTS) as a part of the RNTCP has come to the rescue of programme managers in different countries. It is a strategy that not only cures TB, but also stops the deadly cycle of infection¹⁻⁶.

The RNTCP is under implementation and the programme coverage has gained momentum. As

of 3rd quarter 2004, a population coverage of more than 906 million (86%) with 521 districts reporting⁷ has been achieved. By the end of 2005, the entire country is likely to be covered. DOT has primacy in the scheme of implementation of the programme. RNTCP is a public health programme meant for the health of community. It is universally accepted “that no public health programme can succeed without total involvement and participation of community”. The first step is to involve the community to create awareness and awakening regarding the seriousness

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and the urgency of the problem⁸. Using the services of the community volunteers as DOT providers, a few studies were carried out in the past⁹, one such has been carried out in New York City¹⁰ and the information from the Indian context is sketchy¹¹.

One of the high priority areas suggested by Central Steering Committee on Operational Research for TB, New Delhi, was to test the feasibility and effectiveness of using different types of DOT Providers to find out whether their involvement would ensure improvement of the programme¹². Having consistently achieved a success rate of more than 85% in the implemented areas of the country, it is time to deepen the coverage with greater involvement of the community. Against this backdrop, it was decided to conduct a study using “shopkeepers” as DOT providers under RNTCP in Bangalore.

OBJECTIVES

The study aims to assess:

1. the feasibility of using shopkeepers as DOT providers;
2. their strengths and weaknesses; and
3. effectiveness in terms of success rates.

METHODOLOGY

All new smear positive (NSP) and X-ray active cases diagnosed from the six (6) TUs and the MCs attached to them under BMP were offered treatment facility through DOT Provider till 300 patients were enrolled. The intake procedure was by purposive sampling technique. The period of intake was from April 2002 to June 2003 and during this period, the total number of patients diagnosed and registered for treatment from whole of BMP was 2009 NSP and 1371 X-ray active cases. Following the diagnosis, the HS of NTI and STS of BMP identified the shopkeeper as potential provider in consultation with the eligible patients attending the health facilities. After obtaining the consent of the identified shopkeeper, he was briefed about his role and responsibility using an appeal in the local/English language (Appendix 1). They were trained to fill

the treatment card and were also provided a chart showing the possible side effects of the drugs and action to be taken, both in local & English language (Appendix 2). The pouch containing the intensive phase of anti-TB drugs along with the duplicate treatment card was made available to the provider. After the first follow-up, the continuation phase pouch was given to the DOT Provider. In case the provider was unwilling to administer treatment, 3 attempts were made to identify an alternate provider, failing which, DOTS was administered at the health facility itself.

During the course of treatment, supervisory visits to the DOT provider were undertaken by the HS of NTI and STS of BMP at the time of recommended follow-up examinations to ascertain the regularity of drug consumption and sputum follow-up status.

On completion of the treatment or in the event of change of provider, a structured questionnaire was administered to both patients & provider for eliciting the feedback on the benefits and constraints encountered during the course of DOT. The questionnaire was also administered to the unwilling patients to ascertain the reason and to identify alternate provider. An amount of Rs.175/- per patient was provided as enabler fee to the identified shopkeepers on completion of the treatment.

The data was collected from all patients and the shopkeepers using a specially designed questionnaire based proforma. In case the patients failed to report for drug consumption, the shopkeepers were requested to intimate the same to the STS of the concerned TB unit over telephone. Programme guidelines were followed in respect of treatment execution and follow-up. Data was subjected for testing of the proportion difference in large samples test.

RESULTS

During the process of purposive sampling, 300 patients were enrolled for treatment through DOT provider while 49 patients refused and opted

Table 1: Distribution of patients - TU wise

TB Unit	New Smear Positive	X-ray Positive
Hosahalli	53	17
Hanumanthapur	49	16
Yeshwanthapur	38	15
Jayanagar	37	10
Neelasandra	32	14
Broadway	15	4
Total*	224	76

*Ratio of males to females - 2.8 : 1

treatment from Health Facility which served as control for comparing the outcome. Among the 300 patients who were enrolled for treatment through shopkeeper, 224 (74.6%) were NSP and 76 (25.3%) were X-ray active. Of the 49 (13.75%) patients who refused and opted treatment from the Health facility, 40 (81.6%) were NSP and 9 (18.4%) were X-ray active. The TU-wise distribution of cases who took treatment from shopkeepers is shown in Table 1.

Table 2 shows the classification of shopkeepers as A, B, C & D based on the type of commodities sold and approximate investment made.

The distribution of shopkeepers for 300 patients is shown in Table 3 wherein it can be seen that the cases were almost uniformly distributed and there was no preferential selection of the shopkeeper.

Table 2: Classification of shopkeepers.

Classification	Commodities sold	Approximate Investment (In Rs.)
A	Grocery, detergents & soaps, stationery etc., with facility of telephone, refrigerator etc.	>75000
B	Confectionery viz. chocolates, toffees, chikkies, detergents and soaps,	50000-75000
C	Confectionery groceries and detergents and soaps and vegetables	25000-50000
D	Petty shop selling confectionery items, condiments like pappad etc.	<25000

From table 4, it was observed that out of 300 patients who opted for treatment from shopkeepers, 244 took treatment continuously. Among them, the cure rate was 83.1% for new smear positive patient and treatment completion rate was 95.5% for X-ray positive cases, which is quite encouraging. Among the remaining 56 (18.6%) who discontinued and opted to continue treatment from the health facility, it was found that the cure rate was unacceptably low with a high defaulter rate. For 224 New Smear Positive cases, the cure rate was 74%.

Table 5 shows a comparison of the success rates of the patients who took treatment from the shopkeeper as well as health facility. It was observed that providing DOT through shopkeepers was as effective as DOT delivered by the health system. A comparison test of the treatment outcome of patients who received treatment from shopkeeper with that of patients who received treatment from health facility, it was observed that their success rates were not significantly different from each person at 5% level of significance. When compared with patients who were registered and took treatment from the health facility, it was observed that the success rate of the two groups were not significantly different at 5% level of significance.

Social Aspects

On analysis of the socio-economic, employment status of the patient and distance from the residence for the 300 patients who took treatment

Table 3: Distribution of patients to the classified shopkeepers.

Type of case	A	B	C	D	Total
	>75000	50-75000	25-50000	<25000	
New Smear Positive	50	64	64	46	224
X-ray Positive	14	20	26	16	76

Table 4: Treatment outcome among the patients

Outcome	Continued with Shopkeeper				Discontinued with Shopkeeper & continued from BMP			
	New Smear Positive		X-ray Positive		New Smear Positive		X-ray Positive	
	No.	%	No.	%	No.	%	No.	%
Cured	148	83.1	-	-	18	39.1	-	-
Treatment completed	11	6.2	63	95.5	4	8.7	4	40
Defaulted	-	-	-	-	23	50	6	60
Failure	4	2.2	-	-	1	2.2	-	-
Death	15	8.4	3	4.5	-	-	-	-
Total	178		66		46		10	

Table 5: Success rate for patients treated under shopkeepers and BMP

Patient Particulars		Cures rate (%)	Success rate(%)
a.	Treatment under Shopkeepers	83.1	89.3
b.	Who refused to take Treatment from shop keeper & received from Health Centers	90	90
c.	Registered & taking Treatment from BMP during the period of the study (excluding cases treated under shopkeepers).	83.7	84.8
d.	For 224 New Smear Positive Patients who initially started with shopkeeper	74	81

from the shopkeepers, it was observed that both slum and non-slum dwellers were almost equal in number and about 83.7% were residing within a walking distance of 5 minutes from shopkeeper's place. As regards the employment status, about 56% were employed, their average monthly income was Rs.1970/- and nature of work diverse. Among the 44% unemployed, the reasons for not working were due to sickness (37%), old age (20%): others in the group were housewives (29%) and students (12%).

Reasons for discontinuing treatment from shopkeepers

From the study, it was observed that 56 patients among the 300 who opted treatment from shopkeepers discontinued at different phases of treatment. On scrutiny of the data, 64.2% discontinued during intensive phase, 10.7% in the prolongation phase and 25% in the continuation phase. The major reasons attributable for discontinuation of treatment through the shopkeepers were alcoholism (28.5%), admission to sanatoria (16.1%), shifting of residence by patient & address not known (12.5%), shifting of house & treatment received at other health facility (10.7%), non-cooperation of patient (10.7%) and social stigma (5.4%). The minor reasons attributed were: DOT provider not interested (3.6%), patients found health centre nearer than the shop (3.6%), DOT provider sold the shop (3.6%), and side effects viz., vomiting & weakness etc. (3.6%).

One of the interesting findings was that 30 (61%) out of 49 patients who refused treatment from shopkeeper and took treatment from health facility attributed to the apprehension of disclosure of the disease and social stigma as the reason for not taking treatment from the shopkeepers. Another 27% took treatment from the health facility because of proximity of the centre to the patient's home.

Merits of using Shopkeepers as DOT Provider

With regard to the satisfaction level of the shopkeeper as DOT provider and patient as beneficiary, 224(92%) out of 244 shopkeepers

readily accepted to be the DOT Providers. Of the 244 patients, 207(85%) expressed their satisfaction of taking treatment from shopkeepers because of their easy accessibility, availability, less time consumed and place being convenient to them.

DISCUSSION

The success of TB control programme would be the resultant of multiple components (Health Education, Supportive Health system, Family support, etc) acting in concert to support and enable patients to complete the therapy¹³. Community contribution to effective TB care has the potential to overcome the limitations resulting in more widespread implementation and effective use of resources which has been brought out way back in 70's by the 9th report of World Health Organization Experts Committee on TB¹⁴. This will also result in reducing the load on the Health system. From the study, it was observed that, on an average, the STS and HS of NTI had to make 11 and 7 supervisory visits per month respectively. Harnessing the community involvement for DOT activity would dramatically expand the provisions of effective ambulatory TB care. Shopkeepers can play a complementary role. However supervision must be continued by the STS from the health system to take care of the follow-up examination and retrieval of patients who do not report for drug consumption.

Following the completion of intake of patients into the study, the shopkeepers were classified as A,B,C & D based on the commodities sold and investment made by them to see whether patients taking DOT from these classified shopkeepers has any effect on the treatment completion pattern or cure rates. No differences were observed among them.

Retrieval action for the patient who missed the doses

The authors of the paper felt that it would be too much to expect that the job of retrieval action for the missed dose of patients handled by the shopkeeper and that this job needed to be undertaken by the STS of the health system. The shopkeeper

could only play the role of contacting STS through telephone for passing information about the patients' particulars. This mechanism is workable in urban setup but may not be a solution for the rural areas as distance and connectivity are important factor which come in its way.

In the study 23 NSP and 6 X-ray active cases discontinued treatment from shopkeeper. To get good success rate retrieval of the patients is very important. This area can be strengthened by improving efficiency in timely retrieval action and better co-ordination between DP and the STS. As STS is involved in supervision of all health facilities, a balance has to be struck to entrust the retrieval activity.

Perspective of Shopkeepers as DOT Providers

By interviewing the shopkeepers, it was observed that they too were concerned about community welfare and had a sense of commitment to the fellow human beings. The shop keepers showed keen interest inspite of the fact that most people have no time even for there own kith and kin. Shopkeepers have demonstrated a fellowship that is not only enviable, but extremely heartening as well. They are ready to help one another with an intention of earning goodwill. They have come forward with a spirit of comradeship, thereby making DOTS programme a matter of great pride. This is an example set by the shopkeepers who are from the community and play a complementary role to the programme run by the government. They have shown certain degree of dedication and commitment and have also shown that they can be potential DOT providers in areas where the accessibility of health services is poor.

Of the 244 patients, 207(85%) expressed their satisfaction at taking treatment from shopkeepers because of their easy accessibility, availability, saving of time and general convenience, 22% expressed the convenience of collecting drugs for working patients, 8% expressed that it avoids social stigma and 4% expressed that it saved them time and money.

Constraints encountered and Suggestions offered by Shopkeepers

As regards the constraints encountered, the shopkeepers have expressed their difficulty in

providing DOTs to the alcoholic patients, patients abruptly getting admitted to sanatoria due to complication, shifting of house without informing and a few patients asking for additional blister packs.

Some of the genuine suggestions provided by the shop keepers based on their experience as DOT providers were that the public awareness of TB programme and facilities needs to be strengthened and majority of them expressed their willingness to extend full support to the programme in its future endeavour. They also suggested that housewives, chemists, social worker and service minded people among the community could also be used as DOT providers.

CONCLUSION

Use of shopkeepers as DOT providers can deepen the extent of coverage. No major problems were encountered during the administration of treatment through shopkeepers. As many patients expressed their difficulty to take treatment at the health centre because of the inconvenient timings, non-availability of government DOT centres nearer to their residence, unbearable travel cost and social stigma. The issue of social stigma needs to be further addressed, as it is an important factor as reported in a few other studies in India¹⁵⁻¹⁶. These factors can be overcome by using shopkeepers as DOT providers. During the study, the investigator did not come across any objection from the community for the shopkeeper to act as DOT provider.

ACKNOWLEDGEMENTS

The authors thank the Project Coordinator (RNTCP) and all the Staff of 6 TUs of BMP for their assistance. The authors also acknowledge with thanks the staff of Control Section viz., Smt. V.N. Saroja, Shri. B.A. Eshwara, Smt. Victoria Lalitha and Shri. O Srinivasalu for their technical and operational assistance. We thank Mrs. Sudha Murthy, Sr. Librarian for her valuable editorial inputs. The authors also acknowledge Shri. R. Ravi, Stenographer Gr.II and Shri. Vishveshwara Sharma, for their untiring secretarial assistance.

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Appendix -1

Appeal

Namaskara,

We are from National Tuberculosis Institute (NTI), a Government of India Organization. You might be aware that tuberculosis is one of the major killer among the infectious diseases. It is estimated that, every minute, somewhere in India one person dies of tuberculosis, as the patient is not being detected well in time and treated properly. Tuberculosis (TB) is a curable disease, but it requires 6 to 8 months of regular treatment. Once the patient is put on treatment, the chances of spreading the disease to others will not be there. Because of the long duration of the treatment, majority of patients do not take full course of treatment and many of them stop treatment as soon as they start feeling well or due to other reasons which they should not do so.

To overcome the problem of discontinuing the treatment by the patient, a new TB control programme popularly known as DOTS (Directly Observed Treatment Shortcourse) is in practice. At present, DOT is being given in the government health facilities. We are trying to make it more convenient to the patient by providing treatment as near to their residence and flexible timings for taking treatment. We would be privileged to utilize your services as a DOTS provider and you would be one of the lucky ones to have a chance to provide this type of service. For this, you will be given enabler fee in recognition of your service.

As a DOT Provider, your responsibility would be to make the patient swallow drugs in your presence, 3 times a week in the first two months and once a week in the next four months.

We would be extremely happy if you can extend you support and services by being one of the proud participants in this new venture of providing treatment to the patients, thereby serving the community at large.

Dhanyavadagalu.

Note: In case patient does not come to swallow the drugs, immediately the information has to be paged to 9628 – 827555. The charges for paging would be refunded.

Address for correspondence: The Director, National Tuberculosis Institute, 'Avalon', 8, Bellary Road, Bangalore – 560 003

Appendix - 2

	Symptom	Action to be taken
1.	Drowsiness	Reassure patient usually occurs in the early phase of treatment
2.	Red/Orange urine/sweat	Reassure patients. It is colour of the medicine
3.	Vomiting sensation/vomint/pain in abdomen	Reassure patient. Do not give drugs on empty stomach. Give drugs with less water. Give drugs over a longer period of time (5 to 10 minutes)
4.	Burning in the hands and feet	Refer the patient to doctor
5.	Joints pain	Refer the patient to doctor
6.	Blurring vision	It is rare. If it occurs, stop the drugs and refer the patient to doctor
7.	Jaundice	It is rare. If it occurs, stop the drugs and refer the patient to doctor.

NOTE: If the patients complains of any of the symptoms from serial 4 to 7 above, send the patient to doctor with an intimation to NTI by paging to 9628 - 827555. The charges for paging would be refunded.

Case Report

TUBERCULOSIS IN TRANSVERSE TESTICULAR ECTOPIC TESTIS, A DIAGNOSTIC DILEMMA : CASE REPORT

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(Received on 22.9.2005; Accepted on 25.10.2005)

Summary

Transverse testicular ectopia is a rare entity where one testis migrates to the other inguinal area. Genital involvement due to tuberculosis is rare in children. Tubercular involvement in transverse testicular ectopic testis has not been reported earlier. A case of tuberculosis in transverse testicular ectopic testis is reported here where the testicular mass mimicked as a tumour. Histopathological examination confirmed the diagnosis [Indian J Tuberc 2006; 53:27-29]

Key words: Tuberculosis, Orchitis, Epididymitis

INTRODUCTION

Tuberculosis of the genital tract is uncommon in both sexes before puberty. In males, the route of infection is either haematogenous or through retrograde passage of infected urine through the posterior urethra in the prostatic ducts. Tuberculous epididymitis or epididymo-orchitis can occur in early childhood and may be the initial method of presentation¹.

Transverse testicular ectopia (TTE) is one of the rarest forms of testicular ectopia². In this condition, both testes are located on the same inguinal side. TTE was first described by Lenhossek in 1886². We are reporting a case of tuberculosis in transverse testicular ectopic testis which posed a diagnostic dilemma which was later solved by histopathological examination (HPE). To the best of our knowledge, it is the first case reported in English language literature.

CASE REPORT

A seven year old male child was admitted with the complaints of painless swelling in the right inguinoscrotal region for preceding three months and it was increasing gradually. His father was suffering

from pulmonary tuberculosis and completed his treatment. The child was having low grade fever for 7 days and pain on the swelling for last 2-3 days. On examination, he was anaemic and had tenderness over the swelling which was firm in consistency. His right scrotum was well developed but the left scrotum poorly developed. On palpation, right testis was normal but no testis found in left scrotum. The child was given oral broad spectrum antibiotic with analgesic. His blood count was normal but ESR was raised. His ultrasonography abdomen was normal and no testis found in the left inguino-scrotal area but there was a hypoechoic mass on the right inguinal area, chest skiagram was normal. We did fine needle aspiration cytology of the mass which revealed necrotic material and degenerated cells, without suggesting any confirmed diagnosis. The patient was subjected to exploration of the right inguinal area and a mass of about 6 x 4 cm was found. The mass was connected with vessels and vas deferens which was thickened. Testis and epididymis could not be identified separately. Besides these structures another vas deferens and vessels was there upto normal testis in right scrotum. Macroscopically, it looked like tumor in TTE testis. We removed the mass and subjected the mass for HPE. Cut surface of the mass showed caseous material and the testicular structure was totally destroyed. HPE report was consistent

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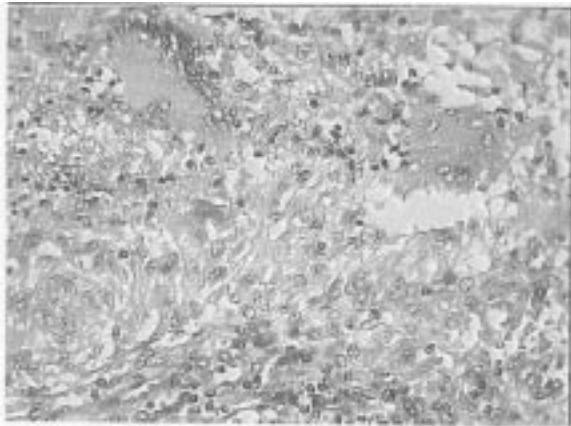


Figure : Photomicrograph of testicular biopsy showing tuberculous granulomas and Langhan's giant cell

with infective tuberculosis (Fig.). His cystoscopy and excretory urography were done later and were normal. His sputum and urine were negative for acid fast bacilli. The patient was put on three drug antituberculous regimen consisting of Rifampicin, Isoniazid and Pyrazinamide and was well after six months of follow up.

DISCUSSION

TTE, the migration of one gonad to the contralateral inguinal canal or scrotum, is a rare entity². The entity has also been named as unilateral double testis, crossed testicular ectopia, transverse aberrant testicular maldescent, and testicular pseudoduplication³. The etiology of this anomaly is uncertain. Different hypotheses include adherence and fusion of developing Wolffian ducts and aberrant gubernaculum, testicular adhesions, deficit in internal inguinal ring, and traction on a testis by persistent Mullerian structures². Almost one third of the cases occur in pseudohermaphrodites⁴. There may be some associated anomalies namely seminal vesicle cyst, persistent Mullerian duct and intersex². The differential diagnosis of the inguinal mass with testis in scrotum on the same side includes hydrocele of the cord, spermatocele, tumour of the testis, spleenogonadal fusion, an adrenal rest or a second testis⁵. Treatment of TTE is trans-septal fixation or modified Ombredanne operation².

Tubercular genital involvement in children is unknown before puberty and the average time interval between the primary lesion and the genital manifestation is rarely less than 5 year and is usually more than 10 years⁶. In children, genital involvement is usually the manifestation of a generalised tuberculous infection. But genital tuberculosis may present solely as reported by Milleneria, in an 18 month old boy⁷. The author advocated that most chronic scrotal swellings in children are malignant, so HPE must be done to confirm the diagnosis. Most of the children with genital tuberculosis had pulmonary infection and from there haematogenous spread occurred⁸. The different routes of infection may be, descending infection from the urinary tract, direct extension from neighbouring organs, early or late haematogenous, lymphatic spread, besides primary tuberculous infection of urethra⁷. Testicular involvement is mostly due to local spread from the epididymis, retrograde seeding from the epididymis and rarely by haematogenous spread⁹. Haematogenous spread is more common in epididymis or prostate due to their rich blood supply⁸. In our case, both the testis and epididymis were involved and produced a firm mass like testicular tumour. Tunica albuginea was distorted due to tubercular infiltration. An intact tunica albuginea indicates retrograde infiltration from epididymis and distorted tunica is a result of direct tubercular extension from epididymis¹⁰. There have been case reports of malignant transformation of TTE like embryonal carcinoma, seminoma, choriocarcinoma, and teratoma². The caseous material which came out after cutting the specimen mimicking as central necrotic material, inside a tumour suggests tuberculosis. Also the clinical symptoms like fever and pain led us to the clinical diagnosis of testicular tumor with necrosis and secondary infection. It is the HPE of the specimen which helped us to diagnose correctly.

CONCLUSION

Though rare, tuberculous infection can occur in TTE testis and HPE must be done to diagnose correctly in cases where a benign disease mimicks malignancy.

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TUBERCULOSIS HEALTH VISITORS' COURSE

The 2006-2007 Tuberculosis Health Visitors' Course of 9 months' duration will be conducted at the New Delhi Tuberculosis Centre. The minimum qualification for admission to this course is 10 + 2 with science and/or hygiene. Science education up to class 10 is essential. Application forms for admission to the course can be obtained from the Secretary General, Tuberculosis Association of India, 3, Red Cross Road, New Delhi-110 001. The last date for receipt of applications is 28th April, 2006.



STATUS REPORT ON RNTCP*

At the end of 3rd quarter, 2005, DOTS services under Revised National Tuberculosis Control Programme are accessible to 95% of the population in 604 districts in 35 states and Union Territories of the country. The population coverage in the 3rd quarter has increased from 1030 million to 1059 million. Almost the entire country has access to DOTS services except a few districts in Bihar and Uttar Pradesh, which are likely to be covered by end 2005.

Performance

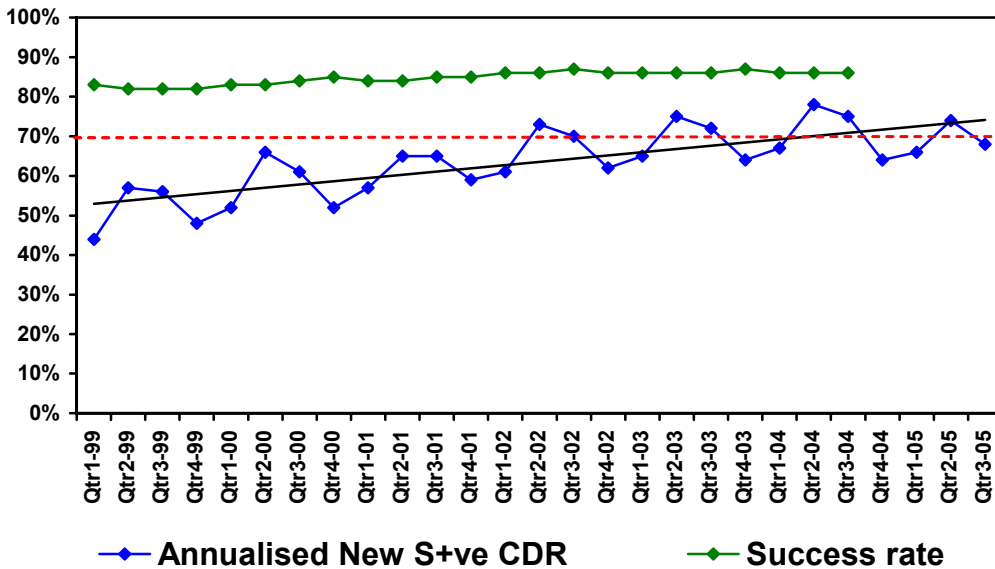
The new smear positive case detection rate for the 3rd quarter of 2005 is 68% with a total of 333,625 patients placed on treatment. The success rate amongst the new smear positive PTB cases registered in the 3rd quarter

of 2004 was 86%. The sputum conversion rate and cure rate among the new sputum positive cases was 88% and 84% respectively.

In addition to the 132,397 new smear positive cases, 98,047 new smear negative cases, 43,526 extra pulmonary cases and 45,974 smear positive re-treatment cases were also initiated on treatment in this quarter. The extra-pulmonary TB cases accounts for 16% of all new cases in the quarter and re-treatment cases for 26% of all smear positive cases.

Quality Assurance of sputum smear microscopy

Significant progress has been made in the states on implementation of the revised



** Population projected from 2001 census
 ** Estimated no. of NSP cases - 75/100,000 population per year (based on recent ARTI report)

Figure: Trend in case detection rate and treatment success rate in DOTS areas, 1999-2005 **

* Dr. L. S Chauhan, DDG (TB), Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, New Delhi

Table: Performance of RNTCP Case Detection (2005, third quarter), Smear Conversion (2005, second quarter), and Treatment Outcomes (2004, third quarter)

State	Population (in lakh) covered by RNTCP	Suspects examined per lakh population	No of Smear positive patients diagnosed	Total patients registered for treatment	Annualized total case detection rate	New smear positive patients registered for treatment	Annualized new smear positive case detection rate (%)	3 month conversion rate of new smear positive patients*	Cure rate of new smear positive patients**	Success rate of new smear positive patients**	No of new smear negative cases registered for treatment	No of new EP cases registered for treatment
A & N Islands	4 (100%)	234	65	113		39					21	40
Andhra Pradesh	798 (100%)	133	15954	27052	136	11186	56 (75%)	88%	84%	87%	9316	2203
Arunachal Pradesh	12 (100%)	233	349	624	208	236	79 (105%)	96%	91%	91%	166	68
Assam	285 (100%)	96	4744	8263	116	3403	48 (64%)	85%	74%	79%	2672	698
Bihar	511 (56%)	44	3320	7972	75	2239	21 (28%)	76%	84%	88%	4121	392
Chhatisgarh	10 (100%)	319	397	652	253	195	76 (80%)	88%	88%	89%	168	161
Chhatisgarh	222 (100%)	104	3105	5842	105	2488	45 (56%)	85%	81%	84%	2202	585
D&N Haveli	3 (100%)	78	52	46		34					4	1
Daman & Diu	2 (100%)	563	75	67		29					13	8
Delhi	160 (100%)	234	6417	11684	291	3401	85 (89%)	91%	87%	87%	2277	3297
Goa	14 (100%)	170	218	374	105	125	35 (44%)	84%	88%	88%	125	59
Gujarat	549 (100%)	147	14081	19157	140	7853	57 (72%)	90%	85%	86%	3411	2176
Haryana	233 (100%)	154	5902	9273	159	3443	59 (62%)	85%	79%	83%	2086	1458
Himachal Pradesh	65 (100%)	253	2107	3604	222	1244	77 (81%)	92%	89%	90%	722	843
Jammu & Kashmir	112 (100%)	68	685	1176	71	510	28 (29%)	90%	89%	89%	333	374
Jharkhand	292 (100%)	82	3751	7450	107	2797	39 (52%)	84%	87%	90%	3202	447
Karnataka	562 (100%)	165	10663	16812	120	6544	47 (62%)	84%	81%	82%	4436	2762
Kerala	330 (100%)	168	3487	5899	71	2536	32 (43%)	86%	84%	87%	1174	1381
Lakshadweep	1 (100%)	23	1	0		0					0	0
Madhya Pradesh	659 (100%)	96	11849	18601	113	7250	44 (55%)	84%	78%	83%	5928	1661
Maharashtra	1050 (100%)	142	19091	35212	134	13644	52 (65%)	90%	87%	87%	10411	5199
Manipur	27 (100%)	136	340	1151	174	263	40 (53%)	88%	87%	87%	409	252
Meghalaya	26 (100%)	104	400	1083	169	308	48 (64%)	83%	72%	77%	285	197
Mizoram	10 (100%)	204	221	509	206	154	62 (83%)	96%	87%	87%	138	112
Nagaland	24 (100%)	109	277	784	129	259	43 (57%)	89%	91%	92%	202	138
O rissa	389 (100%)	108	6552	11123	114	5083	52 (61%)	83%	73%	84%	2996	1610
Pondic herry	10 (100%)	371	380	391	148	165	63 (84%)	86%	70%	75%	72	72
Punjab	261 (100%)	141	4785	8377	128	3197	49 (52%)	89%	81%	85%	2127	1553
Rajasthan	624 (100%)	136	18647	28261	181	10777	69 (86%)	90%	86%	88%	7999	3365
Sikkim	6 (100%)	333	183	384	254	118	78 (104%)	87%	93%	93%	74	101
Tamil Nadu	648 (100%)	246	13293	23175	143	9247	57 (76%)	90%	87%	88%	6879	4311
Tripura	24 (72%)	78	220	319	52	152	25 (33%)	82%	84%	91%	86	27
Uttar Pradesh	1719 (94%)	109	28912	47640	114	19561	47 (49%)	89%	84%	87%	16408	4181
Uttaranchal	91 (100%)	179	2092	3096	136	1274	56 (59%)	94%	86%	87%	827	354
West Bengal	857 (100%)	161	16549	27459	128	12544	59 (78%)	90%	86%	87%	6757	3440
Grand Total	10590 (95%)	136	199164	333625	129	132397	51 (68%)	88%	84%	86%	98047	43526

* Smear conversion rate not expected for states that began implementing RNTCP during 2nd quarter 2005
 ** Cure rate and success rate are not expected for states that began implementing RNTCP after 2nd quarter of 2004

External Quality Assurance (EQA) protocol for sputum smear microscopy. A National Laboratory Network Committee meeting held in September 2005 reviewed the progress in training of STDCs and district staff on EQA and also planned for the next steps for EQA implementation.

DOTS Plus Guidelines

Under RNTCP Phase II, it is planned to first establish a network of RNTCP accredited quality-assured Intermediate Reference Laboratories (IRL), providing culture and DST services for the RNTCP. Concurrently, a network of DOTS Plus sites, as per international guidelines, capable of enrolling and providing care and management for MDR-TB cases would be established. A total of 24 DOTS Plus sites are planned to be established across the country over the next five years, with a view to have in place RNTCP DOTS Plus services that are capable of enrolling for treatment at least 5000 "new" MDR-TB patients every year by 2010. The first DOTS Plus sites will be established in the states of Gujarat and Maharashtra and will be ready to enrol the first patients during 2006.

A national level meeting of experts was held in September 2005 to discuss and finalise operational and technical guidelines for implementation of DOTS plus in the country.

HIV Surveillance among TB patients

HIV surveillance among TB patients has been started in four districts (one in each state) of 4 high HIV prevalence states - AP, Karnataka, Maharashtra and Tamil Nadu with the objective to obtain an estimate of point prevalence of HIV in newly detected TB patients; and also to determine the trend of HIV prevalence in such patients.

The performance of RNTCP in most parts of the country is satisfactory. However, compared to new smear positive case detection rate of 75% in 3rd quarter 2004, the performance in the current quarter is low (68%). The performance of populous states of Bihar (28%) and Uttar Pradesh (49%) is low resulting in decrease in national average. It might be a result of the expansion in several districts of Bihar and Uttar Pradesh, but is viewed seriously and the programme implementation and performance in these states needs to be monitored closely by all concerned.

As the programme enters Phase II of project implementation, there is a need to consolidate and sustain the achievements for 2-3 decades to have an impact on epidemiology of TB. For this prolonged battle towards TB control, the highest level of commitment from the states is required to maintain the quality of the DOTS services and achieve the ultimate goal of TB control in the country.

IS MIGRATION A FACTOR LEADING TO DEFAULT UNDER RNTCP ?

K. Jaggarajamma, M. Muniyandi, V. Chandrasekaran, Sudha G. A Thomas, P.G Gopi and T. Santha

(Original received on 12.7.2005; Revised Version received on 29.9.2005; Accepted on 4.10.2005)

Summary

Objective: To study the contribution of migration to treatment default among tuberculosis patients treated under RNTCP

Methods: Retrospective study by interviewing the defaulters using semi-structured interview schedule to elicit the reasons for default including migration.

Results: Of the 531 patients registered under TB programme in 3rd and 4th quarters of 2001, 104 (20%) had defaulted for treatment. Among defaulters, 24% had migrated. The reasons for migration were: occupational (48%), returning to the native place (28%), domestic problems (12%) and other illnesses (12%).

Conclusion: After initiation of treatment, patients should be encouraged to report to the provider, if they are leaving the area, to transfer treatment to the nearest centre to ensure continuity of treatment. These measures will help to reduce default on account of migration and achieve the desired outcome in RNTCP. Availability of treatment under the DOTS strategy should be popularized among patients, providers and community. [*Indian J Tuberc* 2006; 53:33-36]

Key words: Tuberculosis, migration, default, DOT, RNTCP

INTRODUCTION

The 44th World Health Assembly (1991) recognized the growing importance of Tuberculosis (TB) as a public health problem¹. The persistence of TB has been due to poorly managed TB control programmes^{2,3}, poverty, population growth, migration and a significant rise of TB cases in HIV endemic areas⁴. These issues should be taken into account when designing effective disease control programme. It has been found that in some regions of India, three out of four households include a migrant⁵. Internal migration was mainly for livelihood. Migrants cannot access various health and family care programmes due to their temporary residential status⁵. A study among patients discontinuing TB treatment under the earlier non-DOTS based National TB control programme (NTP) in Tamil Nadu had brought out migration, as one of the reasons for discontinuation of treatment⁶. A study on defaults among TB patients under Directly Observed Treatment Short-course (DOTS) strategy in Bangalore city has shown that non-availability of more than one third of defaulters for interview was

mainly due to temporary migration to their native villages⁷. Our centre has identified migration (7%) as a reason for failure to initiate treatment among smear positive cases identified at the health facilities in Tiruvallur district, Tamil Nadu⁸. However, information on reasons for migration among TB patients is not available. The present study was undertaken to assess whether migration continues to be a problem among defaulters after decentralization of treatment services under the DOTS strategy and to find out the reasons for migration.

METHODS

Setting

The present investigation was undertaken in a tuberculosis unit (TU) of Tiruvallur district, where the DOTS strategy was introduced in May 1999. There are 15 Primary Health Centres (PHCs) and two government general hospitals, covering a population of 580,000. Of these, eight PHCs border the adjacent state of Andhra Pradesh and other

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districts of Tamil Nadu.

In a cohort of 531 patients registered for treatment between July and December 2001, 104 (20%) had defaulted for treatment. Medical social worker of Tuberculosis Research Centre (TRC) visited all defaulters using the address recorded in the TB register to elicit reasons for default, using a semi-structured interview schedule. For patients who had migrated, the reasons for migration were collected from a responsible family member or a close relative / neighbour of the patients. The

corresponding DOT providers were also contacted to substantiate the reasons.

Definitions

Default: As per RNTCP guidelines default is defined as "a patient who, at any time after registration, has not taken anti-TB drugs for two months or more consecutively⁹.

Migration: A patient who was reported to have moved out from the address given at the time of

Table: Risk factors for default among tuberculosis patients

Factors	Total (N 531) A	Defaulter (N 104)		Migration (N 25)	
		No. B	% (B/A)	No. C	% (C/B)
Sex:					
Male	400	94	24 (p<0.01)	23	25
Female	131	10	8	2	20
Age:					
< 45 years	268	49	18	13	27
≥45 years	263	55	21	12	22
Type of cases					
New	434	61	14 (p<0.01)	21	34 (p<0.01)
Old	97	43	44	4	9
Literacy					
Literate	287	42	15	11	26
Illiterate	176	32	18	12	38
Occupation					
Employed	287	51	18	15	29
Unemployed	176	23	13	8	35
Drinking					
No	289	32	11(p<0.01)	9	28
Yes	174	42	24	14	33
Duration of stay					
≤2 years	44	9	20	7	78
>2 years	416	64	15	15	23

Of the 531 patients included in the study, only 463 were available when interviewed at the residence after the start of treatment to elicit information on sociological profile.

registration, to another area in the same TU or another TU within district/State or to the other State, without informing the concerned health facility, is considered as a migrant for the purpose of this investigation.

Statistical analysis

Data were entered and analyzed using the SPSS (8.0 version SPSS Inc, Chicago, IL) package. Data were cross-tabulated to examine the relationship between socio-demographic, economic characteristics of patients and migrants. Statistical analysis was performed using the Chi-square test for test of association between default rate with migrants and non-migrants. If a cell value was <5, Fisher's exact test was used. A 'P' value of <0.05 was considered as significant.

RESULTS

Of the 104 defaulters, 21 (20%) were reported to have died at a later date after their outcome was declared as default; addresses could not be traced for 2 (2%) and 7 (6%) had completed treatment and were wrongly documented as default. Migration was one of the reasons for default among 25 (24%) of patients. Of the 49 patients who were interviewed, drug related problems such as bulk of tablets and side effects were reported by 37 (76%), alcohol consumption by 18 (37%), symptom free by 23 (47%), taking treatment from private practitioner or other government facility by 11 (22%) and work related problems such as inconvenient timings/going out stations on work by 8 (16%) and stigma by 4 (8%). (Patients had given multiple reasons for default).

Migration was significantly higher among newly diagnosed patients as compared to previously treated Category II cases [21 of 61 (34%) vs. 4 of 43 (9%) $P < 0.001$], and among patients who had resided at the given address for two years or less compared to more than two years (7 of 9 vs. 15 of 64; $P < 0.001$). However, there was no significant difference in migration among the patients belonging to border PHCs with others (Table 1).

Of the 25 default patients for whom migration was reported to be the reason for default,

12 (48%) of the migrated did so on occupational grounds, 7 (28%) returned to their native place, 3 (12%) had domestic problems and 3 (12%) had other illnesses.

DISCUSSION

This study has brought out migration as an important factor for treatment default (24% of the defaulters had migrated). A study from TRC had reported that migration was one of the reasons for patients discontinuing treatment under non-DOTS based NTP using Short-course Chemotherapy⁶. A previous study from Bangalore city had reported that 20% of the defaulters had migrated under the DOTS based programme⁷. In our series, migration was mainly due to occupational reasons and returning to their native place. Irregular and incomplete treatment on account of migration is likely to increase the burden of TB in the community. A report from WHO- Emro has brought out that the transient nature of their work and the long duration of TB treatment make it difficult for seasonal migrant workers to balance their economic needs with their health needs¹⁰. Since migration, whether temporary or permanent, contributes to nearly one fourth of default, it is important to work out strategies to overcome this. The RNTCP guidelines on this issue state that patient's house should be visited before start of treatment. This will help the providers to confirm patient's place of stay and decide to refer him to other health facility if he resides outside the jurisdiction of the treatment centre. However, this was not followed strictly due to practical constraints like lack of adequate staff, transport and health staff engaged with other programmes. It is alternatively suggested that verification of proof of residence such as ration card, voter's identification card, etc. can be made mandatory. Providers should be sensitized on the fact that migration is an important factor for default and encouraged to motivate the patients to take regular treatment for the prescribed duration.

Other reasons reported for default were drug related problems, alcohol consumption, symptom free and work related problems. Motivation of patients and taking care of minor reactions could

reduce the default. In a community survey conducted by TRC in the study area, annual migration rate was observed to be 5% (unpublished data). In our present study, 5% (25 of 531) may be a small number among the total patients studied. However, this amounted to 25% among those who defaulted. Motivation strategies to address the problem of migration should be worked out to suit the target population and local conditions. Before starting treatment, it is important to identify the migrant population. In the study area, health education programme through Information, Education and Communication (IEC) and Inter Personal Communication (IPC) has been strengthened. In addition, RNTCP has got a mechanism to refer the migrant population to the respective places for treatment. Hence, after diagnosis, if a patient is found to be non-resident and is moving right away, he/she can be referred to another treatment site convenient to the patient. After initiation of treatment, patients should be encouraged to report to the provider, if they are leaving the area, to transfer treatment to the nearest centre to ensure continuity of treatment. These measures will help to reduce default on account of migration and achieve the desired outcome in RNTCP. Availability of treatment under the DOTS strategy should be popularized among patients, providers and community. The health system needs to be improved to address this problem in motivating and improving the patient's perception about disease and encouraging the patients to complete the treatment. In this context, the use of non-DOTS regimens under RNTCP could be another alternative for patients who are likely to migrate while on treatment. For this population, government has to evolve policy to treat such population with suitable non-DOTS regimen. This will not only take care of such patients by not denying the treatment during their stay in the particular place but also take care of programme indicators to desired level. Further research is needed in this area to further strengthen TB control programme.

Limitation of the study

The migrated patients were not contacted in person by the investigator. The reasons for their migration were elicited from close relatives and DOT providers. This information provided from secondary

sources could not be confirmed from patients. This is a major limitation in this study.

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Short Communication

SPUTUM EXAMINATION AT 2-MONTHS INTO CONTINUATION PHASE - HOW MUCH DOES IT CONTRIBUTE TO DEFINE TREATMENT OUTCOME?

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Summary

Objective: To assess the usefulness of sputum examination at 2-months into Continuation Phase (CP) to declare treatment outcome.

Methodology: It is a retrospective study conducted in one tuberculosis unit, Tiruvallur district of Tamilnadu among smear positive patients treated with Category I and Category II regimens from May, 1999 – December, 2003.

Results: Sputum was collected at 2-months into CP from 70% of 1551 Category I and 74% of 292 Category II patients declared cure, failed or treatment completed. Result at 2-months CP was used for giving outcome in 112 (10.3%) of 1088 Category I patients and 37 (17%) of 217 Category II patients.

Conclusion: In practice, sputum needs to be collected for 7.8% of the patients with smear positive at the end of Intensive Phase. By doing so, there will be a delay of 1 month for 3.6% of the patients in declaring 'failure'. By deferring the sputum examination at 2 months into CP, workload of laboratory technicians can be reduced by about 30%. [*Indian J Tuberc* 2006; 53:37-39]

Key words: Tuberculosis, treatment outcome, intensive phase and continuation phase

BACKGROUND

Sputum microscopy for acid-fast bacilli (AFB) is an accepted tool to diagnose and monitor the progress of pulmonary tuberculosis cases globally¹. For monitoring progress, sputa are examined at the end of intensive phase (IP), 2-months into the continuation phase (CP) and end of treatment². Sputum smear result at 2-months of intensive phase is to decide the need for extension of IP or going on to CP. Smear at 2-months into CP, helps to identify failure cases and is also useful to declare a patient 'cured' in case smear at end of IP is positive. End of the treatment smear is necessary to give treatment outcome. 'Cure' is defined as 'initially smear positive patient having negative smear during follow up on two occasions out of which one is at the end of treatment'. The present paper reports on the utility of sputum examination at 2-months into CP to decide the treatment outcome among sputum positive patients treated with Category I (CAT I) and Category II (CAT II) regimens.

We undertook a retrospective analysis of patients treated with CAT I (2EHRZ₃/4RH₃) and CAT II (2SHREZ₃/1HREZ₃/5RHE₃)² regimens of Directly Observed Treatment Short-course (DOTS) strategy from May 1999 to December 2003 from one

tuberculosis unit (TU) area of Tiruvallur district, Tamilnadu.

RESULTS

Among 1893 patients admitted to CAT I treatment, 1447 (76 %) were declared 'cured', 257 (14%) 'defaulted', 85 (4%) 'died', 94 (5%) 'failed' and 10 cases 'treatment completed'. Corresponding figures for 575 CAT II patients were 237 (41%), 242 (42%), 41 (7%), 52 (9%), and 3, respectively.

Of these 1893 CAT I patients, 1551 were declared 'cured', 'failure' or 'treatment completed' and were eligible for sputum collection at 2-months into CP. Sputum was collected from 1088 (70%) patients (Table). Of these, 1012 (93.0%) specimens were negative at 2-months into CP, of which 955 (94.4%) were not useful to declare the outcome as 'cure', as these patients were sputum smear negative at end of IP and end of treatment. For the remaining 57 (5.6%) patients, the sputum was negative at 2-months into CP and was useful for declaring the outcome as 'cure' as these patients were sputum positive at the end of IP. Among 76 patients who were positive at 2-months into CP, 21 were negative at the end of IP and end of treatment for declaring as 'cure'; hence 2-months CP result was of no

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Table: Utilization of sputum result of 2-month into CP for treatment outcome among category I and II patients treated under DOTS

	CAT I		CAT II		Total	
	No.	%	No.	%	No.	%
Total admitted	1893		575		2468	
Eligible for sputum collection at 2m CP ('cure', 'failure' and 'treatment completed')	1551		292		1843	
2m CP specimen collected	1088	70.1	217	74.3	1305	70.8
2m CP - smear negative	1012	93.0	177	81.6	1189	91.1
Used for treatment outcome 'cure'-(a) (End of IP smear positive)	57		5		62	
Not used treatment out come 'cure' (End of IP – smear negative)	955		172		1127	
2m CP - smear positive	76	7.0	40	18.4	116	8.9
Used for treatment outcome 'failure'-(b) (End of IP negative and subsequent positive)	29		18		47	
Used for treatment outcome 'failure'-(c) (End IP and subsequent positive)	26		14		40	
Not used treatment outcome 'cure' (End of IP and end of treatment negative)	21		8		29	
2m CP - used for treatment outcome- (a+b+c)	112	10.3	37	17.1	149	11.4

consequence. For the remaining 55 (72.4%) who were subsequently positive, the 2-months CP result was useful to declare them as 'failure'. Overall sputum result at 2-months into CP was useful for 112 (10%) of 1088. Out of 112 patients, sputum was negative for 29 patients at the end of IP and positive at 2-months into CP. These patients will be declared as 'failure' if they continue to be sputum positive at 5th month also. If sputum was not examined at 2 months into CP, these patients would have been declared as 'failure' at 6 months, with a delay of one month. Smear results at 2-months into CP was really useful to give outcome only for the remaining 83 (7.6%) of 1088 patients who were smear positive at the end of IP.

Similarly, among 575 CAT II patients registered, 292 were eligible for collection at 2-

months into CP and sputum was collected from 217 (74.3%) (Table). One hundred and seventy seven patients were smear negative at 2-months into CP but only 3% (5 of 177) of the result was utilized for declaring the outcome as 'cure'. Among 40 patients who were positive at 2-months into CP, 32 (80%) was useful for declaring the outcome as 'failure'. Overall only 17% (37 of 217) of the smear result at 2-months into CP was utilized for outcome. Eighteen of 37 patients with smear negative at the end of IP would have been declared 'failure' with a delay of 1 month if sputum was not examined at 2-months into CP. Smear results at 2-months into CP was useful to give outcome only for the remaining 19 (8.8%) of 217 patients who were smear positive at the end of IP.

Significantly more patients were absent for

sputum examination at 2-months into CP among patients near to non-microscopy centre (34%; 112 of 326) compared to microscopy centre (29%; 351 of 1225) ($P < 0.05$); aged 45 years or more (33%; 229 of 691 vs. 27%; 234 of 860: $P < 0.05$) and alcoholics (35%; 173 of 493 vs. 27%; 267 of 1003: $P < 0.001$). In total, for CAT I and CAT II combined, only for 11.4% (149 of 1305) of patients, the result at 2-months into CP was used for declaring the outcome. Among the 149 patients, 47 (3.6%) would have been declared failure with a delay of 1 month had sputum not been examined at 2-months into CP. Sputum need to be examined only for the remaining 102 (7.8%) patients with positive smear at the end of IP.

DISCUSSION

Our finding indicates that sputum results at 2-months into CP has been useful mainly for patients who were smear positive at the end of IP, to define the treatment outcome. Sputum collection at 2-months into CP is done for patients who are initially smear positive. Since continuation of treatment in the CP with the same drugs is not dependent on the results of 2-months into CP, DOT provider is likely to miss to collect the specimens. In our study, sputum was not collected for 30% of patients at 2-months into CP among eligible CAT I patients. Non-collection of sputum was associated with type of centre, alcoholism and age of the patient. However, this has not influenced decision of treatment outcome. A small proportion (3.6%) of patients (CAT I and CAT II) for whom sputum was negative at the end of IP but found to be positive at 2-months into CP, could be the group for whom there is likelihood of delay of 1 month to declare 'failure'. If patients visit the health facility for the sputum examination in the 2-months into CP, they may have an added advantage of being motivated by the medical officer. But if we insist on the sputum examination at the stage, the DOT provider may not give the remaining CP drugs till sputum is given and the results become available.

Zhao et al^{3,4} reported that end of IP sputum results are predictors of outcome and sputum

conversion during the third month of treatment is an important predictor of treatment success; failure to convert predicts treatment failure. Wilkinson et al⁵ reported that with CAT I treatment in the absence of initial drug resistance, rifampicin-based short course chemotherapy results in microbiological cure of almost all patients who complete treatment, thus making routine follow-up smear examinations a low priority. Follow-up smear examination may remain necessary in countries with high rates of drug resistance or in persons with an unfavourable clinical course.

Our findings also showed that the smear results at 2-months into CP was required only for patients (CAT I; 7.6% and CAT II; 8.8%), who were smear positive at the end of IP. For the patients who were likely to be positive at 2-months into CP, there would be a delay of 1 month to declare them 'failure' as sputum is examined at the end of treatment. Of 3 occasions during follow up, if we cut down sputum examination at 2-months into CP, there will be about 30% reduction in the work load of sputum examination during follow up. Based on these findings, resources and time and energy of workers and patients can be saved by deferring routine sputum examination at 2-months into CP for patients with smear negative at the end of IP.

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Short Communication

SURVEY OF DIAGNOSTIC SERVICES IN THE PRIVATE HEALTH SECTOR OF MUMBAI FOR ASSESSMENT OF TB CASE DETECTION

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(Original received on 21.12.2004; Final Version accepted on 6.12.2005)

Summary

Background: The exact burden of tuberculosis remains unknown due to the fact that there are many health care providers who continue to provide care to patients suffering from tuberculosis and remain unregulated despite the DOTs strategy being implemented on a nationwide scale. RNTCP has initiated interventions to involve these providers in case reporting protocols through Public Private Mix Projects.

Results: Our study highlights the issues concerning the reporting of cases of tuberculosis seeking private care in Mumbai where there is an Act, which makes TB a notifiable disease.

Conclusion: This study shows that there is a need to establish formal mechanisms for case reporting and control among all health care providers. [*Indian J Tuberc* 2006; 53:40-42]

Key words: TB case load, private sector.

INTRODUCTION

The total number of TB cases reported to WHO increased very little over the period 1995-2002 (average detection rate 46%)¹. This is largely due to a large proportion of tuberculosis cases (around 60%) approaching other service providers including the private health care sector^{2,3}. Even though the Public Private Mix programme implemented by the Revised National Tuberculosis Control Programme (RNTCP) has shown improvement of case detection rates^{5,6}, there remains a large number of cases unrecorded. Few attempts have been made to assess the proportion of such cases.

Mumbai is home to heterogeneous private health service providers who are mostly unregulated and have varied treatment practices. A large part of the population accesses this sector for diagnosis.

The objectives of the current study were to design and test tools for facilitating TB case reporting and to study the issues in implementing mechanisms for reporting from the diagnostic services of the private health sector. The study would also give us an idea of

the utilization of the various services by the practicing clinicians and the approximate number of cases being treated in the private sector.

METHODOLOGY

Study Area

Five health post areas in KE ward of Zone 3 in Mumbai were selected for the study. The population covered was 336447 with 219 general practitioners.

Design

Assuming that patients would generally seek advice from the doctors near their residence and that the references for investigations would be made to diagnostic centres near the clinics of private practitioners and/or the patients' residence, we decided to conduct a survey of these centres.

Data collection forms¹ were designed in consultation with the respective specialist so that appropriate information could be obtained.

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The diagnostic centres in these five health post areas were enumerated by physically scouting the area. The specialist in charge at each enlisted centre was individually explained about the project by the investigator and cooperation sought. Those willing to participate in the survey were given the survey forms.

Study duration

The study was carried out for a period of three months (May to July 2004).

Data & analysis

Data was entered daily by the doctor at the centre, collected by the investigator on a monthly basis and was recorded and analyzed on Microsoft Excel.

RESULTS

A total of 16 centres (7 radiology and 9 pathology) were enlisted, 3 had both facilities for radiology and pathology (Fig.).

Willingness to participate

One fourth of the centres were not willing to participate mainly due to time constraints, different data recording formats or ‘no data recorded’ and in one case due to absence of any incentive for participation.

Cooperation: Only one centre dropped out after one month. Field investigator had to send reminders and help in data recording.

Quality of data: Cross-checking with original records was done and the data was found to be correctly entered.

Utilization of services

Though not a prime objective of the study, we analyzed the utilization of services by various clinicians. Overall radiological services were utilized more than the pathological services (2093 vis 741) (Table). GPs avail both the services equally. Consultants rely heavily on radiological and more advanced investigations.

Overall positive rates were low: 10.6% for pathological investigations and 13.6% for radiological investigations. In all, there were 363 reports positive for tuberculosis.

DISCUSSION

A sizeable proportion of cases being detected and treated solely in the private sector go unrecorded. Enlisting these cases of tuberculosis in the programme reports will not only help in assessing the burden of tuberculosis but also improve the coverage and accessibility to the RNTCP services.

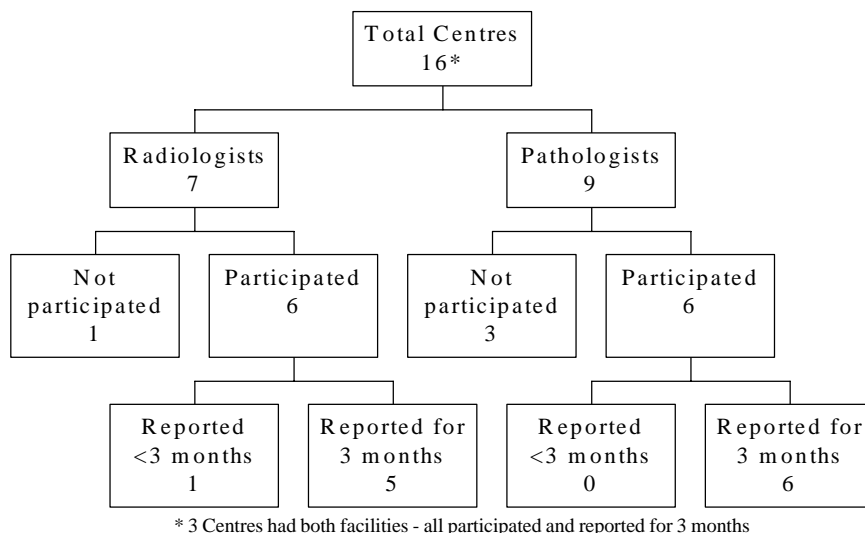


Figure: Showing the participating centres

Table: Showing radiological and pathological tests carried out - referral source, gender and results

Characteristics		Radiological				Pathological			
Nature of referral	Sex of Pt.	Total		% Positive	Propn. of pts refd.	Total		% Positive	Propn. of pts refd.
		Total	Positive			Total	Positive		
Self	M	121	25			197	14		
	F	90	13			140	9		
	Total	211	38	18.01	10.08	337	23	6.82	45.48
GP	M	381	63			182	30		
	F	247	39			90	11		
	Total	628	102	16.24	30.00	272	41	15.07	36.71
Consultant	M	710	88			76	7		
	F	543	56			56	8		
	Total	1253	144	11.49	59.87	132	15	11.36	17.81
BMC*	M	1	0						
	F								
Grand Total		2093	284	13.57		741	79	10.66	

In absence of official regulations, it is difficult to get information from the private practitioners. The main barriers are constraints of time (4/16 centres) and absence of uniform recording systems (2/16 - centres). Commercial interest could be an inhibiting factor.

The data obtained from the centres indicate that a sizeable number (363 positive reports) of TB patients continue to be diagnosed in the private sector; during the same period 95 cases were registered in the RNTCP from the area under study. Assuming that the 363 positive reports came from half the number of patients (undergoing both radiological and pathological examination) in the worst-case scenario the number of TB patients diagnosed in the private sector is around 180 at the minimum. This provides a strong case for the programme to initiate case reporting protocols for patients using private health services.

We recommend that in addition to the reporting systems established under the PPM (Public Private Mix) initiatives, systems for reporting cases of tuberculosis availing private diagnostic and treatment facilities should be designed and protocols

formulated and made mandatory.

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Short Communication

HIV AND TUBERCULOSIS*

Beena Susheel¹ and Pai²

Summary

Background: The study adequately demonstrates the entire gamut of clinical presentations in AIDS. The scourge is TB followed by Acute bronchitis, *Pneumocystis carinii* pneumonia and Bacterial pneumonia. The concept 'Hit hard, hit early should be adequate to treat TB' is demonstrated with SCC.

Results and Conclusions: Patients were closely monitored for compliance and safety, profile of SCC and antiretroviral drugs. Gastrointestinal disturbances, peripheral neuropathy, jaundice, hepatitis, arthralgia and hyperuricaemia were significantly higher in 29 HIV vs 546 non HIV patients. Sputum remained positive at end of 3rd follow up in 86.2% HIV vs 12.2% non HIV patients in spite of the subset of HIV patients in this study not being in advanced immunosuppression, as evidenced by minimal opportunistic infections, chest X-ray findings upper lobe lesions seen predominantly in non HIV population, low incidence of EPTB. [*Indian J Tuberc* 2006; 53:43-46]

Key words: HIV, Tuberculosis

INTRODUCTION

HIV infection is a major threat in the global resurgence and in the control of tuberculosis (TB) in developing countries. It is estimated that worldwide nearly two billion persons are infected with *Mycobacterium tuberculosis*, sixteen million are HIV infected and five to six million are dually infected. As HIV infection progresses, CD4 lymphocytes decline in number and function, making the immune system less able to prevent the growth and local spread of *M. tuberculosis*¹. The risk of TB infection progressing to active TB is estimated to be eight percent per year in an HIV positive person versus, a life time risk of ten percent in an immunocompetent person². This is important in India where estimates are that more than half the adults harbour *M. tuberculosis* infection².

MATERIAL AND METHODS

From August 1999 to October 2000, the study was conducted in three hospitals in Mangalore. A total of 575 patients from medical wards and OPD who were diagnosed to have pulmonary tuberculosis and included in the study, based on clinical examination, sputum analysis for AFB smear/culture, chest X-ray and history of promiscuous sexual contact (the commonest risk factor for acquiring

HIV infection in South India). Those testing positive for HIV by sequential ELISA were followed by Western blot test after obtaining informed consent. CD4 count was done at intervals of two months till the end of treatment. All patients were counselled on their disease status, possible complications and risks of transmission of HIV to their contacts. Pulmonary tuberculosis patients received Isoniazid + Rifampicin + Pyrazinamide + Ethambutol for first two months, followed by Isoniazid and Rifampicin for another six months, (six HIV patients received Rifabutin). HIV patients received Zidovudine and Nevirapine.

RESULTS

29 of the 575 tuberculous patients were HIV positive. Tables 1 and 2 give the sex distribution and

Table 1: Sexwise distribution of patients

Sex	HIV patients	Non HIV patients	Total
Male	20	396	416
Female	9	150	159
Total	29	546	575

Average age of HIV vs Non HIV presentation was 32.1 ± 6.19 range 20-40 years vs 40/9 ± 10.7 range 18-55 years

* Awarded Chanchal Singh Memorial Prize at the Goa Conference, 2002.

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Table 2: Symptoms observed in the study subjects.

Symptoms	Baseline		1 st Follow up		2 nd Follow up		3 rd Follow up	
	HIV	Non HIV	HIV	Non HIV	HIV	Non HIV	HIV	Non HIV
Fever	29	543	24	140	23	71	23	57
Cough with expectoration	29	546	29	413	27	211	25	67
Hemoptysis	14	103	6	63	10	41	6	19
Loss of appetite	29	544	19	147	13	17	13	21
Loss of weight	29	543	21	129	21	11	21	23
General weakness	27	481	23	92	20	24	21	27
Diarrhoea	21	84	18	17	17	5	15	5
Headache	-	7	-	3	-	2	-	2
Skin complaints	3	19	3	9	3	7	2	5

HIV n = 29, Non HIV n = 546

Table 3: Baseline chest X-ray findings

	HIV (n = 29)	Non-HIV (n = 546)
Upper zone lesions	17	147
Extensive multizone lesions	1	59
Upper and mid zone lesions	3	23
Mid zone lesions	-	22
Miliary mottling	2	5
Pleural effusion	1	16
Lobar pneumonia	1	16
Cavitary lesions	-	219
Infiltration	-	468
Multiple cavities	-	17

symptoms among HIV and non HIV patients having pulmonary tuberculosis. Tables 3 and 4 give chest X-ray findings and sputum analysis. Among 29 HIV patients, significant Lymphadenopathy was present in 10%: Details of opportunistic infections were; Bacterial pneumonia in 10%, Acute bronchitis in 17.2%, Extra pulmonary tuberculosis (EPTB) - TB meningitis in 10%, TB lymphadenitis in 3.4%, TB abdomen in 3.4%, Meningococcal meningitis in 10%, Cryptococcal meningitis in 6.8%, Oral candidiasis in 44.8% and *Pneumocystis carinii* pneumonia (PCP) in 6.8%. Patients with PCP were treated with oral trimethoprim and sulphamethoxazole (20mg and 100mg/kg/day) respectively for 14-21 days. Bacterial pneumonia was managed with intravenous crystalline penicillin and in one case with cephotaxime. Acute bronchitis responded well to oral amoxycillin/cephalexin and steam inhalation. Diarrhoea due to

Table 4: Follow up sputum analysis among the patients.

AFB Smear	Baseline			End of 3 rd Follow up		
	HIV**	Non HIV	Total	HIV	Non HIV	Total
-Ve	0	24	24	4	479	483
1+	2	234	236	20*	50*	70
2+	13	216	229	5*	17*	22
3+	3	27	30	-	-	-
4+	11	45		-	-	-
Total	29	546	575	29	546	575

* Sputum was positive in 25 HIV (86.2%) vs 67 non HIV (12.2%); p value <0.001 (VHS)

** In HIV group sputum analysis revealed *Pneumocystis carinii* in 2 (6.8%) and *Streptococcus pneumoniae* in 4 (13.7%).

intestinal pathogens was treated with cotrimoxazole tablets. Symptomatic and microscopic cure was achieved. Three cases of giardiasis received metronidazole. Cryptococcal meningitis was treated with amphotericin B for 15 days and meningococcal meningitis with ciprofloxacin 500mg single dose. Oral candidiasis was managed with clotrimazole application (in seven patients oral fluconazole was added). Diabetes Mellitus was diagnosed in 17% (the diagnosis of Diabetes Mellitus preceded TB/HIV). Mortality was nil in this study.

DISCUSSION

Of the 575 pulmonary tuberculosis patients, 29 were seropositive for HIV. Average age at presentation in HIV patients was 32 years with the maximum number in third decade. Maheshwari et al³ and Nirgudkar et al⁴ have recorded the highest incidence of HIV patients in the third decade. Progress of anti-tuberculous treatment was monitored by sputum for AFB smear/culture. 4 of the 6 patients on Rifabutin in the HIV group were sputum negative at the end of ATT. The remaining 25 patients remained sputum positive. Rifampicin being a CYP3A₄ inducer may have yielded sub therapeutic plasma concentration of antiretroviral drugs⁵. This in turn may have decreased the efficacy of treatment in HIV patients, accelerating and amplifying the clinical course of AIDS, the resulting advanced immunosuppression yielding a higher degree of sputum positivity for AFB in HIV patients at end of third follow-up, p<0.001, Table 4.

The registry of AIDS patient at NACO⁶ shows weight loss, fever, diarrhoea and cough as commonest symptoms. In this study the commonest symptoms in descending order were fever, cough with expectoration, weight loss and general weakness. Manohar⁷ and Nirgudkar et al⁴, report an incidence of 7.2% and 46.8% of anemia. In this study the incidence was 79.3%, Microcytic to normocytic hypochromic anemia being the commonest. The incidence of PCP 6.8%, bacterial pneumonia 13.7%, compares with the- studies of Wallace et al⁸ and Nirgudkar et al⁴. In this study both patients of PCP presented with miliary mottling (atypical presentation). It is well recognised that early

HIV positive status is associated with a relatively intact immune system and the radiographic appearances of TB approximate those of reactivation disease as evidenced by upper lobe involvement. This was seen in 59% of HIV patients in this study.

Patients were monitored meticulously for co-operation and compliance to the treatment regimens and to assess the safety profile of drugs. In this study there was a high incidence of nausea, vomiting and gastritis, which was statistically significant in the HIV group. A balance between administration of these drugs, after meals to minimise gastrointestinal tolerance and before meals on an empty stomach for better absorption is worthwhile looking at. In the HIV group there was a statistically significant incidence of numbness and tingling, known to be associated with poor nutrition and genetically determined incidence of slow acetylation of Isoniazid. Jaundice and hepatitis confirmed on the basis of LFT was also statistically significant in the HIV group. Arthralgia and elevated serum uric acid levels were significantly elevated in the HIV group. Pyrazinoic acid, a metabolite of Pyrazinamide, competes for the excretion of uric acid⁹.

The findings of this study are: SCC is an effective ATT regimen provided compliance of the patient is ensured inspite of adverse effects: the subset of HIV patients may not have been in advanced immunosuppression (relatively intact immune system) as evidenced by minimal opportunistic infections; chest X-ray findings predominantly seen in non HIV population namely upper lobe lesions; low incidence of EPTB. In spite of this, sputum positivity was significantly higher at the end of 3rd follow up in HIV patients.

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NATCON - 2006

The 60th National Conference on Tuberculosis & Chest Diseases will be held at K.G. Medical University, Lucknow (UP), from 23rd to 26th February, 2006. For further details, please contact Dr. Rajendra Prasad, Organising Secretary, Natcon-2006, Prof. & Head, Department of Pulmonary Medicine, King George's Medical University, Lucknow-226 003; Tele.: 0522-2255167 (O) 2369373 (R) Fax : 0522-2255167; Mobile: 9415021590; E-mail: rprasad2@sancharnet.in.

BRIEF REPORT ON THE 23RD EASTERN REGION OF INTERNATIONAL UNION AGAINST TUBERCULOSIS & LUNG DISEASES (IUATLDER)*

The 23rd Conference of IUATLDER was held in Lahore (Avari Hotel) Pakistan, from 25th to 28th September, 2005, which was attended by about 900 delegates. IUATLDER and Pakistan Anti TB Association very well organized the Conference. The Scientific Committee of the Conference included the scientific subjects on various aspects of tuberculosis and respiratory diseases.

Dr. M.M. Singh, Vice Chairman (OR), Tuberculosis Association of India and member, Executive Committee of the IUATLDER and Dr. (Brig.) S.L. Chadha, Hony. General Secretary of the Delhi TB Association attended the Conference.

The Conference was inaugurated by the Principal of the King Edward Medical College, Lahore. The president of PATA Ch. Mohd. Nawaz welcomed all the delegates and highlighted the activities of the Eastern Region of the Union. Dr. Nils Billo, Executive Director, IUATLD, addressed the audience and highlighted the activities of Union. He requested all members to become members of the Union individually as well as collectively through the National Associations of the respective countries.

Dr. M.M. Singh, Vice Chairman of the TB Association of India, as a member of the Executive of IUATLDER, also addressed the delegates and broadly spoke about the successful RNTCP/DOTS programme in India, which is one of the biggest DOTS programmes in world. During the Conference Sessions, Dr. Singh highlighted the multifarious activities of TB Association of India with special reference to health education and awareness programmes being carried out by TAI through Schools, by organizing debates, painting competition and cultural show on Tuberculosis and its prevention. The TAI is supplementing and complementing the RNTCP/DOTS Programme in India.

During the Conference of Executive Committee, the Council and *ad hoc* Committees

meetings were held on various dates. Dr. M.M. Singh, as one of the elected members of the Eastern Region, attended and actively participated in meetings. The extract of minutes of the Agenda No. 6 of the Executive Committee meeting held on 25th September, 2005 at the Mughal Room of Avari Hotel regarding division of IUATLDER in two parts, is reproduced below:

“Agenda item No. 6

The Executive Committee recommends to Council the following resolution:

That the Council of ER IUATLD resolves

1. To seek the agreement of the General Assembly of IUATLD at its Paris meeting in October 2005 to its decision in 2003 to divide the ER IUATLD into 2 new Regions
2. That the proposed membership of each daughter Region basically follows the WHO groupings, but will be finally determined by each nation. The proposed groupings are:
 - **South East Asian Region (SEAR):** Bangladesh, India, Indonesia, Myanmar, Nepal, Sri Lanka, Thailand, Pakistan
 - **Asia Pacific Region (APR):** Republic of Korea, Japan, China, Hong Kong, Taiwan, Philippines, Singapore, Mongolia, Malaysia, Australia, Cambodia, Laos, Vietnam, other Pacific Islands
3. That the new Constitutions will be submitted for approval to the IUATLD in 2006. That the long-standing cordial and effective relationships between the countries be maintained and that future activities and arrangements with the Paris Office are equitably sustained.

*Dr. M.M. Singh, Vice Chairman (OR), Tuberculosis Association of India, New Delhi.

Dr. Nils Billo, the Executive Director of IUATLD, has committed to support the new regions. Specifically, he intends to call an organizational meeting in India for the South East Asian Region (SEAR) in January 2006.

An *ad-hoc* committee of people from

member countries of APR met on 26th September 2005. At the proposed first meeting of the interim Council of Asia Pacific Region (APR) on 10 and 11th February 2006, it is intended to discuss and develop a final draft of the new constitution, elect officers and develop a regional strategic plan for the APR for the next 3-5 years.



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The Editor and the members of the Editorial Board of
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Indian Journal of Tuberculosis wish you all a Very Happy &
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Prosperous New Year 2006
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REPORT ON THE 36TH WORLD CONFERENCE OF IUATLD ON LUNG HEALTH*

The 36th World Conference on Lung Health was held in Palais Des Congres at Paris from 18 to 22 October 2005. The theme of the conference was "Scaling up and sustaining effective Tuberculosis, HIV & Asthma prevention and control". The conference was inaugurated by President of IUATLD Dr. Asma EL Sony.

Prof. V.K. Arora, Drs. Rupak Singla, Chest Physician, and V. P. Myneedu, Microbiologist, LRS Institute of Tuberculosis & Respiratory Diseases attended the Conference.

The conference programmes were divided into

- Union administrative meetings
- Union scientific section meetings
- Other meetings

All the programmes/meetings were held simultaneously in several halls in the Palais Des Congres, Paris. The Scientific section of the conference, attracted the most delegates. The delegates from almost all the member countries attended the conference. The scientific programmes were spread over 5 days from 18th October to 22nd October 2005.

The Scientific programme included Pre-conference PG Courses, Workshops, Special guest lectures and Symposium of 3 working groups of STOP TB partnership (DOTS expansion, TB-HIV, DOTS plus MDR-TB)

The PG courses were held on 19.10.2005. The topics covered were :-

- Quality of TB care, with focus on patients perspective and staff performance.
- Training experience in linking diverse care provider to National TB Programmes
- Integrated care of HIV infected patients : Natural history, opportunistic infection and

- anti-retroviral treatment.
- Caring for HIV infection : case discussions
 - Basic techniques for research in lung health: EPI methods
 - Quality improvement in TB programmes
 - Using logic models for programme planning and evaluation
 - How to conduct and assess TB programme training

The workshops were held on 19/10/2005. These were meant for targeted professionals in the following fields:-

- Global TB today : a workshop for Journalists
- Using data to strengthen pharmaceutical management in developing countries.
- TB in the frame work convention for tobacco control; how are we with implementation?
- Practical laboratory issues in low resource settings

Conference Programme included the plenary sessions, symposia, poster display and thematic slide presentations

- The plenary sessions highlighted the following fields/programmes
 - An assessment of the contribution of global health initiatives to poverty alleviation through scaling up and sustaining TB & HIV Control.
 - BCG : will it work forever ?
 - Access to HIV and asthma drugs. The special session highlighted the following programmes/projects
 - Global fund to fight AIDS, TB and Malaria (GFATM).

The symposia highlighted the topics/programmes for targeted professionals from clinical research and health policy and public health.

Symposia were held from 20 October to

* Prepared by Prof. V. K. Arora, Additional Director General Health Services, Govt. of India, Director, LRS Institute of Tuberculosis & Respiratory Diseases & Vice Chairman of TB Association of India.

22 October 2005. The thirty two symposia highlighted the social, economic, public health, laboratory, basic and operational research issue of TB, HIV, Asthma, and their inter relationships. Some symposia which attracted the attention of the delegates are :-

HIV infection and laboratory diagnosis, recent advances in TB drug development, New vaccines against tuberculosis, TB-HIV co-treatment issues and expanding TB culture systems and advances in new diagnostic systems. Free literature in the form of books, CDs, Manuals and posters were distributed by IUATLD for the benefit of delegates.

During the conference special meetings were also held :-

1. Meet the Experts : The topic discussed ranged from TB, HIV-AIDS, DOTS-plus, Asthma, etc.
 2. Special meetings were conducted by the Union and its partners with various country delegations.
- (a) One of the special meetings was conducted by CDC Atlanta USA regarding the multi centric project titled PETTS (Preserving the Effective Tuberculosis Treatment with Second line drugs)

- The Chief Investigator of the Project Dr. Peter Ceigleski conducted the programme. The participating teams from Estonia, India, Latvia, Peru, Philippines, Arkhangelsk Russia, Orel Russia, Tomsk Russia, Pitt Russia, South Africa, South Korea, Thailand attended the meeting.

- The Indian team under the leadership of Dr. V.K. Arora, Addl. D.G. & Director LRSI, participated in the meeting. It was decided that the PETTS team plans to visit the site (LRSI-India) during 2nd week of December 2005 for onsite evaluation and training the other members of the team for the project.

(b) Another special meeting was held between Vice President of IUATLD and Dr. V.K. Arora.

- Several decisions were taken including the release of IUATLD Journal through TAI.

(c) Final day award ceremony was held where the results of TB seal contest was announced. The TB Association of India entry was declared the 2nd best entry and the award was presented by Dr. Asma EL Sony. Dr. V.K. Arora, the Vice Chairman of TAI received it on behalf of the TB Association of India.

The conference was declared closed by the President of IUATLD during the General Body Meeting.

**SUMMARIES OF PAPERS PRESENTED AT THE 59TH NATIONAL
CONFERENCE ON TUBERCULOSIS AND CHEST DISEASES HELD
IN DELHI, FEBRUARY 3-6, 2005**

**Mobile Data Management System for
monitoring of RNTCP – an innovative
approach**

*R. Jitendra, K.P. Unnikrishnan and Dr. P. Kumar
National TB Institute, Bangalore*

Objective: The project aims at studying the feasibility of empowering the field staff with the use of the latest technologies of hand held devices and its utility in enhancing the quality of patient and programme monitoring.

Methodology: In the RNTCP setup the field supervisors are required to capture and update the patient data during periodic field visits. This is done on hand held devices (called simputers), instead of the usual registers/diaries. The captured data is transferred to a central server, installed at NTI, through a toll free telephone line, enabling the data to be accessed by the programme managers at all levels (even at national level) through an internet based web application. Availability of patient level data at higher level enhances the quality of supervision and cure. A base line survey to assess the current mode of information retrieval and patient monitoring with time lines was conducted by NTI in all the sixteen pilot TB unit areas in Bangalore (BMP, Urban and Rural districts).

Main findings: The device has been welcomed by the field staff as it has cut short drastically the time required for compilation of the quarterly monitoring report as well as other miscellaneous reports they are asked to prepare. The supervisors at higher levels have easy access to dynamic patient data thereby increasing the quality of supervision and retrieval of potential defaulters. Improvements in programme parameters as well as in the critical job responsibilities of STS/STLS will be the success of the PDA project.

**A tuberculin survey in the districts of Purbi
Singhbhum and Samastipur**

*Preetish S. Vaidyanathan, V.K. Chadha, P. Kumar,
Lakshminarayana, J. Gupta and Jameel Ahmed
National TB Institute, Bangalore*

Objective: To estimate the proportion of infected children in the age group 1-9 yrs. from the two districts with regard to age group (1-4 & 5-9 yrs.), sex, BCG scar and residential status (rural/urban).

Methodology: The two districts were a subset of the 26 selected districts for the nationwide tuberculin survey conducted between 2000-03. The study subjects comprised 3681 children from Purbi Singhbhum and 6505 from Samastipur from the age group 1-9 yrs. The children were subjected to the standard tuberculin test using ITU PPDRT23 with Tween 80 and the reactions read after 72 hours. The proportion of infected children was estimated from the histogram of reaction size considering reactions of > 15mm as infected.

Results: In children 1-4 years of age without BCG scar in Purbi Singhbhum district 4.2% were infected, while the rate was 13.3% in those 5-9 years of age. Among those with BCG scar, 4.2% and 11% were infected in the age groups 1-4 yrs. and 5-9 yrs. respectively.

In Samastipur district, the proportion of children infected, without BCG scar, in the 1-4 year age group was 3.1%, while the rate was 7.9% in those 5-9 years of age. In children with BCG scar 5.7% and 8.9% were infected in the age groups 1-4 yrs. and 5-9 yrs. respectively.

The proportion of infected children irrespective of the BCG scar status was more in the

age group 5-9 years compared to 1-4 years and was more in urban compared to rural children. The proportions did not differ among males and females. The analysis of the data based on the BCG scar status was inconclusive. The results of this study would be invaluable, as there was no prior epidemiological data on tuberculosis from these areas.

Awareness of Tuberculosis among Chest Symptomatics in Urban Slums

*G. Umadevi, P. Suganthi, V. Magesh, J. Gupta, R.K. Srivastava and V.K. Chadha
National TB Institute, Bangalore*

The highest rates of transmission of tuberculosis (TB) infection have been observed among slum dwellers. One of the reasons could be lack of awareness regarding the disease and availability of anti-TB services.

Methods: In selected slums of Bangalore city, 3,930 person, >14 years were screened for chest symptoms by house-to-house survey. Of 71 symptomatics, 55 were interviewed using a semi-structured proforma.

Results: Among symptomatics, 22 were aware that cough is a common symptom of TB, only 6 suspected that their symptoms could be due to TB. 17 said prolonged fever and chest pain could also be symptomatic of TB.

Forty eight did not have any idea about the cause of TB. Only 3 knew that germs cause TB, which spreads from person to person by coughing; 4 cited poverty, malnutrition, heavy workload, smoking or alcoholism as the causes.

Forty eight had no idea about the tools of diagnosis. Only 7 were aware of the role of sputum examination - 4 of them said that X-ray was also required.

Nine were aware of the availability of free diagnosis and anti-TB treatment at Government health centres. 9 persons said that TB is fully curable, 7 said it is incurable; 39 had no idea. 4 persons knew the

duration of TB treatment as 6-12 months, others had no idea.

Conclusion: Study revealed a poor level of awareness regarding tuberculosis among slum dwellers. It emphasizes the role of appropriate IEC activities for their informed participation in TB control.

Tuberculous infection among Children in two districts of West Bengal by age-group, residence, BCG status and sex

*Joydev Gupta, Sanjay Singh, V. Magesh, R.K. Srivastava, G. Uma Devi and V.K. Chadha
National TB Institute, Bangalore*

Abstract

11,970 children (1-9 years) in Bardhaman district and 6,518 in Jalpaiguri district were tuberculin tested with 1TU PPDRT23 with Tween 80 as part of a nation-wide study. Maximum transverse diameter of induration was measured 72 hours later. Based on frequency distribution of reaction-size, reactions > 15 mm were considered attributable to tuberculous infection.

In 1-4 years age-group, 4% of children without BCG-scar were infected in rural and 5.6% in urban areas of Bardhaman. Among children with BCG-scar, 8% were infected in rural and 8.1% in urban areas. In 5-9 years without BCG scar, 9.3% were infected in rural and 15.1% in urban areas. In children with scar, proportion of infected was 14% in rural and 16.6% in urban areas.

In 1-4 years age-group, 4.1% of children without BCG-scar were infected in rural and 7.6% in urban areas of Jalpaiguri. Among children with BCG-scar, 8.7% were infected in rural and 9.2% in urban areas. In 5-9 years without BCG scar, 13.3% were infected in rural and 16% in urban areas. In children with scar, proportion of infected was 17.4% in rural and 13.6% in urban areas.

Therefore, higher proportions were infected in Jalpaiguri compared to Bardhaman. Prevalence

of infection was higher in urban areas for most of the sub-groups. Proportions of reactions > 15mm was higher among children with BCG-scar compared to without scar. No definite difference trend was observed in risk of infection between sexes.

Health seeking behaviour of chest symptomatics among slum dwellers

*S. Jameel Ahmed, Lakshminarayana, P. Suganthi, R.K. Srivastava and V.K. Cuadha
National TB Institute, Bangalore*

A recently conducted nation-wide study revealed higher risk of tuberculosis infection among slum dwellers, who constitute a high-risk group for TB due to poorer living conditions and nutritional status. A study was undertaken in randomly selected slums of Bangalore City to find out health-seeking behaviour of chest symptomatics .

Methods: 71 chest symptomatics were detected through house-to-house survey among 3926 individuals > 14 years of age. 55 were interviewed for their action taking pattern using a semi-structured questionnaire.

Results: Only 33 (60%) had taken action for relief of their symptoms. The most common reason for no action by other symptomatics were cited as non-severity of symptoms, domestic and financial problems.

The first point of contact for the majority was private health centre, due to faith and shorter distance. However, one third of them later shifted to Government health centres. While 70% of those attending Government health centres were subjected to sputum examination as well as x-ray of the chest, most attending private centres were not subjected to investigations for TB. Of the total cases, about 50% were diagnosed as TB after visiting 2-5 health centres-government /private. An equal number were diagnosed at private and government health centres.

Conclusion: Information, Education and Communication (IEC) activities are called for disseminating information on availability of quality

services at Government health centres and for facilitating behavioural change in the form of early action by chest symptomatics.

Asthma and Pregnancy

*Jai Kishan, Navnit Mavi, Manjit Mohi and
Asha Mittal
Medical College, Patiala*

Introduction: Prevalence of asthma in women of childbearing age is increasing. 4% of pregnant women have asthma. Severe life threatening asthma occurs in 0.05%-0.2% pregnant women. Physiological, hormonal, biochemical and uterus size changes during pregnancy on one hand and lung function changes in asthma along with drugs used for treatment for bronchial asthma on the other hand can affect each other.

Objectives: To study course of asthma during pregnancy and effect of asthma on pregnancy, mode of delivery and new born.

Methods: Total patients studied 150, divided in 3 groups of 50 patients in each group Group I: Asthma & pregnancy: Group II: Asthma without Pregnancy Group III: Pregnant women without asthma. Asthma was assessed at beginning, during pregnancy and 3 months post partum. Pregnancy was assessed in terms of uterus size, complications of pregnancy, mode of delivery and outcome of labour. New born was examined, weight at birth and Apgar score was recorded. Subsequently child was followed up to 3 months of age.

Results: Asthma worsened in 48.7 %, improved in 20.6% and remained unchanged in 30 % pregnant asthmatics. Higher chances of worsening were noted in patients having severe asthma in the beginning. Progress of pregnancy, complications of pregnancy, mode of delivery, Apgar score, weight of child at birth and respiratory symptoms up to 3 months post partum were comparable up to 3 months of age in asthmatic and non-asthmatic women. Incidence of intra uterine growth retardation and low birth weight was significantly higher in mothers experiencing status asthmaticus.

Conclusions: Course of asthma during pregnancy is highly variable. Asthma if controlled during pregnancy doesn't adversely affect pregnancy, labour or newborn. Poorly controlled asthma/ status asthmaticus is strong predictor of IUGR and low birth weight babies. In women having pregnancy and asthma, asthma should be properly controlled. Withholding anti asthma treatment can be more harmful than giving the drugs.

Tuberculosis in Elderly

*V.B. Singla, P.K. Garg, S.P. Singh and Jai Kishan
Government Medical College, Patiala*

Introduction: Elderly population is steadily growing in India. Life expectancy has increased from 36.7 years (1951) to 64.6 years (2000). Ageing by itself besides the disorders of elderly like diabetes mellitus, carcinomatous disorders and HIV can adversely affect the cell-mediated immunity, which in turn can lead to difference in incidence of tuberculosis and its presentation. Symptoms of tuberculosis may be ignored presuming that they are part of ageing phenomenon or due to concomitant diseases. Moreover, elderly are socially ignored. All these factors compounded together can result in difference in presentation of tuberculosis in elderly.

Objectives: To study presentation of tuberculosis in elderly and its comparison with presentation in young age group.

Methods: 200 patients were studied. Group A: 100 patients (more than 50 years). Group B: 100 patients (age 20-50 years). Detailed history, clinical examination, radiological examination and investigations were undertaken for tuberculosis and other concomitant diseases of both the groups and compared.

Results: TB was more common in males in both the groups. Classical symptoms of TB like cough, fever, anorexia, loss of weight and haemoptysis were significantly less common in elderly than

young age groups, occurring in 78%, 75%, 38%, 44% and 7% in elderly but in 94%, 88%, 54%, 58% and 16% in young age group respectively. Breathlessness, pallor and clubbing was significantly higher in elderly, occurring in 38/4, 38% and 25% in elderly and only in 16%, 20% and 3% cases in young age groups respectively. Tuberculin test was negative in 84% in Group A and in 48% in Group B. Concomitant diseases like diabetes mellitus, hypertension and COPD were common in elderly (25%) and only in 8% in young. Diabetes mellitus was present in 15% in elderly and in 3% in young age groups. There was no difference in extent of disease and presence of cavitation on examination of X-Ray Chest in both the groups.

Conclusion: Higher incidence of breathlessness may be due to concomitant diseases like COPD, hypertension and decreased lung function due to ageing. Lower incidence of tuberculin positivity can be due to diminished immunity due to ageing or due to concomitant diseases like diabetes mellitus. Since classical symptoms of Tuberculosis in elderly are infrequent and symptoms due to concomitant diseases are predominant, for diagnosis of TB in elderly, a high index of suspicion should be maintained.

Results of Sputum Smear Examination for Diagnosis of Pulmonary Tuberculosis under Programme Conditions

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Objective: World Health Organization and Revised National Tuberculosis Control Programme (RNTCP) of India recommends 3 sputum smear examinations (Day 1- 1 Spot, Day 2-Early Morning Specimen + 2nd Spot) for diagnosis of pulmonary tuberculosis in patients having cough of 3 weeks or more. In order to evaluate performance of RNTCP for diagnostic activities, a study was needed to be undertaken to find out any gap between actual and recommended results of sputum smear examinations of chest symptomatic under programme conditions.

Methods: A retrospective study of 3916 chest symptomatic patients attending TB & Chest Hospital Patiala who were sent for sputum smear examination was undertaken from the available record. A note was made of gender of patient, results of sputum smear examinations, number of sputum smear examinations. The results were analyzed.

Results: Out of 3916 chest symptomatics, 2221 (56.71.%) were males and 1695 (43.28%) were females, Out of 3916 patients, 1354 (34.5%) did not undergo requisite number of sputum smear examinations, Out of these 1354 patients, 685 (50.59%) missed one smear examination, 657 (48.52%) missed two smear examinations and 22 (1.62%) missed all the three smear examinations.

Sputum smear was positive in 289(13.01.%) out of 2221 males and in 332(19.58%) out of 1695 females. On Day-1, out of 289 positive males, 256 (88.58%) and out of 332 positive females only 145 (43.67%) were positive.

Conclusion: One out of three patients did not undergo 3 requisite smear examinations. Although more number of females (19.58%) were positive than males (13.01%) but on Day-1, more males (88.58%) as compared to females (43.67%) were positive. Females may be feeling more comfortable at home for producing sputum for smear examination. Single day sputum smear examination cannot be recommended because only 401 (64.57%) patients out of a total of 621 sputum positive patients were positive on Day-1.

Clinical Implication: Since 34.5% of patients did not undergo 3 requisite sputum smear examination, a foolproof methodology needs to be implemented to trace the patients who miss requisite number of smear examination. All patients, especially female patients, should be told and demonstrated the technique of producing correct sputum specimen. A separate enclosure for producing sputum should be

provided to avoid hesitancy from onlookers.

Treatment outcome of Category II regimen in “Failure” and “Relapse” sub-groups and their follow-up

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Setting: A study was carried out among patients registered under RNTCP in category II at New Delhi Tuberculosis Centre.

Objective: To assess and compare the treatment results for “relapse group” and “failure group” and to study the relapse rates of the cured cases among these sub-groups.

Design and Methodology: All the patients treated with Category II in ‘failure group’ during the year 1999-2003 and equal number of patients from “relapse group” selected by systematic sampling techniques from among relapse group during the same period were included in the study. Outcome of treatment results was noted from treatment cards and these patients were called to the centre, and investigated in detail for evidence of active disease to assess relapses. Median follow up for relapse group was 26.0 months and for failure group was 18.5 months.

Result: Overall unfavourable outcome in “failure group” was significantly higher, 26.3%, as compared to 8% in “relapse group”. The follow up of treated cases did not reveal any difference in mortality in both the groups. Relapse rates in “relapse group” were however slightly higher than the “failure group”, although the difference was not statistically significant.

Conclusion: Category II regimen was observed to have significantly higher unfavourable outcome in “failure group” as compared to “relapse group”. However, once successfully treated there was no difference in mortality or relapse rate during the follow-up.

Tropical pulmonary eosinophilia in Eastern U.P. and response to DEC

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This study included 61 cases and 39 healthy controls, and was done at Allahabad, situated in Eastern U.P., an endemic zone for *W. bancrofti* as reported by Bedi (1989) and Sandhu (1996). This study followed Donohugh criteria in all cases with age above 10 years, of both sexes, clinico-radiologically and hematologically suspected cases of TPE. Patients with a past history of chronic bronchitis, bronchial asthma, chronic pneumonia, pleurisy, pulmonary tuberculosis, worm infestations, allergic reaction to drugs and having received DECC during the past 6 months were excluded.

According to duration of symptoms, cases were grouped in A (< 1 month), B (1-3 months), C (> 3 months) which ranged from 10 days to 6 years. 98.4 % cases had AEC counts > 3,000/mm³. Mid and lower zones involvement were observed maximum in 34.4 % cases with reticulo-nodular pattern in 37.6% cases. Rare presentations like consolidation and cavity were also observed in 4.9% & 1.6% cases respectively. One case of fibrosis was observed in a patient who had duration of illness > 6 years. Obstructive pattern of PFT defect was observed in 36.1 % cases. Lung function values were observed minimum in cases having mixed pattern of defect as compared to others. Negative correlation was observed in lung values as age advanced. FVC showed negative correlation with

duration of illness. In cases with duration of illness < 1 month, either normal or obstructive pattern was observed but as duration advanced, restrictive pattern was also observed. No relationship was found between lung function changes and degree of peripheral blood eosinophilia. Statistically, no significant difference was observed in lung values between any age groups of cases. Statistically, mean values of FVC, FEV1 & MMEFR of cases were significantly lower than those of controls and also lower in females than in males, but values of FEV1/FVC ratio showed no difference.

All cases were treated with Diethyl carbamazine citrate 6 mg/kg/day divided in three doses (following standard WHO guidelines) for 3 weeks. During treatment in 3.2% cases, ACE count raised but ultimately decreased. After treatment improvement was observed in all parameters of clinical, hematological and lung functions, but statistically highly significant difference was observed in all hematological parameters, while non significant difference was observed in lung function values. Although lung function improved after treatment but values were still lower than those of controls.

It was concluded from the study that PVC showed negative correlation with duration of illness but no correlation was observed between lung function changes and AEC count. In group A, mainly obstructive pattern was observed while mixed pattern also occurred as age advanced. AEC count can increase during treatment. After treatment, parameters of clinical hematological and lung function improved but some lung function abnormalities still persisted.

ABSTRACTS

Predictors of incident tuberculosis among HIV-1-infected women

P.A. Venkatesh, R.J. Bosch, K. Mcintosh, F. Mugusi, G. Msamanga and W.W. Fawzi. *Int J Tuberc Lung Dis* 2005; **9(10)**: 1105-1111.

The development of tuberculosis (TB) in HIV-1-infected individuals is associated with accelerated HIV-1 disease progression. Objective of the study was to examine the predictors of incident TB in HIV-1-infected women. A prospective cohort of 1078 HIV-1-infected pregnant women was enrolled in a randomized clinical trial to examine the role of vitamin supplements in HIV-1 disease progression and fetal outcomes. Of 1,008 women evaluated for TB, 88 (8.7%) developed TB. After controlling for age, education and hemoglobin concentration, in multivariate analysis, low CD4 cell count, elevated erythrocyte sedimentation rate (ESR), decreased mid-upper arm circumference, and high viremia were associated with an increased risk of TB. CD4 <200 vs. ≥ 500 cells/mm³ was associated with a 4.44-fold increase in risk of TB (95% CI 2.10-9.40). Individuals with high viremia ($\geq 50,000$ copies/ml) had a 2.43-fold increase in risk of TB (95% CI 1.24-4.76). Elevated malarial parasite density was slightly associated with a 65% (95% CI 19-85) decreased risk of TB. The risk of developing TB was elevated among women with low CD4 cell counts, elevated ESR, co-infections with other pathogens, poor nutrition and high viremia. There is a slight inverse association between malarial infection and TB, possibly because treating malaria may reduce the risk of TB.

Humoral response to *Mycobacterium tuberculosis* antigens in patients with tuberculosis

C. Greenaway, C. Lienhardt, R. Adegbola, P. Brusasca, K. McAdam and D. Menzies. *Int J Tuberc Lung Dis* 2005; **9(10)**: 1112-1119.

Objective was to determine and compare the sensitivity and specificity of four common

mycobacterial antigens with three RD-1 region antigens in the serological diagnosis of active pulmonary tuberculosis (PTB). Serum from 300 patients (100 with active PTB, 100 of their household contacts, and 100 community controls) was tested using an ELISA method to detect antibodies to seven mycobacterial antigens (three encoded in the RD-1 region [ESAT-6, CFP-10 and Rv3871] and four common [38 kDa, GLU-S, 19 kDa and 14 kDa]). The sensitivity of the RD-1 antigens ranged from 34% to 67%, while specificity ranged from 51% to 71%. The sensitivity of the common antigens ranged from 24% to 75% and specificity from 26% to 75%. In countries with high rates of TB, such as the Gambia, the clinical utility of serological testing to diagnose active TB remains limited, even with newer antigens encoded in the RD-1 region of *Mycobacterium tuberculosis*.

Integration of microscopy and serodiagnostic tests to screen for active tuberculosis

G.V. Kanaujia, P.K. Lam, S. Perry, P.N. Brusasca, A. Catanzaro and M.L. Gennaro. *Int J Tuberc Lung Dis* 2005; **9(10)**: 1120-1126.

Objective was to create a simple screening strategy for tuberculosis (TB) that includes antibody detection assays to improve the accuracy of microscopic examination of sputum for acid-fast bacilli (AFB smear). Serum samples were obtained from 190 patients suspected of having active TB. Diagnosis was established by *Mycobacterium tuberculosis* culture. HIV status was determined by commercial serologic tests. IgG antibody levels were measured by ELISA using purified *M. tuberculosis* antigens. Data from 130 randomly selected patients were used to develop a screening strategy; data from the remaining 60 patients were used for validation. AFB smear had 70% sensitivity and 88% specificity. In algorithms integrating single or multi-antigen ELISA with AFB smear and HIV results, the sensitivity improved over each test alone. The algorithm that included a four-antigen ELISA (38 kDa antigen, lipoarabi-nomannan, MPT-64 and glutamine

synthase) had a sensitivity of 93% and a specificity of 76%. Compared to AFB smear, the sensitivity of the algorithm was significantly higher, while the specificity was not statistically different. This study demonstrates that a screening strategy can be created by integrating multi-antigen ELISA with AFB smear and HIV testing.

Socio-economic status and adherence to Tuberculosis treatment

P. Mishra, E.H. Hansen, S. Sabroe and K.k. Kafle. *Int J Tuberc Lung Dis* 2005; **9(10)**: 1134-1139.

The study was conducted in a western hill district in Nepal, where tuberculosis (TB) treatment under DOTS was offered by the regional tuberculosis centre, two primary health centres, eight health posts, three sub-health posts and one ward of sub-metropolitan Pokhara. Objective was to analyse the contribution of socio-economic status to non-adherence to DOTS. It was a case-control study. Data were collected by questionnaire-based face-to-face interviews. The study sample consisted of 50 cases and 100 controls. The participation rate was 80% for cases (non-adherents) and 95% for controls. Logistic regression analysis showed that the risk of non-adherence to TB treatment was significantly associated with unemployment (odds ratio [OR] 9.2), low status occupation (OR 4.4), low annual income (OR 5.4), and cost of travel to the TB treatment facility (OR 3.0). Factors significant in the bivariate analyses - living conditions, literacy and difficulty in financing treatment - were not found to be significantly associated with non-adherence when adjusted for other risk factors in the multivariate regression model. Low socio-economic status and particularly lack of money are important risk factors for non-adherence to TB treatment in a poor country such as Nepal.

Application of PCR-based Restriction Fragment Length Polymorphism (RFLP) for the identification of Mycobacterial isolates

P. Deepa, K.L. Therese and H.N. Madhavan. *Indian J Med Res* 2005; **121**: 694-700.

Conventional identification of mycobacteria is achieved by standard biochemical tests that are

time consuming, laborious and is not always conclusive. This study was thus undertaken to standardize a simple, rapid and cost-effective polymerase chain reaction based restriction fragment length polymorphism (PCR-RFLP) using primers coding for the 16S -23S rRNA spacer region to identify the mycobacterial isolates to the species level. The PCR with primers targeting the 16S-23S rRNA spacer region was standardized using the standard mycobacterial strains and applied on 51 clinical isolates. The PCR amplified products were subjected to RFLP using the restriction enzymes, *Hae* III, *Msp*I and *Bst*XI. The results obtained were compared with those of conventional biochemical tests. PCR was sensitive to detect 2.5 pg of H37Rv DNA (370 bp for slow grower mycobacteria) and 1.5 pg of *M. fortuitum* DNA (450 bp for rapid grower mycobacteria). Based on the PCR- RFLP products obtained the 51 mycobacterial isolates were classified into 41 slow growers and 10 rapid growers. Among the 41 slow growers, 40 were identified as *M. tuberculosis*, one as *M. xenopi* and 10 rapid growers as *M. fortuitum*. PCR using primers targeting the 16S-23S rRNA spacer region was a reliable tool for rapid identification of mycobacterial isolates into slow and rapid growers within 4 h of isolation and further speciation by PCR-RFLP within 6-8 hours.

Reversal of subclinical Adrenal Insufficiency through antituberculosis treatment in TB patients

S.K. Sharma, S.M. Tandan, P.K. Saha, N. Gupta, N. Kochupillai and N.K. Misra. *Indian J Med Res* 2005; **122**: 127-131.

Subclinical adrenal insufficiency has been shown to occur in patients with tuberculosis. Whether this insufficiency can be reversed with therapy and on long-term follow up, is not known. We studied the effect of antituberculosis treatment (ATT) with respect to reversal of the adrenal insufficiency, as assessed by response to standard dose adrenocorticotropin (ACTH) stimulation test in TB patients. One hundred and five HIV-negative tuberculosis patients were studied. Of these, 72 patients had pulmonary and 33 had extrapulmonary forms of the disease. Baseline (pre-treatment)

standard-dose ACTH stimulation test was done on all the subjects, following which, they were put on standard antituberculosis therapy, depending on the type of disease and were followed up for a period of 30 months. ACTH stimulation tests were performed at follow up, every 6 months. Baseline (pre-treatment) standard-dose ACTH stimulation test revealed an impaired response in 52 of 105 patients (49.5%). At 6 months, the percentage of responders had increased to 71 per cent with a gradual increasing trend noted thereafter. At 24 months, 31 of the 32 patients (97%) who were followed up demonstrated a normal response to ACTH stimulation. The percentage of responders was comparable in both pulmonary [21 of 22 patients; (95%)] and extrapulmonary TB [(10 of 10 patients (100%)] groups at follow up. Our study shows that nearly half of patients with active tuberculosis had a subclinical adrenal insufficiency indicated by an impaired response to ACTH stimulation test. This insufficiency reverses with therapy in most patients on long-term follow up.

Application of nested Polymerase Chain Reaction (nPCR) using MPB 64 gene primers to detect *Mycobacterium tuberculosis* DNA in clinical specimens from extrapulmonary tuberculosis patients

K. Lily Therese, U. Jayanthi and H.N. Madhavan.
Indian J Med Res 2005; **122**: 165-170.

The conventional culture technique for

diagnosis of extrapulmonary tuberculosis is time consuming. In order to find a sensitive and rapid technique nested polymerase chain reaction (nPCR) targeting the conserved MPB 64 gene of *Mycobacterium tuberculosis* was evaluated for detection of *M. tuberculosis* DNA directly from clinical specimens of extrapulmonary origin. A total of 400 clinical specimens from clinically suspected cases of extrapulmonary tuberculosis and 30 control specimens of nontuberculous aetiology were processed by smear and culture and by nPCR technique for detection of *M. tuberculosis*. The specimens were divided into 3 groups, (group I - 280 specimens (104 peritoneal fluid (PF), 120 cerebrospinal fluid (CSF), 44 lymph node biopsies 3 pericardial fluid and 9 other biopsy specimens), group II - 120 aqueous humour (AH) from idiopathic granulomatous uveitis cases, and group III - 30 control specimens (10 CSF and 20AH). The conventional culture was positive only in 16 of 400 specimens. The overall positivity of nPCR was 35.2 per cent (141/400). Among the 280 specimens from extrapulmonary lesions (group I), 15 were bacteriologically positive, while 115 of 265 bacteriologically negative specimens (43.4%) were positive by nPCR. All the 30 control specimens were negative by nPCR. The nPCR using MPB64 gene primers might be a rapid and reliable diagnostic technique for detection of *M. tuberculosis* genome in clinically suspected extra pulmonary tuberculosis specimens, as compared to the conventional techniques.

K.K. Chopra

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