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Contents

Editorial : The 32nd National Conference Text of Special Lecture delivered	... 55
—K.S. Sanjivi	... 58
The National Tuberculosis Programme and the role of Tuberculosis Associations and other voluntary organizations	... 62
—C.W.L. Jeones	... 62
Immunological classification of Pulmonary Tuberculosis	... 65
—M.S. Agnihotri, U.C. Chaturvedi and S. K. Pande	... 65
Tuberculosis trends in an urban community	... 77
—S.S. Goyal, G.P. Mothur and S.P. Pamra	... 77
Incidence of sputum positive tuberculosis in different Epidemiological groups during five year follow up of a rural population in south India	... 83
—G.D. Gothi, A.K. Chakraborty and M.J. Jayalakshmi	... 83
Hypersensitivity Pneumonitis	... 92
—K.L. Sobti, R.S. Hoon and R.N. Dutta	... 92
Prevalence of tuberculosis in certain pockets in the city of Madras	... 95
—K.V. Krisbnaswami, M. Abdul Rahim and R. Parthasarathy	... 95
Summaries of papers presented at the Thirtytwo National Conference on Tuberculosis and Chest Diseases	... 101
Recommendations for 6th Five-Year Plan	... 109
Resolution of the Conference on TB and Chest Diseases	... 111
Dr. K.S. Sanjivi Obituary—	... 115
Dr. B.K. Sikand	... 116

News & Notes

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The Indian Journal of Tuberculosis

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THE 32ND NATIONAL CONFERENCE

Delegates who attended the 32nd National Conference on Tuberculosis and Chest Diseases last November have every reason to feel that their week's stay in Trivandrum, the picturesque capital of idyllic Kerala, was quite rewarding. Though many of them had to brave the hardships caused by the unfortunate cyclone havoc to reach Trivandrum and undergo gruelling experiences in trains and buses, they were satisfied that the pilgrimage was worth the ordeal and the fare provided more than compensated the tribulations they had to experience. Delegates met in a homely atmosphere and the personal difficulties usually associated with large conferences were practically nil.

The conference had a colourful start in the auditorium of the Trivandrum Medical College. Smt. Jyoti Venkatachellum, Governor of Kerala, inaugurated the conference before a large and distinguished gathering. Shri A.K. Antony, Chief Minister of Kerala, in a short address appreciated the work of the Tuberculosis Association of India, touched on the tuberculosis problem in Kerala particularly among labour and suggested intensification of relief measures in that sector. Shri J. Chittaranjan, Health Minister, reviewed the health programme of the State Government with special reference to tuberculosis and pleaded for a planned propaganda programme to educate the public about tuberculosis and the norms to be observed in its treatment and control. Dr. K.V. Krishnaswami, in his Presidential Address, covered many important features of tuberculosis control and appealed to every one concerned to mobilise all resources for a determined attack on tuberculosis.

A special feature of the conference was that there were four lectures by distinguished guest-speakers. In the course of a thought-provoking talk Dr. K.S. Sanjivi suggested that the Tuberculosis Association of India should chalk out a time-bound programme of health education during the next five years so that in 1982—the centenary year of the discovery of tuberculous bacillus—we may be able to show real progress in the national control programme. Dr. C.W.L. Jeanes of Canada emphasised the role of voluntary organisations in the control of tuberculosis and pointed out that in developing countries with large rural population the emphasis should be on *health* rather than on *illness*. Prof. G. Daddi, former Director of the Forlanini Institute, Rome, pointed out that Rifampicin had made rapid strides during the last eight years. Prof. B. Mariani, present Director of the Forlanini Institute, Rome, gave a short review of the status of Mycobacteriosis in different countries of the world.

Dr. G.D. Gothi who received the Wander-TAI Oration Award in presenting his subject 'Natural History of Tuberculosis', covered different phases of TB from infection to disease and pointed out the difficulties in and obstacles to eradicating tuberculosis because of its special features.

In his paper on 'Immunological Classification of Pulmonary Tuberculosis' which won for him the Chanchal Singh Memorial Award, Dr. M.S. Agnihotri discussed the role of tuberculin test, DNCB sensitization and leucocyte migration inhibition test.

Inaugurating the scientific session, Dr. R. Ananthanarayanan referred to the state of flux in the country and recommended a three-pronged approach—scientific, educative and administrative—to remove pessimism and defeatism in the country. If we educate the people and administrators on the scientific aspects of the control programme, he said, people will give us the necessary influence which is essential for success, for, as he put it, "in our nascent society, democracy is Government of the influential, by the influential, for the influential".

The scientific sessions covered Epidemiology, National Control Programme, Drug Default, Role of surgery, Chemotherapy and TB in Industry. There were some assorted papers also. The consensus in the session on Epidemiology was that there was no appreciable change in the epidemiological indices during the last few years. In the panel discussion on Surgery, the discussants agreed by and large that surgery had a definite role in the management of tuberculosis where cavity remained open and sputum continued to be positive after six to nine months of chemotherapy. In the session on Chemotherapy, six of the eight papers dealt with short-term chemotherapy, including the one on the study undertaken by the Research Committee of the Association. The consensus was that short-term chemotherapy is proving to be quite effective in the management of TB. A number of papers highlighted the psychological aspects of irregularities by patients in drug-taking. Discussions in the session on TB in Industry showed that the prevalence of TB among industrial workers would be more than in the general population.

It is noteworthy that the defaulter rate among those who were to present papers which was fairly high in the previous conferences came down to less than 8 % in this conference and this despite the hardship in travel caused by nature's fury on the eve of the conference. Another healthy feature was that majority of the papers were presented by the younger age-group. Those who have been attending the conferences for the past several years would have noticed that the presentations have considerably improved in quality, are concise and to the point—indicating that our workers have grasp of the subjects allotted to them and therefore seldom overstep the time-limit for their presentations.

A thoroughly informal atmosphere pervaded the entire conference. Shri Chittaranjan, the Health Minister, almost *in cognito*, joined the delegates at lunch on the first day of the conference, hosted a dinner to members of the Technical Committee and gave a reception to delegates at the Kanakakunnu Palace. Delegates were entertained with two special cultural shows reflecting the culture of Kerala, viz., Kathakali, Mohiniyattam, Bharatanatyam, Kaikottukali,

etc. The Committees appointed by the Kerala TB Association for attending to various organisational matters and the group of pleasant-mannered volunteers who served as guides to delegates were extremely helpful. A typical Kerala-style lunch hosted by the organising Association provided a grand finale to the conference. We are confident that delegates left Kerala fully satisfied with their annual social contacts and exchange of scientific knowledge.

A few of the papers presented at the Conference, text of two guest lectures, summaries of other papers and some of the decisions made by the conference and the Technical Committee are given in this issue of the Journal.

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Text of Special Lecture delivered by K S. Sanjivi, Professor Emeritus, Madras Medical College, Madras at the 32nd National Conference on TB & Chest Diseases held at Trivandrum.

I am grateful to the Tuberculosis Association of India for the honour they have done me in awarding the Association's Gold Medal, this year.

Having been an active tuberculosis worker for many years and now being retired from all clinical responsibilities, it is possible for me to look at the tuberculosis situation in India from outside.

To this audience and on this occasion of the 32nd National Conference on tuberculosis and chest diseases, it is not necessary for me to go into the various clinical aspects of the problem. I shall therefore, confine my brief talk to the control of tuberculosis. Timing of my talk in this session seems appropriate.

We have seen the eradication of smallpox in our country and the W.H.O. has given the assurance that very soon the disease will be totally eradicated from the entire world. In malaria we had an almost similar hope that the disease could be banished from our country. But in this we have been disappointed.

Tuberculosis, from the epidemiological view point cannot be compared either with smallpox or malaria. While in smallpox the incubation period and the duration of the illness with its infectivity scope, are both short, in tuberculosis the period between the infection and the occurrence of the overt manifestations of the disease may in fact be several years. The crucial difficulty in tuberculosis is the recognition of the point at which a person with a tuberculous lesion in his lungs starts to throw out the bacilli in his sputum, quite apart from the time gap that may occur between the infection itself and the radiological demonstration of the earliest focus in the lung. Failure to recognise this point results in the patient infecting large numbers of his contacts before he himself is diagnosed, brought under treatment and rendered sputum negative.

The problems connected with the control of tuberculosis have always been twofold. The first is the diagnosis of cases of tuberculosis at a sufficiently early stage of the disease so that the patient may be really and permanently cured with the judicious use of modern chemotherapy. The second is the employment of the drugs in a manner and for a period that will secure the required results and prevent the occurrence of relapses. In other words, if every person with

sputum showing easily demonstrable bacilli can be brought under treatment, it will have considerable effect on the occurrence of fresh cases. At the same time it is not wise to under rate the importance of early diagnosis, on clinical and radiological grounds—because perhaps the demonstration of bacilli, at that stage of the disease may require much more elaborate steps than a simple routine microscopy.

Raj Narain *et al.* (1971) have commented on the fact that patients in whom tubercle bacilli were demonstrated only on culture, constituted 61 % of all patients whose sputum was positive and they have further commented on the inadvisability of excluding such large numbers from national control programmes.

Surely we now know by experience that such early cases can be treated much more effectively and rendered much less dangerous to the community. Indeed, if we emphasise only a smear positive sputum finding, can any one estimate the number of children, in particular, that the patient have already infected before he is diagnosed and taken on hand.

The Tuberculosis Chemotherapy Centre, Madras concluded in one of its earlier studies that the major source of contact infection was exposure to the index case before diagnosis, and that the other two sources of infection (the general urban environment and exposure to the patient while under treatment) were much less important.

Our efforts towards the control of tuberculosis since Koch's eventful demonstration in 1882 of the bacillus named after him can be discussed under the following broad headings.

Improving the general socio-economic status which will include education, better nutrition, less overcrowding and the earlier recourse to medical aid, that go along with better living conditions. While in a small country with a high per capita income and a proportionately high expenditure on health like the U.K., such raising of standards of living might have contributed to the diminution of tuberculosis morbidity, one wonders how many more Five-Year plans are needed in India to produce a visible improvement in the numbers of its citizens climbing over the poverty line.

The decision of the profession therefore that

we should continuously emphasise that tuberculosis is an infectious disease is absolutely correct. Even in the case of malaria and smallpox it is now accepted on all hands that the identification of every single patient with the particular disease and his being rendered non-infectious, are the essential pre-requisites for the control of any communicable disease. In tuberculosis likewise, we should plan our strategy in such a way that the pool of infection in the community is markedly diminished.

In this attempt, with artificial pneumothorax and resection holding the field until 1946 - practically till the end of the first half of the century — the tuberculosis specialist took upon himself the entire responsibility for tuberculosis control.

At this stage the role of the general practitioner was limited to early diagnosis. The general practitioner was to go and get him and hand over the patient to the specialist. In fact we were rather afraid of this slogan. The present speaker then expressed his fears in the following terms. "The slogan 'Go and get him' may be all right in the U.S.A. where the open case of tuberculosis has been effectively brought under control with a death-rate in many cities of 40 or less per 1,00,000. But in our large cities thousands of active open cases totally incapacitated and with distressing symptoms and obviously a source of the gravest danger to the community, are being allowed to die for want of adequate facilities to take them on hand, treat them and segregate them out of their overcrowded dwellings. So long as we have not got the means to deal with the further enormous number of cases that will be discovered by Mass Miniature Radiography, it does not appear to be a useful procedure in the situation existing in our country at present. A Tamil saying questions the wisdom of the mother of six children going round the sacred peepul tree to be blessed with a seventh child when the first six are scouring their food plates in greedy hunger."

Since 1946 and more particularly since 1952 when INH came into common use, the G.P. has assumed a much greater role. The diagnosis and management of the case were both in his hands with perhaps some help from a specialist. And how he fulfilled this tremendous responsibility of tuberculosis control? After the advent of such effective chemotherapy, the word 'contact' got a new connotation. It was not merely the children and others in contact with the open case; but the continuous contact that the doctor had to maintain with the patient he was treating; 'case holding' being an equally important function as 'case finding'.

Here the average general practitioners is much more to blame than the patient himself. In India where the general practitioner is not provided with para medical help such as health visitor or secretary in his consulting room no one really explains the importance of regularity of treatment to the patients. Again and again, I have got the indisputable statement of patients that they have not been told anything about the length of treatment needed. A very common case history is that of a person in the low income group who does not understand what a family doctor means and seeks the help of the nearest GP, Dr. A., because he had fever, cough and perhaps slight haemoptysis for about two weeks or more during which he had tried all home remedies. The doctor makes a cursory clinical examination, does not get the sputum tested even when facilities are easily available at little cost and just starts the patient on daily injections of streptopencillin. The 10 or 12 injections because of their 'streptomycin content are just enough to produce a temporary clinical improvement. No mention of tuberculosis is made to the patient, much less of the treatment needed. The patient stops away when the symptoms are temporarily better. When, however, the inevitable breakdown occurs in a few weeks, he says to himself that this time, perhaps, Dr. B. will give him better injections. With Dr. B. the same story is repeated. This episodic therapies and breakdown go on until the patient has no more resources for 'private' treatment and so reports to a public hospital. It is sad that this story is true even when the patient has excellent facilities provided for him by his employers, such as the governments, ESI Corporation or railways. When he does go to the public hospital he is found to be a case of bilateral disease riddled with cavities. The chances of the bacilli he emits being resistant to one or more drugs as well as the danger he presents to the community both need no reiteration.

At the same time, it is perfectly correct to warn against over diagnosis of the disease as is now happening in the hands of paediatricians and radiologists. Similarly the prescription of anti-tuberculous drugs simply on the presence of Mantoux positivity in an adult in India is a wasteful, if not a harmful procedure.

Now that all of us with the knowledge have failed to apply that knowledge in an effective manner, whatever excuses we may offer — the administration and economists in raising the socio-economic conditions, the specialists and the G.P.s in enforcing adequate and appropriate action towards early diagnosis and complete cure of the patient — we can today talk of a 'cure' a word we were afraid of using in the past

I am suggesting that the challenge may be handed over to the community itself.

How to do this? By intense health education at the 'periphery' as we used to call the level of the community. Indeed, in as much as every health problem arises at this level, this should be called the centre of all activities, New Delhi being the periphery.

The Ministry of Health first placed before a Task Force (on which I served) of the Planning Commission in 1971, its proposals for a Rural health scheme. Several groups discussed these proposals which were never implemented. In 1975, the Shrivastav Committee (to these meetings I was a special invitee) categorically enunciated the rationale behind the utilisation of locally identified, briefly trained Community level health workers, whom we in Madras had even earlier put into position in certain villages as Lay First Aiders.

The Janata Government decided in April 1977 to implement the new health scheme for rural areas as from October which has been done in several Panchayat blocks.

The horizontal integration at the Health Centre level of the Central Government's various vertical schemes—of which tuberculosis control is one—has also been accepted as a policy decision. The Multipurpose workers are being trained rapidly in fulfilment of this decision.

What I am suggesting now is that the Tuberculosis Association should evolve a time-bound programme of health education with special emphasis on tuberculosis; enable every person with over three weeks cough and expectoration to have his sputum examined in a proper way and where possible advise his being x-rayed also. Till now we have been viewing the problem from where we are; mostly in insulated ivory towers. Let us now ask the people to take up the problem from where they are. The organisation should be in villages and slums; symptom oriented and community based.

I have always been against anyone advising us to follow the British model of a National Health Service or the Chinese model of a 'bare-foot doctor'. But the 'mass line' approach of China can possibly be utilised to organise the local, intense case-finding programmes. Taking the hand the cases diagnosed for oral chemotherapy will not be outside the State's budget on health care, supplemented by a Health Cess of 0.5 % of the annual income of the family from the rich, the poor, the urban and the rural. This case will be for comprehensive community health

care which will include tuberculosis as an important component.

I am confident that Dr. Deshmukh's 'Shibirs' modified with an emphasis on the consumer rather than on the donor of the services, introduced and spread rapidly as a mass movement is the only answer.

Money spent on this mass approach may indeed provide us with data not merely of morbidity but also of the people's behavioural responses, making it even more worthwhile than a repetition of the 1956 type of national survey. We must confess that up till now our methods of health education have been information-centred rather than behaviour-centred.

If the Mini Health Centre concept of regarding 1,000 families or 5,000 population as the unit for health care can be accepted and voluntary agencies encouraged to operate them with the State's financial assistance, as has been done by the Tamil Nadu Government my suggestion may not after all be so impracticable or Utopian.

I had to criticise the VIII report of the W.H.O. expert committee on tuberculosis (1964) for some of its retrograde proposals. The 1974 IX report is more acceptable. For example one cannot differ from its statement "The majority of the world's adult population has been infected by tubercle bacilli. From this pool, new cases of tuberculosis will therefore continue to develop for several decades to come. Hence, no crash programme or one time endeavour can substitute for the delivery of a permanent programme." Indeed in several papers I have objected to a health delivery system based on crash programmes, drives, mobile camps etc., and insisted on a permanent set up. The community should be made aware of this health centre in its midst, that its services are available to them all the year round and what is more, the part time doctor and the full time para medical workers, especially the village level workers (whom we call Lay First Aider), are all readily accessible to them. Therefore, while new cases of tuberculosis will undoubtedly develop from time to time from those already infected, let us at least bring down the pool of infection in the near future with the concomitant result of markedly reducing the evolution of new cases.

The Tuberculosis Association should take up this challenge, stimulate the District Tuberculosis officers into much greater visible action, help educate the citizens in a big way that tuberculosis can definitely be kept under reasonable control though we may not dare to speak of eradication. This time-bound programme with the firm

conviction that a dent can be made on the tuberculosis situation in the country can be reviewed, evaluated and redrawn on the 24th March 1982, the centenary of Koch's discovery. As a Hindu, I can imagine it will please Koch's soul that atleast a hundred years after his discovery, mankind has made use of it.

Before I close, I wish to stress why the Tuberculosis Association of India, through its branches, should take up this challenging task and not leave it to mere Governmental action. I am a firm believer in voluntary associations, as in them we find one of the best means of education in the democratic way of life. Whatever we possess in the way of skill, property and joy is enhanced, often without limit, by sharing it with others. Our richest experiences come when

we are acting with other people to achieve some common goal. Voluntary work is indeed the source of expansion of our lives.

Democracy demands, on the part of its citizens, a knowledge of all their institutions. It is fundamental in democracy that citizens must take part though they do not have to agree. Sound community planning must originate with the people who live in the area and will succeed with proper communication, and through the joint effort, of the professional and the voluntary workers. Let us make a determined effort, in the larger interests of the country, to educate 90 per cent of India's citizens, who are today underprivileged, that democracy means much more than shouting political or party slogans with the brandishing of multicoloured flags.

THE NATIONAL TB PROGRAMME AND THE ROLE OF TB ASSOCIATIONS AND OTHER VOLUNTARY ORGANIZATIONS

C.W.L. JEANES

(Special Adviser, Health and Population, Canadian International Development Agency)

It is a pleasure and a privilege to be attending this annual meeting of the Tuberculosis Association of India.

This is my tenth visit to India and I have thus had the opportunity to travel extensively in the country and to have a deep knowledge of and love for India.

Canada has long had connections with tuberculosis work in India starting in 1957 with visits to India by a Canadian team through the Colombo Plan and visits to Canada by a number of Indian experts in tuberculosis over the course of several years.

India has developed the world famous institutes at The Chemotherapy Research Centre, Madras, and the National Tuberculosis Institute, Bangalore. These institutes have done pioneering work, the results of which have influenced the management of tuberculosis around the world. Certainly the lessons of Madras and Bangalore have been very much applied in Canada.

I was for 15 years the Executive Secretary and Medical Director of the Canadian Tuberculosis Association and for the past 7 years have been consultant for health programmes to the Canadian International Development Agency.

In both these positions I have had the opportunity to travel extensively around the world and have been able to observe health problems and progress in many countries. It is in the light of what I have seen that I now talk about the situation regarding health in the world today.

The Health Situation in the World Today

A. Developed Countries

There has been a great increase in man-made diseases:

- a. Stresses and strains of city life leading to heart disease.
- b. Cigarettes and air pollution — lung cancer, emphysema, etc.
- c. Over eating — obesity, heart disease.
- d. Road accidents.
- e. Alcohol and drugs.

In the developed countries of the world the

per capita health budget is from \$300- \$500 per year — mostly spent on very costly treatment of sickness, with only a very small percentage spent on prevention and positive health.

The emphasis is on treating sick people in hospital, with increasingly sophisticated and expensive equipment. It is a cold hard fact of life that everything has to be paid for — and the health budget is not unlimited, even in developed countries.

B. Developing Countries

The greatest problem is the high infant and maternal mortality. The big killers of children are:

- a. Malnutrition
- b. Parasitic diseases
- c. Diarrhoea
- d. Infectious diseases
- e. Pneumonia

Modern sophisticated hospitals in the large cities do absolutely nothing to improve this situation — in fact, by using up a grossly disproportionate share of the health budget and personnel — doctors concentrated in city hospitals — actually make the health situation worse for more than 80% of the world's population who live in rural areas away from the cities. In one African city 50% of the total national health budget is spent in one hospital.

The problem is how to change this situation, how to spread out the available resources — both personnel and budget, equipment and supplies, equably among all the people of a country — and how to promote positive health — not just the treatment of disease.

Even though some people may disapprove of the political systems in China and Cuba, yet those countries have developed excellent health services spread out fairly among all people.

The World Health Organization theme for 1978 is "Primary Health Care" and this will be promoted throughout the world in an effort to promote the development of basic health services in all countries — with "Health for all by the year 2000" as the target.

The Situation in India

It would be presumptuous and unwise for an outsider to comment on the affairs of a country in which he is an invited guest. I will therefore choose my words very carefully, but I have been very much assisted in deciding what to say by my study of the newspapers of India during the 4 weeks I have been here — and also by my talks with many health workers in India.

May I quote some of the newspaper headlines to you.

Bombay—16th November: The need for open heart surgery in India.

Bombay—18th November: Mechanical hearts—still a far cry for India.

Madras—20th November: Opening of renal dialysis unit by President of Indian Medical Association.

BUT

Trichur—20th November: Rural bias in medical care urged.

Mr. J.P. Yadav, Union Minister for Health and Family Welfare said-

“While health is accepted as a basic human right, 80% of the country’s population living in the villages have no access to even the most rudimentary form of health care.

Due to the adoption of wrong models of health care, medical facilities have been developed in urban areas to the neglect of rural people.

There is need to perceive and interpret health needs in the larger perspective of the development of human resources.

It must be realized that no programme imposed by a government from above, however good its intentions, could succeed unless the community, the local authority and the state government, felt a sense of participation.”

That ends the quotation from Mr. Yadav’s speech. May I emphasize especially his remarks about the vital need for community participation and involvement.

There has been a very marked set back in

India’s family planning programmes because the people felt the programme was being imposed on them from above. It will take a long time to reverse these feelings and to re-establish the people’s confidence in the programme.

In tuberculosis, more than in any other disease, community involvement is essential, if the disease is ever going to be controlled in India.

You have massive problems with 8 million cases, of whom 2 million are infectious.

There are a total of one and a half million under treatment, but of these only about one-half million are from the two million infectious group, and only 40% complete their treatment. There are therefore one and a half million active tuberculosis patients not under treatment, continuing to spread infection in the community.

Diagnosis and treatment of tuberculosis are now very straightforward, and prevention through BCG available. The problem is how to bring all these together for the benefit of ALL people.

Even if those one and a half million infectious patients not now being treated could be found and persuaded to undergo treatment and the same for the five million non-infectious cases, the cost of the necessary chemotherapeutic drugs would be enormous. It would be a great challenge to tuberculosis workers in India to use the best and cheapest treatment regimes and to ensure that a very much higher percentage of patients complete their treatment. The lessons of Madras and Bangalore cannot be too strongly stressed for India.

This annual meeting of the Tuberculosis Association of India will be discussing how these massive problems can be tackled.

Governments alone cannot succeed in this task. They can provide resources and facilities.

The community-voluntary associations can and must work with the people to make certain that these resources are used to the best possible advantage to ensure that all the two million infectious cases are treated plus as many as possible of the five million non-infectious cases and to ensure that treatment is completed.

If there are insufficient resources to deal with the problem then it is the *duty* of the *voluntary*

Association to persuade the government to provide these resources.

associations and governments is the most effective way to accomplish this.

Summary and Conclusion

India's problem in tuberculosis is to make certain that all the two million infections cases are found and treated until they become inactive and non-infectious. A partnership of voluntary

May I wish every success to the deliberations of this 32nd Conference of the Tuberculosis Association of India and that those attending will be well informed and stimulated to return home to carry on their work with increased incentive and vigour.

IMMUNOLOGICAL CLASSIFICATION OF PULMONARY TUBERCULOSIS

M.S. AGNIHOTRI, U.C. CHATURVEDI And S.K. PANDE
(From King George's Medical College, Lucknow)

Pulmonary tuberculosis had been classified according to anatomical extent of disease, cavitary status, bacillary status, sensitivity of bacilli, treatment history and activity of disease. ("Classification of tuberculosis" adapted by Tuberculosis Association of India in 1969). Till now no attempt has been made to classify pulmonary tuberculosis on immunological basis.

It is well established that some patients of pulmonary tuberculosis remain tuberculin negative (Mascher, 1951; Kent, 1967; Leonard Howard, 1970). Tuberculin test was recently used to assess the cell mediated immunological reactivity of an individual (Pepys, 1975). Immunity against tuberculosis operates through cell mediated immune response (Mackanos, 1964). Further, the lack of correlation between virulence of different strains of tubercle bacilli and type of clinical diseases (Bhathena *et al.*, 1970), emphasis the role of immune responses of individual in ultimate outcome. Therefore, the immunological status of the patients of tuberculosis was assessed in the present study.

Cell mediated and humoral immune responses of patient with pulmonary tuberculosis were studied and correlated with clinical picture. The results revealed that the pulmonary tuberculosis could be classified immunologically.

Material and Method

The study included 35 patients of pulmonary tuberculosis admitted in K. T. B. Clinic and Hospital. Patients with extra pulmonary tuberculosis, diabetes, severe anaemia, pregnancy, marked emaciation and those over 50 years of age were excluded. Sputum was either positive at the time of admission or was positive in past (confirmed by old record). Mantoux test with 1 URT 23 with Tween 80 was done soon after admission before start of therapy. Patients were grouped according to tuberculin status as reactor (R) and hyporeactor (H). Patients with induration of more than 10 mm were classified as reactor (R) and those with induration of 10 mm or less as hyporeactor (H). Hyporeactors and reactors were selected randomly and studied for C.M.I. and humoral immune responses.

Tests for Cell Mediated Immunity

1. D.N.C.B. Skin Sensitization Test

The method of Catalona *et al.* (1972) was used. 2,000 microgram of 1-chloro-2, 4-dinitrochlor benzene (D.N.C.B.) in 0.1 ml of acetone,

was applied on volar aspect of left forearm in an area of 2 cm. diameter through a metal ring. Another test with 50 microgram of D.N.C.B. in 0.1 ml of acetone was simultaneously applied on right forearm. The sites were covered with band-aid and patient were instructed to avoid washing. Result of D.N.C.B. skin sensitization test were interpreted as follows:

1. Non-specific inflammatory reaction — The site with 2,000 microgram of D.N.C.B. was observed for the first 4 days for swelling, erythema and pain. If present, the non-specific inflammatory reaction was considered positive.

2. Cell mediated immune response to D.N.C.B.—Both sites were inspected every day between 7 to 14 days after application. The sites were observed for spontaneous flare characterised by induration itching and vesiculation. If spontaneous flare occurred at both the site within 14 days result was 4+ for C.M.I. against D.N.C.B., if it occurred only at 2,000 microgram site it was read as 3+. If there was no spontaneous flare within first four days of observation a challenge dose of 50 microgram of D.N.C.B. was applied on the left forearm at different site. The reaction was observed upto 72 hours. If it was positive unequivocally it was read as 2+, if it gave an equivocal reaction it was recorded 1+. If there was neither a spontaneous flare nor a reaction to challenged dose of D.N.C.B., the reaction was recorded as negative.

2. Migration Inhibition Test

Peripheral blood leucocytes were separated from heparinized blood and the leucocyte migration inhibition test was set using the technique of David *et al.* (1964). The details of this technique have been described elsewhere (Natu and Chaturvedi, 1977).

II. Tests for Humoral Immunity

Immunoglobulin estimation

The immunoglobulin levels were determined by radial diffusion technique of Mancini *et al.* (1965) using the Tripartigen plates of Bohring Institute.

Clinical evaluation was done as follows:

III. Duration of Disease

Patients were specially asked about the total

duration of disease. Those with history of less or more than 2 years were grouped separately.

History of bacterial and viral infection

Each patients were asked about previous history of repeated bacterial infection and viral infection such as measles, mumps and smallpox. Percentage of positive answers in subgroup of pulmonary tuberculosis were calculated and tabulated.

Anatomical extent of disease

Patients were classified according to criteria of classification of tuberculosis adopted by tuberculosis Association of India 1969.

1. Minimal — Lesion involving small part of one lung or both lung, the total extent regard less of distribution not exceeding the volume of lung on one side up to the level of the lowest point of the second costochondral junction.

2. Moderately advanced — Lesion involving one lung or both lungs but no exceeding the volume of lung on one side upto the level of the lowest point of the fourth costochondral junction.

Far Advanced — Lesions more extensive than moderately advanced lesion.

Cavitary Status

Presence or absence of cavity was judged from the postero-anterior X-ray film at the time of inclusion in the study.

Radiological Improvement

Radiological improvement was assessed by comparison of the postero-anterior X-ray film taken at the time of admission and at the end of follow-up period. The average stay in the hospital was 80 days.

Sputum Conversion

Sputum smear was examined for presence of acid fast bacilli by Zeihl-Neelson's staining every month during their stay in the hospital. Sputum was taken to be converted if it become negative for acid fast bacilli in subsequent examination.

Observation

Table I shows the results of tuberculin test in pulmonary tuberculosis. 54.28% cases had tuberculin reaction of size of 10 mm or less and were grouped as hyporeactor (H). 45.72% cases

having tuberculin reaction more than 10mm were grouped as reactor (R). 8.57% cases had tuberculin reaction between 20.30 mm.

Table I

Tuberculin Test in Pulmonary Tuberculosis

Group	Size of tuberculin reaction	No. of cases	Percentage
Hyporeactor (H)	0—10	19	54.28
Reactor (R)	10—20	13	37.14
	20—30	3	8.57

Raj Narain et. al. (1974) regarded that persons with reaction size of 14 mm or more to PPD-S as being infected with mycobacteriuin tuberculosis where as persons with reaction size of 0-7 mm were classified as showing non-specific sensitivity. In the present study the patients of group H and R were classified into three groups, according to size of tuberculin reaction. Those having tuberculin reaction of 5 mm or less, reaction size of more than 5 mm to 15 mm and reaction more than 15 mm.

Table II

Size of tuberculin react/on in hyporeactor and Reactor patients of pulmonary tuberculosis.

Size of Tuberculin Reaction in mm	Hyporeactor	Reactor
0—5	78.9	—
5—15	21.0	50
15—30	—	50

78.9% patient of group H had tuberculin reaction less than 5 mm and in 50% of group R patient had tuberculin reaction more than 15 mm.

Table III shows results of D.N.C.B. skin sensitization tests in pulmonary tuberculosis and control. All the control were D.N.C.B. positive,

whereas, 48.57% cases of pulmonary tuberculosis were D.N.C.B. positive

of pulmonary tuberculosis could be further classified in four subgroups

Table III

D.N.C.B. Skin Sensitization test in Tuberculosis

Group cases	No. of	D.N.C.B. Sensitization Test	
		% Negative	% Positive
Control	10	0	100
Pulmonary Tuberculosis	35	51.42	48.57

Table IV

D.N.C.B. Skin Sensitization Test in hyporeactor and Reactor patients of pulmonary tuberculosis.

Group	No. of cases	D.N.C.B. Skin % Negative	Sensitization % Positive
Hyporeactor (H)	19	73.68	21.3
Reactor (R)	16	25.00	75.00

This table shows that 73.68% patient of group were D.N.C.B. negative and 27.31% had positive D.N.C.B. skin Sensitization test. In group R 75% and 25% patients were D.N.C.B. positive and negative respectively. Thus patients

1. Hyporeactor D.N.C.B. negative (subgroup H=ve)
2. Hyporeactor D.N.C.B. positive (subgroup H+ve)
3. Reactor D.N.C.B. negative (subgroup R=ve)
4. Reactor D.N.C.B. positive (subgroup R+ve)

This table demonstrates that 80% of patients having tuberculin reaction of 0-5 mm were of subgroup H = ve group, whereas 87.5% cases with tuberculin reaction of 15-30 mm were of subgroup R=ve group. Patients with tuberculin reaction of 5-15 mm were 16.6, 16.6, 25 and 41.6% of subgroup H=ve, H+ve, R=ve and R+ve respectively.

Table VI shows that migration inhibition index percentage in pulmonary tuberculosis was 52.88 ± 17.47 with valid range of distribution of 16.74-90.13. 8 normal controls had migration inhibition index % of 10.41 ± 3.16 with valid range of distribution of 6.32-15.33. The migration inhibition index percentage in pulmonary tuberculosis was found to be significantly higher than that of control ($P < 0.001$).

Table VII shows that migration inhibition index percentage in patients with tuberculin reaction between 0-10 mm (hyporeactor) was 33.77 ± 11.40 with valid range of distribution of 16.74-58.80 which was found to be significantly lower ($P < 0.001$) than migration inhibition index percentage in cases of pulmonary tuberculosis having tuberculin reaction between 10-20 mm (reactor). The migration inhibition index percentage was 75.22 ± 14.57 with valid range of distribution of 41.02-89.58, in patients with tuberculin reaction between 10-20 mm. No significant difference was observed in migration inhibition

Table V *Size of tuberculin reaction in sub-group of pulmonary tuberculosis.*

Tuberculin Reaction in mm	No. of cases	% Hyporeactor		% Reactor	
		D.N.C.B. —ve	D.N.C.B. +ve	D.N.C.B. —ve	D.N.C.B. +ve
		0—5	15	80	20
5—15	12	16.6	16.6	25	41.6
15—30	8	—	—	12.5	87.5

Table VI

Leucocyte migration inhibition test in pulmonary tuberculosis.

Group	No. of	Migration Inhibition Index percentage			
		Mean± S.D.	Range	T	P
Control	8	10.41± 8.16	6.32—15.33		
Pulmonary tuberculosis	35	52.88 ± 17.47	16.74—90.13	13.45	<0.001***

Table VII

Migration inhibition index percentage in hyporeactor and reactor patient of pulmonary tuberculosis

Tuberculin reaction in mm	Group	No. of cases	Migration inhibition index percentage			
			Mean ± SD	Range	t	P
0—10	Hyporeactor	19	33.79±11.40	16.40—58.80		
10—20	Reactor	13	75.22 + 14.57	41.02—89.58	.58	<0.001
20—30		3	77.25 + 11.93	69.94—90.13	.28	>0.05

Table VIII

Migration inhibition index percentage in sub-group of pulmonary Tuberculosis.

Sub-group	No. of cases	Migration inhibition index percentage			
		Mean+S.D.	Range	t	P
H—ve	14	27.37+ 6.84	16.74—40		
H + ve	5	51.72+ 8.06	29.70—58.80	6.02	<0.001
R—ve	4	64.94+23.60	41.02—89.58		
R + ve	12	78.43+ 6.20	69.94—90.13	1.33	>0.05

index percentage value of patient with tuberculin reaction of 10-20 mm and 20-30 mm ($P<0.05$).

Table VIII shows that migration inhibition index percentage value of subgroup H=ve was found to be significantly lower than that of subgroup H+ve ($P<0.001$). No significant differ

ence in migration inhibition index percentage value of subgroup R=ve and R+ve could be demonstrated ($P<0.05$). But significant difference was observed in migration inhibition index percentage value of subgroup H =ve and R =ve ($P<0.01$) and also those of subgroup H +ve and R+ve. Thus, four subgroup of pulmonary

tuberculosis could be identified by migration inhibition test. On further analysis it found that migration inhibition index percentage value of subgroup H=ve was significantly lower than that of pulmonary tuberculosis as a whole ($P < 0.001$). Whereas migration inhibition index percentage value of subgroup R+ve was significantly higher ($P < 0.001$). Migration inhibition index percentage value of subgroup H = ve and R = ve were not statistically different from pulmonary tuberculosis ($P < 0.05$).

Thus according to values in Table VIII the migration inhibition index percentage between 41-60 could be regarded as indicating adequate C.M.I, response, value above 60 ment hyporeactive CM. responsiveness and value below 40 indicates deficient cellular immunity.

Assessment of Humoral Immune Response

Table IX shows that IgG levels in pulmonary tuberculosis was found to be 2799 ± 857.45 mgm/100 ml with valid range of distribution of 2064-5182. The IgG levels in pulmonary tuberculosis was significantly higher ($P < 0.01$) than control value (control IgG levels 1566.6 ± 194.03 with valid range of distribution of 1437-1676).

No significant difference ($P < 0.01$) in IgG

level in hyporeactor and reactor group of pulmonary tuberculosis could be demonstrated in present study (Table No. X).

This table shows result of IgA levels in pulmonary tuberculosis. IgA level were 397.83 ± 89.76 mgm/100 ml with valid range of distribution of 257.6-584 in pulmonary tuberculosis which was significantly higher ($P < 0.01$) than control value (control levels were 287.5 ± 39.87 with valid range of distribution of 265-310).

Table XII shows that no significant difference ($P < 0.05$) was observed in IgA levels between group H and group R of pulmonary tuberculosis.

Clinical Assessment of Subgroup of Pulmonary Tuberculosis

Table XIII shows percentage of cases having duration of disease more than 2 years in H =ve, H+ ve, R+ve and R +ve group of pulmonary tuberculosis. 64.5% cases of H =ve group had disease for more than 2 years, whereas 33.3% cases in R+ ve group the duration of disease was more than 2 years. In R =ve group 40% had disease for more than 2 years whereas in none of the cases in R =ve group had disease more than 2 years.

Table IX

IgG levels in pulmonary tuberculosis.

Group	No. of cases	IgG levels (mgm/100 ml)				
		Mean±S.D.	Range	S.E.	t	P
Control	2	1566.5 ±194.03	1457—1676	408.91	0.92	<0.01
Pulmonary Tuberculosis	18	2799 .66 ±857 .45	2064—5182	108.62		

Table X

IgG levels in hyporeactor and Reactor patient.

Group cases	No. of	IgG levels (mgm/100 ml)				
		Mean±S.D.	Range	S.E.	t	P
Hyporeactor (H)	7	3037. 85 ±1081 .88	2258—5182	408.91	0.92	<0.01
Reactor(R)	11	2648 .2±360.24	2064.3204	108.64		

Table XI

IgG A levels in Pulmonary Tuberculosis.

Group	No. of cases	IgA levels (mgm/100 ml)				
		Mean±S.D.	Range	S.E.	t	P
Control	2	287.5 ±39.87	265 — 310			
Pulmonary tuberculosis	18	397.83±89.76	257.5—584		3.13	<0.01

Table XII

IgG levels in hyporeactor and reactor patient.

	cases	IgA levels (mgm/100 ml)				
		Medn±S.D.	Range	S.E.	t	P
Hyporeactor (H)	7	411 .45 ±120 .99	257.6—584	45.73		
Reactor (R)	11	389 .29 ±97 .01	257 —564	29.25	0.41	>0.05

Table XIII

Duration of disease in subgroup of pulmonary tuberculosis

Group	Duration of disease more than 2 years		Group	% Positive answer for H/O Bacterial and viral infection	
	D.N.C.B. Negative	D.N.C.B. Positive		D.N.C.B. Positive	D.N.C.B. Negative
Hyporeactor (H)	64.5%	40%	Hyporeactor (H)	50	40
Reactor (R)	—	33.3%	Reactor (R)	25	18.7

Table XIV

History of bacterial and viral infection in subgroup of pulmonary tuberculosis.

Table XIV shows percentage of positive answers to history of bacterial and viral infection in subgroup of pulmonary tuberculosis 50% positive answers were recorded in subgroup H =ve. Whereas, percentage of positive answers was 18.7% in subgroup R +ve group. Percentage of positive answers in subgroup H +ve and R =ve were 40 and 25 respectively.

Table XV shows percentage of patient with minimal, moderately advanced and far advanced

disease in subgroup of pulmonary tuberculosis. Minimal disease was present in 14.2% and 41.6% cases of subgroup H =ve and R + ve respectively, whereas far advanced disease was recorded in 50% and 25% cases of subgroup = ve and R + ve. Moderately advanced disease was observed in 35.7, 20, 25.0, 33.3% cases of subgroup H =ve, and H +ve, R=ve and and R+ve cases respectively.

Table XVI shows percentage of cases with

Table XV

Anatomical extent of disease in sub-group of pulmonary tuberculosis.

Group	% Cases of anatomical extent of disease					
	Minimal		Moderately Advanced		Far Advanced	
	D.N.C.B. -ve	D.N.C.B. +ve	D.N.C.B. -ve	D.N.C.B. +ve	D.N.C.B. -ve	D.N.C.B. +ve
Hyporeactor (H)	14.2	40	35.7	20	50	40
Reactor (R)	25	41.6	25.0	33.3	50	25

initial cavities in various subgroup. 57.14% cases of subgroup H =ve had cavity whereas 25% cases in subgroup R -f-ve had radiological evidence of cavity, 40 % cases of subgroup H+ ve and 50% cases of subgroup R =ve has cavitory disease.

Table XVI
Cavitory status in subgroup of tuberculosis

Group	% of cases with cavity	
	D.N.C.B. Negative	D.N.C.B. Positive
Hyporeactor (H)	57.14	40
Reactor (R)	50	25

Percentage of cases of pulmonary tuberculosis having radiological improvement were shown in Table XVII. 35.14% and 66% cases of subgroup

Table XVII
Radiological improvement in subgroup tuberculosis of pulmonary

Group	% of cases having radiological improvement	
	D.N.C.B. Negative	D.N.C.B. Positive
Hyporeactor (H)	35.14	60
Reactor (R)	50	66

H =ve and R +ve respectively showed radiological improvement during the period of follow up. H +ve and R =ve group had radiological improvement in 60% and 50% respectively.

This table shows results of sputum conversion in subgroups of pulmonary tuberculosis. Subgroup R-fve had 80% sputum conversion, whereas in 42.8 % cases sputum became negative

Table XVIII

Sputum conversion in subgroup of pulmonary tuberculosis

Group	% Cases with sputum conversion	
	D.N.C.B. Negative	D.N.C.B. Positive
Hyporeactor (H)	42.8	50
Reactor (R)	66.6	80

Discussion

Tuberculin test is used to assess the cell mediated immunological responsiveness of individual (Papys, 1975). Depression of cell mediated immunity was demonstrated by use of PPD in primary biliary cirrhosis (Sherlock 1970) and in sarcoidosis, chronic lymphocytic leukaemia, mucocutaneous candidiasis (Lockshin and Ombardieri, 1971). Tuberculin test is used in tuberculosis for diagnosis and for quantitative

assessment of degree of sensitivity in epidemiological study. Patients with active pulmonary tuberculosis may remain tuberculin negative (Mascher, 1951); and Kent, and Schwartz, 1967. In the present study 54.28% cases of pulmonary tuberculosis were hyporeactors. Every care was taken to exclude the known causes of negative tuberculin reaction in pulmonary tuberculosis.

(1) Faulty technique — Mantoux test was done by standard technique using 1 TU of fresh PPD RT23 with Tween 80 (BCG laboratory Guindy, Madras, India).

(2) Incubation period — Tuberculin test becomes positive after 23 to 60 days of interval after initial infection by tubercle bacilli. During the incubation period negative tuberculin test may occur despite active tuberculosis (Mascher, 1951). All patients included in the present study had duration of illness of more than 2 months.

(3) Non-specific anergy -- Negative tuberculin reaction may be due to alteration in the peripheral vascular mechanism that effects the capacity of vessel to respond to inflammatory irritants, irrespective of state of hypersensitivity (Rich, 1951). In the present study patient with cachexia and toxemia were excluded to avoid the effect of non-specific factors.

(4) Overwhelming tuberculous infection - Severely ill tuberculosis patients especially those with miliary tuberculosis and tuberculous effusion may have negative tuberculin reaction as massive amount of circulating endogenous tuberculin binds up all available antibodies. So that the relatively small amount of exogenous tuberculin injected into the skin is not enough to produce a visible local reaction. Patient of miliary tuberculosis, tuberculous effusion and severely ill patients were not included in the study.

(5) Association of other infection — Patient of pulmonary tuberculosis may have negative tuberculin reaction due to association of other infections (Lester and Atwell, 1958). Depression of tuberculin reaction has been observed after use of measles vaccines (Starr and Berhovich, 1964) and polio vaccine (Brody and coworkers, 1964). None of the patient studied had viral infection during period of study though previous history of infective illness was present in 70% patients.

(6) Unrelated Disease — Hypothyroidism (Rich, 1951) had sarcoidosis (Mayock et. al., 1963) may give false negative tuberculin reaction. Our patients were suffering from pulmonary tuberculosis and those with any other associated disease were excluded.

(7) Age — Johnston et al. (1963) observed decline in sensitivity to tuberculin over 50 years of age. All our patient were between 20 to 50 years of age. Extreme age groups were excluded from the study.

(8) Drug-Corticosteroid (Solomen and Angel, 1961) and anti-tubercular drug (Hewell and Suyemoto, 1954) may diminish or abolish tuberculin reaction. Patients who had not taken any treatment at least of 2 weeks before admission were included. Tuberculin test was done before the start of therapy. Only 1 TU of PPD RT23 was used in the present study as the purpose of study was not to assess the diagnostic or epidemiological value of tuberculin reaction but to assess the cell mediated immune responsiveness of patients of pulmonary tuberculosis. Patients were classified as hyporeactor (Group H) and reactor (Group R) on the basis of tuberculin reaction and not as positive and negative. Lester and Atwell (1958) reported 21.7% tuberculin negative reaction in pulmonary tuberculosis. The higher percentage of hyporeactor in present series was due to method of selection of patient.

In the present study statistically comparable numbers of patients in Group H and R were selected randomly. On further analysis it was found that 78.9 % cases of group H had tuberculin reaction between 0-5 mm and 50% cases of group R had tuberculin reaction of between 15-30 mm. The tuberculin reaction of 0-5 mm in our patient could be taken as an indicator of non-specific sensitivity. Raj Narain et. al. (1974) regarded persons with reaction of 0-7 mm to PPD-S and of 14 mm or more to PPD-B as showing non-specific sensitivity. Our patients having tuberculin reaction of 5 mm or less satisfied clinical, radiological and bacteriological criteria of diagnosis of pulmonary tuberculosis. Therefore, tuberculin reaction between 0-5 mm in patients was taken as an indication of deficient cell mediated immune response. According to this criteria 78.9% cases of Group H had depressed cell mediated immunity. Tuberculin reaction more than 15 to 30 mm indicated hyperactive cell mediated immunity and 50% of Group R patients were in this range. Tuberculin reaction of more than 5-15 mm indicated adequate cell mediated immunity. 21 % of Group H and 50% of Group R patients belonged to this group.

D.N.C.B. Skin Sensitization Test

D.N.C.B. is a simple chemical substance and acts as sensitizer by binding into body own protein, and changes produced are those of proliferation of T. lymphocytes in paracortical or thymus dependent areas, which are typical

of development of C.M.I. (Turk, 1967). D.N.C.B. sensitization was used as a test for cell mediated immune responsiveness (Southill, 1975).

In the present study, 451.42% patient of tuberculosis were negative to D.N.C.B. skin sensitization test indicating depressed C.M.I. Malviya et. al. (1975) observed that 50-60% patients with pulmonary tuberculosis showed their inability to respond to D.N.C.B. Gorodezky (1974) and Gross (1965) also reported inability of patient of tuberculosis to become sensitized to D.N.C.B. Abnormalities of C.M.T. in patient of tuberculosis had been reported by Buckley and Vilsech (1972) and Zeitz et al. (1972). Advance age (Waldorf et. al., 1968) and malnutrition (Edelman et al., 1973) may cause negative D.N.C.B. skin sensitization. All patient in the present study were below 50 years of age, cachexic and toxic patient were excluded. 73.68% cases of Group H were D.N.C.B. negative where as, 75% patient of group R were D.N.C.B. positive. When tuberculosis test and D.N.C.B. skin sensitization test were used together as indicator of C.M.T. it was found that subgroup H = ve had deficient C.M.I., where as Subgroup R + ve had adequate cell-mediated immune responses. 80% cases of subgroup H=ve had tuberculin reaction of 5 mm or less, whereas, 87.5% patient of subgroup R + ve had tuberculin reaction of more than 15 mm. Therefore, tuberculin reaction of 5 mm or less and negative D.N.C.B. sensitization indicated deficient C.M.I. in pulmonary tuberculosis, whereas, tuberculin reaction of more than 15 mm and positive D.N.C.B. indicated hyperactive C.M.I. Tuberculin reaction of more than 5 mm to 15 mm with negative or positive D.N.C.B. response indicate adequate pulmonary tuberculosis.

Leucocyte migration inhibition test

When sensitized lymphocyte interact with specific antigen soluble indicators of cellular hypersensitivity are generated (Dumonde et. al., 1969). The ability of soluble factor to inhibit migration of cultured macrophages and leucocytes provides one of the measure of cellular hypersensitivity (Dumonde and Maini, 1971). Migration inhibition test was used to assess cellular immune response in immunodeficiency (Southill, 1975). Dormont et. al. (1972) used this test as an early devise for rejection crises in kidney recipients. In the present study migration inhibition test was used to assess the cell mediated immune responsiveness in pulmonary tuberculosis.

Significantly higher migration inhibition index percentage was observed in pulmonary tuberculosis as compared to controls, indicating acti-

vation of C.M.I. in pulmonary tuberculosis. It is well-known that infection by mycobacterium tuberculosis also leads to development of immunity against tuberculosis. Group H had significantly lower migration inhibition index percentage as compared to Group R of pulmonary tuberculosis. Federlin (1971) observed that leucocyte migration test correlated with positive mantoux reaction in every subject and none of negative subject gave a positive reaction. Significant difference in migration inhibition in PPD negative and PPD positive patient of sarcoidosis, lymphocyte leukaemia and mucocutaneous candidiasis was observed by Lockshin and Ombardien (1971). Thus in the present study hyporeactor had depressed cell mediated immunity as compared to reactor patient. It was further observed that subgroup H =ve had significantly lower migration inhibition index percentage as compared to subgroup H + ve but no significant difference in migration inhibition index percentage was observed between subgroup R = ve and R+ve. Comparison of migration inhibition index percentage value between subgroup H =ve and R =ve and also between subgroup H + ve and R +ve was found to be significantly different. Therefore, it was concluded that H =ve, H + ve, R =ve and R+ve are distinct subgroup of pulmonary tuberculosis according to migration inhibition index percentage values. When compared with migration inhibition index percentage value of pulmonary tuberculosis, it was observed that subgroup H = ve had significantly lower migration inhibition index percentage, whereas, subgroup R + ve had significantly higher migration inhibition index percentage. No significant difference in migration inhibition index percentage values of subgroup H + ve and R =ve observed as compared to pulmonary tuberculosis. Therefore, it was concluded that subgroup H =ve had deficient C.M.I., in subgroup R +ve the C.M.I. was hyperreactive. In subgroup H + ve and R = ve C.M.I., was adequate.

IgG and IgA levels were found to be significantly higher in pulmonary tuberculosis as compared to control. This finding was similar to that of Sobti et. al., 1976. Elevation of IgG levels in pulmonary tuberculosis was also observed by Donate and Fishbein (1971).

No significant difference in IgG and IgA level was observed between hyporeactor and reactor indicated that the humoral immune response in two groups was of the same order.

Clinical Evaluation of Subgroup of Pulmonary Tuberculosis

64.5% patient in subgroup H = ve had

disease for more than 2 years where as in subgroup R + ve 33.3% had disease more than 2 years duration. This finding indicate that in the present era of effective chemotherapy pulmonary tuberculinis lingered on for a longer period in subgroup H = ve as compared to subgroup R +ve. Patient were selected randomly on the basis of tuberculin reaction, therefore, factors such as inadequate treatment, development of resistance, non-cooperation of patient, which lead to prolongation of disease could be similar in both groups. 80% cases of subgroup H =ve had deficient C.M.I, and 87.5% patient of subgroup R +ve had hyperactive C.M.T. Therefore, it seems that immune responsiveness of individual was also a factor causing prolongation of disease.

Clinical suspicion of immune deficiency is often aroused by recurrent infection in more than one organ (M.R.C., 1971). History of bacterial and viral infection was present in maximum number of patient of subgroup H =ve and minimum number of subgroup R +ve patients. Thus, episode of bacterial and viral infection such as smallpox, measles and mumps in patients pulmonary tuberculosis indicate deficient C.M.I.

Minimal disease was present in more patient of subgroup H +ve and subgroup H =ve had more far advance disease, cavitation was more often present in subgroup H =ve than in subgroup R +ve. Radiological improvement was seen in maximum number of patient in sub-H = ve. Leonard et. al., (1970) and Woodruff et. al. (1968) also reported radiologically advance disease in hyporeactor patients of pulmonary tuberculosis. They reported cavity to be an essential characteristic of hyporeactor patient of pulmonary tuberculosis. Sputum conversion was observed more often in subgroup R +ve as compared to subgroup H =ve. Leonard Howard et al. (1970) and Woodruff et. al. (1968) observed that tuberculin negative patient of pulmonary tuberculosis have greater number of A.F.B. than tuberculin positive patient. Lesser percentage of sputum conversion in subgroup H = ve in the present study was, therefore, due to larger number of bacilli in lesion. Tubercular bacilli is an intracellular parasite and had a capacity to multiply within macrophages. Eventually they reach such a large number that the phagocyte cells within which they reside are killed and destructive lesion of tuberculosis appear (Canetti, 1955). Machaness (1964) demonstrated that macrophages had an role in cell mediated immune response and macrophage form tuberculous animals were more actively phagocytic. Thus patient with deficient C.M.I, will have larger number of tubercle bacilli in the body. The present study

have demonstrated the subgroup H =ve had deficient C.M.I, and subgroup R+ve had hyperactive C.M.I.

Patient of pulmonary tuberculosis could be classified into three group immunologically.

(1) Patient with deficient C.M.I.

- Criteria (1) Tuberculin reaction 5 mm or less.
 (2) D.N.C.B. skin sensitization test negative.
 (3) Migration Inhibition index percentage significantly lower than the mean value in pulmonary tuberculosis or between 20-40.

(2) Patient with adequate C.M.I.

- Criteria (1) Tuberculin reaction more than 5 mm to 15 mm.
 (2) D.N.C.B. skin sensitization test positive or negative.
 (3) Migration inhibition index percentage same as that of pulmonary tuberculosis or between 41-60.

(3) Patient with hyperactive C.M.I.

- Criteria (1) Tuberculin test more than 15 mm.
 (2) D.N.C.B. skin test positive.
 (3) Migration inhibition index percentage significantly higher than the mean value of pulmonary tuberculosis or between 61 to 80.

Conclusion

35 patient of pulmonary tuberculosis were assessed for cell mediated and humoral immune responses. Tuberculin test, D.N.C.B. skin sensitization test and leucocyte migration inhibition test was used to assess cell mediated immunity and estimation of IgG and IgA was done for assessment of humoral immunity. Patient of pulmonary tuberculosis could be classified immunologically into three groups. (1) those having deficient C.M.I. (2) Patient with adequate C.M.I, and (3) Patient having hyperactive C.M.I. Clinical evaluation of patient with deficient C.M.I, and those with hyperactive C.M.I. demonstrate difference in radiological and bacteriological presentation.

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TUBERCULOSIS TRENDS IN AN URBAN COMMUNITY

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A population of nearly 30,000 in city of Delhi has been under surveillance by the New Delhi Tuberculosis Centre, New Delhi for the last 15 years to study the changes in prevalence and incidence of pulmonary tuberculosis. It is a thickly populated area, inhabited mostly by low income families. A good domiciliary service has been available to the area for the last 34 years from the Centre which is close by.

The base line survey was carried out in 1962. Five more surveys have since been carried out, each 2.1/2 years after the preceding one except the 6th survey where the interval was 4 years. Results upto the fourth round were presented in 1966 and 1973.

Each survey was preceded by an accurate re-census of the population. The procedures remained unchanged all through. Briefly 70 mm film was used. Children below the age of 5 years were excluded. The films were read by two independent readers. All persons considered or suspected to have abnormal shadow by either of the two readers were called to the Centre for follow up. If the sputum was found negative by direct smear, assessment of aetiology and activity was made after a period of observation, sometimes extending even upto 6 months, during which at least two cultures of sputum/laryngeal swab were set up and 2 or 3 radiographical examinations, at least one of which was by a large film, were carried out. Where follow up was not possible, small film rading (if there was agreement between the two readers) or the umpire reading (in case of disagreement) was taken as final assessment. All persons considered tuberculous were categorised into three groups :

1. Bacillary — where the sputum was positive by direct smear or culture.
2. Active abacillary — where all sputum/laryngeal swab direct smear and cultures were negative but the lesion was considered to be active radiologically.
3. Inactive — where all sputum and laryngeal swabs were negative by direct smear and culture and lesions were stable radiologically.

The present paper reports the results of all the six surveys.

Table 1 shows the population under surveillance and the coverage obtained during the six

surveys. Besides the natural increase in population and the usual emigration and imigration, these figures have also been influenced by slum clearance programme which were carried out sporadically in this area. In all the surveys, over 90% of the eligible and available persons were x-rayed. Investigations could be completed in 86 % to 97 % of the persons whose small film was marked as abnormal.

Table 2 shows the prevalence of active bacillary and total active disease.

It will be seen that the rate of bacillary disease remained unchanged from the 1st to 3rd survey at 4.0 per thousand, was 2.1 per 1000 in the 4th survey and nearly 3 per 1000 in the 5th and 6th surveys. The rate of total active disease which was 17 per thousand in the first survey has been round about 13 per thousand since the 2nd survey except for an apparent inexplicable fall to 9 per thousand in the 4th survey. The apparent fall from 17 per thousand to 13 per thousand can be explained by the fact that a large number of patients who would normally have gone undiscovered in the 1st survey were given treatment and were rendered inactive by the time the 2nd survey took place.

The age-sex specific prevalence rates of total active and bacillary disease at the 1st and 6th surveys are shown in Fig. I. At the time of 1st survey the prevalence of active disease was 16.8 and 17.5 per 1000 for males and females respectively (bacillary rate 4.4 and 3.5 per 1000). At the 6th survey the corresponding figures are 14.6 per 1000 in males and 11.3 per 1000 in females (bacillary rate 3.9 and 3.5 per 1000).

It would be noted that in both surveys there is a difference in the age specific pattern of disease between males and females. For males, the prevalence by and large shows a steady increase with age. For females, on the other hand the prevalence reaches a peak around the age group 25-35 years and then by and large, stays at the same level.

Table 3 shows the incidence of fresh disease among the x-ray negatives of the previous survey during the five successive periods. It would be noted that as in the previous papers, the incidence is calculated in terms of total fresh disease, including bacillary, active abacillary and inactive. This index has been preferred since it takes into

Table 1

Rate of attendance at the six x-ray surveys and for subsequent investigations.

	First survey 1962	Second survey 1964-65	Third survey 1967	Fourth survey 1969-70	Fifth survey 1972-73	Sixth survey 1976-77
Total population	29,484	32,157	33,397	33,642	34,960	35,290
Number eligible for examination (5 years or more)	24,887	27,257	29,456	29,193	30,268	32,229
Number available for x-ray	23,000	24,823	27,327	27,234	28,823	28,803
Number x-rayed	21,344 (93 %)	22,621 (91 %)	24,803 (91 %)	24,808 (91%)	26,132 (91 %)	26,686 (93%)
Number recalled for further investigation	2,424	2,041	1,683	1,267	974	1,067
Number completing investigation	2,076 (86%)	1,808 (86%)	1,633 (97%)	1,211 (96%)	888 (91 %)	1015 (95%)

Table 2

Prevalence of pulmonary tuberculosis at the six surveys.

	Number examined	Baci Mary cases per 1,000	Active abacillary cases per 1,000	Total active cases per 1,000
<i>Current Study</i>				
1st Survey, 1962	21,344	4.0	13.2	17.2
2nd Survey, 1964-65	22,621	4.0	8.9	12.9
3rd Survey, 1967	24,803	4.0	9.7	13.7
4th Survey, 1969-70	24,808	2.1	6.7	8.8
5th Survey, 1972-73	26,132	2.8	9.2	12.0
6th Survey, 1976-77	26,686	3.2	9.9	13.1

account all fresh tuberculous shadows developing after the previous surveys. Whether these cases developed bacillary disease or not would depend to a great extent on the lapse of time between the two surveys and the latter alone would therefore be an inadequate index of the amount of total fresh disease. Similarly, inclusion of the inactive cases can be justified on the ground

that they must have been active sometime or the other during the interval, being x-ray negative in the previous surveys.

Some persons reported voluntarily in the inter-survey intervals for such, cases their worst status between the time of diagnosis and the next has been taken into account.

Table 3

Comparative incidence of pulmonary tuberculosis among former X-ray negatives in five successive periods.

			1st-2nd Survey	2nd-3rd Survey	3rd-4th Survey	4th-5th Survey	4th-6th Survey
No. of former x-ray negative re-examined			16,247	17,433	18,249	20,165	19,202
Fresh cases of pulmonary tuberculosis	Bacillary	No.	38	55	49	34	140
		Per 1000 p-y*	0.9	1.3	1.1	0.6	1.8
	Total	No.	138	222	181	226	368
		Per 1000 p-y	3.4	5.1	4.0	3.7	4.8

* Person-years

It would be noted that the incidence of total fresh disease from the 1st to the 6th survey has oscillated between 3.4 and 5.1 per 1,000 per year. Nearly 1/4th of the fresh cases were bacillary in the first four periods, but the proportion was about 40% in the last period probably, because the interval between the 5th and the 6th surveys was about four years instead of 2.1/2 years.

As in previous surveys it was found at the 6th survey also that for males the incidence above the age of 15 years was more or less the same i.e. around 6 per 1000 per year. For females there was a peak in the age group 15-24 (8.8/1000 per year) with gradual decline in subsequent age groups. A point worth noting is that both as regards prevalence and incidence of primary disease, females in the age group 5-14 and 15 to 24 fare worse than males. For example, prevalence among males in the two age groups was 3.0/1000 and 0.9/1000 among males compared to 7.1/1000 and 5.3/1000 for females. The annual incidence rates of primary disease for males were 0.8/1000 and 0.1/1000 compared to 2.0/1000 and 1.0/1000 per females.

Table 4 shows the incidence of disease among persons who were x-ray negatives in the 1st survey and were covered in all subsequent surveys; in other words persons moving out of

the area or moving into the area after the 1st survey have been excluded. The trend of incidence among these, it would be seen, was more or less the same as in Table 3. Since the study has lasted nearly 15 years, the population considered in this table has naturally undergone an ageing process and it is not unlikely that this would be reflected to some extent in the seemingly increased incidence rates as revealed in the last survey.

Fate of persons having inactive disease in the five successive periods

Inactive cases found at various surveys were kept under observation for the entire duration of the study. The breakdown rate of these cases is shown in Table 5. Except for an inexplicable fall in the third period the breakdown rate has stayed around 2 % per year. Nearly half the cases were bacillary at the time of breakdown.

Fate of active cases

The fate of the active bacillary and abacillary cases was analysed at the time of 6th survey and the results are shown in Table 6.

It would be seen that 26% of the bacillary cases of the 5th survey who could be followed in

Table 4

Subsequent incidence of pulmonary tuberculosis among persons found x-ray negative at the time of first survey.

			1st-2nd Survey	2nd-3rd Survey	3rd-4th Survey	4th-5th Survey	5th-6th Survey
Number of persons re-examined			16,247	15,271	12,650	10,415	8,448
Fresh cases of pulmonary tuberculosis	Bacillary	No.	38	36	31	24	72
		Per 1000 p-y*	0.9	1.0	1.0	0.8	2.1
	Total	No.	138	203	126	129	183
		Per 1000 p-y	3.4	5.3	4.0	4.1	5.4

* Person-years

Table 5

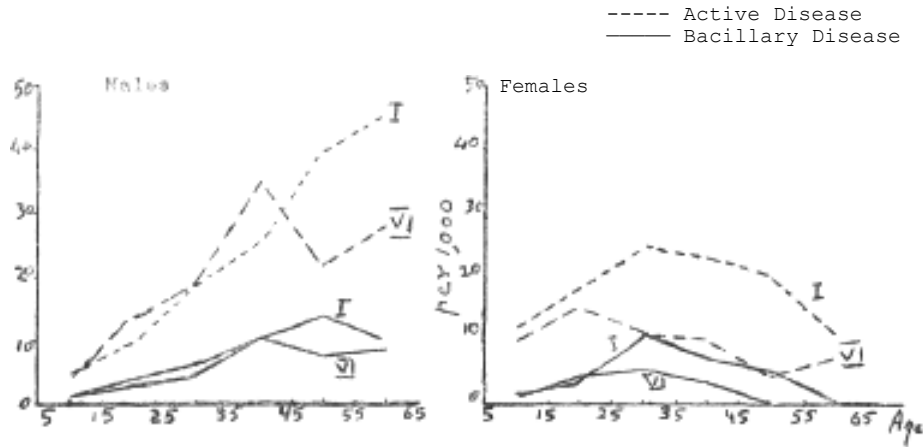
Comparative fate of persons found to have inactive pulmonary tuberculosis in five successive periods.

	Number of inactive cases re-examined	Fresh cases of active disease					
		Bacillary		Active abacillary		Total Active	
		No.	% p-y	No.	% p-y	No.	% p-y
1st to 2nd Survey	485	17	1.4	15	1.2	32	2.6
2nd to 3rd Survey	542	13	1.0	28	2.1	41	3.0
3rd to 4th Survey	627	6	0.4	11	0.7	17	1.1
4th to 5th Survey	763	25	1.1	28	1.2	53	2.3
5th to 6th Survey	647	21	0.8	23	0.9	44	1.7

the 6th died during this period and about 57 were converted. Of the active abacillary cases 5% became bacillary, 9% died and 77% were labeled inactive. These figures too are almost similar to those obtained during the earlier periods.

Sensitivity pattern of the bacilli

The drug sensitivity pattern of new patients found positive was also studied. Excluding patients who were positive only by direct smear or



F. 1. Prevalence of pulmonary tuberculosis at 1st & 6th Surveys by age and sex

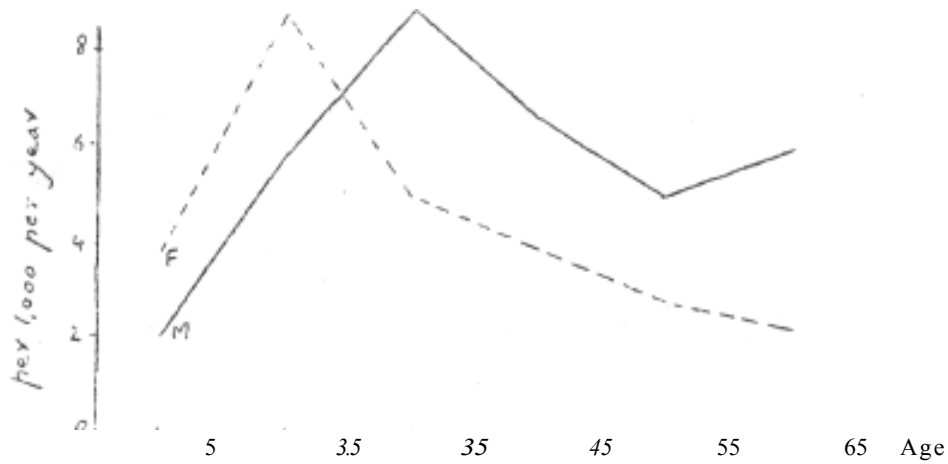


Fig. 2. Incidence of pulmonary tuberculosis by age & sex (5th to 6th Survey) (Total fresh disease:

Table 6

Status at lime of 6th survey of Active Cases of 5th Survey.

5 th Survey Status	Number assessed	6th Survey Jtatus			
		Active Bacillary	Active Abacillary	Inactive	Dead
Active Bacillary	65 100.0%	11 16.9%	9 13.8%	28 43.1%	17 26.2%
Active Abacillary	146 100.0%	7 4.8%	13 8.9%	113 77.4%	13 8.9%

whose cultures were contaminated, there were 123 patients whose results are available. Ten (i.e. 8.1%) were initially resistant to INH, 6 (i.e. 4.9%) to streptomycin, one to PAS and 3 to thiacetazone; 93 (75.6%) were sensitive to all these drugs. The figures for INH and streptomycin sensitivity for previous surveys are more or less of the same order.

Mortality

A rough estimate of the mortality due to tuberculosis in the community can be made on the basis of these surveys. During the period 1972-76 (i.e. between the Vth and VIth surveys) there were 43 deaths due to tuberculosis from amongst nearly 105,000 person years. This comes to about 40 deaths per 100,000 per year for population over the age of 5 years in this community

to whom a good domiciliary treatment service and periodic active cases-finding programme was available. In a similar study carried out in a rural population near Bangalore to which good treatment facilities were not available, the death rate was about 95 per 100,000.

To conclude, the study now being reported has been going on for nearly 15 years. No appreciable change in respect of any important epidemiological index has been noted so far. Although slight fall in the prevalence rate was recorded around the year 1969, but this has not been sustained. Much significance cannot be attached to this apparent fall unless it is maintained for a sufficiently long period. One may even speculate what would have been the fate of this community, if a good treatment service and active case-finding had not been available.

INCIDENCE OF SPUTUM POSITIVE TUBERCULOSIS IN DIFFERENT EPIDEMIOLOGICAL GROUPS DURING FIVE YEAR FOLLOW UP OF A RURAL POPULATION IN SOUTH INDIA

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Introduction

Many epidemiological studies 1,2,3,4,5 have been conducted at different places and at different times in India to determine prevalence of tuberculous infection and disease. A few longitudinal studies 2,4,5 from the country have also provided information on the incidence and trend of the infection and disease. Though in these studies several repeated surveys were carried out, yet the information on incidence was from among population examined at any two consecutive surveys only. In the longitudinal studies, all persons admitted at the initial survey, though belonging to the same geographical area, could not be examined at all the surveys for reasons of emigration and non-cooperation at different times. Consequently, information on the risk of developing new disease among population groups with similar initial characteristics followed up completely on long term basis in India could not be made available. Such information is desirable as it enables one to identify high risk groups in the community.

For this purpose the data, from five year epidemiological study of tuberculosis in a population that could be examined completely and repeatedly over a period of five years were analysed to find out the annual incidence* of pulmonary tuberculosis in four broad age groups:

1. In total population and
2. Among infected and non-infected population separately with:
 - (i) Normal chest X-ray (N)
 - (ii) Abnormal shadows on X-ray, classified as non-tuberculous or inactive tuberculous (AB)
 - (iii) Abnormal shadows on X-ray classified as active or probably active Tuberculosis

* Incidence of culture confirmed pulmonary tuberculosis: Persons with normal X-rays or with abnormal X-rays but bacteriologically negative at previous surveys and were found to have culture confirmed tuberculosis at subsequent surveys.

Method and Material

Out of 50,146 persons without BCG scar examined at first survey (1961-63) in 119 randomly selected villages of 3 sub-divisions of Bangalore district, 22,468 persons (44.8%) were examined completely 4 times (including first survey) over a period of 5 years. The intervals between I and II surveys and between II and III surveys were same viz., 1½ years; it was 2 years between III and IV surveys.

All persons were examined in the villages. The procedures of examinations for each survey remained unchanged; these consisted of:

1. Tuberculin testing of all, with 1 TU RT 23 with Tween 80. The tuberculin tests were read after 72-96 hours of testing. Persons with induration sizes of 10 mm or more at first survey were classified tuberculin positives (infected) and those with reaction of 9 mm or less as tuberculin negatives (not infected).

2. X-raying of the population aged 5 years and more: The X-rays were interpreted by two readers independent of each other. The X-ray that were judged to have active or probably active shadow by any one of the two readers were reviewed by a third reader (umpire) for arbitration. His interpretations of abnormal shadows were accepted as final. Based on such readings, the X-rays of each survey having abnormal pulmonary shadows were classified according to the following code:

- | | |
|---|--|
| A | Condition to be of non-tuberculous etiology. |
| B | Suggestive of tuberculous etiology judged to be inactive. |
| C | Suggestive of tuberculous etiology judged to be possibly active. |
| D | Suggestive of tuberculous etiology judged to be probably or definitely active. |

The X-rays without any abnormality in the lung field were coded as 'N' (Normal).

3. Collection of two specimens of sputa,

a spot and an overnight from persons with any X-ray abnormality at any of the four surveys. These were examined by direct smear and culture followed by identification and drug sensitivity tests for positive cultures.

Study Population

Age and Sex Composition

Out of the total 50,146 persons examined at I survey, 22,468 (Table 1) were examined completely four times during a period of 5 years (1961-63 to 66-68). Their age and sex distribution was significantly different from the total population registered and examined at first survey and also from that examined at first as well as second surveys (not presented in the Table). In the population completely examined for five years, there were more females for all aged combined as well as in the age group of 5-54 years. Also, the proportion of persons aged 0-4 years in this population was more than those in the population examined either at the I survey or that examined at both the I and II surveys.

Table 1

I Survey Population Followed-up for 5 Years by Age and Sex

Age at I Survey	Sex		Total	
	Male	Female	Number	%
0—4	2145	2050	4195	18.6
5—14	3693	3747	7440	33.1
15—34	2435	3057	5492	24.4
35—54	1541	2192	3733	16.7
55 +	848	760	1608	7.2
All Ages	10662	11806	22468	100.0

Comparison of Prevalence of Tuberculous Infection and Disease in Study Population with those of I survey Dejure Population

At the first survey (1961-63) the over all prevalence of infection in the population followed up for five years was 25.9% and that of sputum positive disease 6.9% (Table not

presented). Compared to these, the prevalence rates of infection and disease, in total dejure population examined at I survey were 29.5% and 4.06 % respectively,⁵ these differences were statistically significant ($P \leq 0.05$). This could be attributed to the above mentioned differences in the age and sex composition of the population. However, the prevalence rates of infection in three age brackets — 0-4, 5-9 and 10-14 years of the group followed up over the five-year period were similar to those of the same age brackets of population examined at 1st survey.

Epidemiological Sub-Groups

Excluding 4,195 persons of 0-4 year age group not X-rayed at I survey and 66 whose X-rays were unsatisfactory, the incidence of tuberculosis has been studied among the remaining 18,207 persons (Table 2).

Table 2

Population Group by Tuberculin and Radiological Status at I Survey

Tuberculin Status	Radiological Status			Total
	N	AB	CD	
Positive	4653	832	184	5669 (31.1)
Negative	11498	953	87	12538 (68.9)
Total	16151 (88.7)	1785 (9.8)	271 (1.5)	18207 (100.0)

Figures in parenthesis are percentages to total.

On the basis of tuberculin test and chest X-ray interpretations as mentioned above, this population has been classified into six sub-groups for the study of risk of sputum positive disease namely, N, AB and CD, and each of these into tuberculin positive and negative. At I survey, 31.2% of the persons in age groups 5 years and over were tuberculin positives. X-rays of 88.7% persons were normal, the abnormal shadows among 9.8% were classified as AB and in the remaining 1.5% as CD.

Findings

Incidence of sputum positive disease

The overall annual incidence (attack) rates of culture positive disease calculated from the observation over a period of 5 years are presented age wise in Table 3. During a period of 5 years, in all, 135 new tuberculosis cases were detected. The annual incidence in the entire five years followed up population was 1.45 per thousand. In females incidence rate was lower than in males ($P < 0.05$). The incidence rates increased with age.

Table 3

Annual Incidence of Culture Positive Disease by Age in Total Population Followed-up for 5 Years

Age at I Survey	Number Followed-up for 5 years	New Cases in Five years	Annual Rate per thousand
5—14	7414	16	0.42
15—34	5479	39	1.40
35—54	3717	42	2.21
55 +	1597	38	4.66
All Ages	18207*	135	1.45
Male	8491	90	2.08
Female	9716	45	0.91

* Excludes 66 persons whose X-rays were technically inadequate at different surveys.

Among tuberculin positives, the overall incidence rate (3.5 per thousand) was about 7 times that among the tuberculin negatives (0.5 per thousand) (Table 4). The incidence rate among tuberculin positive males was significantly higher than that for females ($P < 0.05$). Among tuberculin positives as well as negatives the annual incidence rates increased with age, being lowest in 5-14 years and highest in 55+

years. Of the total 135 new cases found, 32 (23.7%) were from the tuberculin negatives and 103 (76.3%) from tuberculin positives.

Incidence among X-ray normals

In all, 16,151 persons whose chest X-rays were normal at I survey were followed up for five years. Among them 65 new cases occurred giving an overall annual incidence rate of 0.70 per thousand. The annual incidence rate was little over 4 times among the X-ray normal tuberculin positive population than that in tuberculin negatives (Table 5). Among tuberculin positives, the incidence rate was significantly higher in males than in females ($P < 0.05$). The incidence rates increased with age in the tuberculin positives. This was not so among the tuberculin negatives. Out of the total 41 new cases in tuberculin positives, 24 (58.5 %) were from the age group 35 years and over, whereas among tuberculin negatives there were only 4 (16.7%) from the same age group.

Incidence among persons with AB shadows

Out of 1,785 persons with AB shadows, 34 new cases occurred in five years giving an overall incidence of disease 3.73 per thousand per year. No progressive increase in incidence with age was seen. It was about five times that among the X-ray normals. Among persons with AB shadow, the annual incidence was 6.83‰ for tuberculin positives and 1.03‰ among tuberculin negatives (Table 6). Out of 29 new cases among the tuberculin positive 19 (65.5%) occurred in the age group 35 years and above.

Incidence among persons with CD shadows

The overall annual incidence rate of disease among the persons with CD shadows was highest — 26.04 per thousand, 36 cases having occurred among 271 in five years, 33 of whom were from tuberculin positives. The incidence rate among tuberculin positives CD was 5 times than that in the tuberculin negatives. The number of persons at risk in the latter sub-group (87) was also small (Table 7). Increase in annual incidence with increasing age among tuberculin negative CD sub-group was not observed. There was no new case either among tuberculin positive or negative in age group 5-14 years.

The size of the six sub-groups and the proportional contribution to total new case from each of them

The given figure shows the size of the 6 sub-groups, the annual incidence of disease and the contribution of new cases from each one of

Table 4

Annual Incidence of Culture Positive Disease by Age, Sex and Tuberculin Status at I Survey—In Population Followed up for Five Years.

Age at I Survey	Infected (Tuberculin Positive)			Not Infected (Tuberculin Negative)		
	Number Followed up for 5 years	New Cases in 5 years	Annual Rate Per 1000	Total at Risk	New Cases in 5 years	Annual Rate Per Thousand
5—14	825	4	0.95	6589	12	0.36
15—34	2085	30	2.82	3394	9	0.52
35—54	1856	38	4.01	1861	4	0.42
55-f-	903	31	6.73	694	7	1.98
All ages	5669	103	3.56	12538	32	0.50
Male	3079	73	4.64	5412	17	0.62
Female	2590	30	2.27	7126	15	0.41

them. In the population studied the largest sub-group was that of the tuberculin negative X-ray normals (63.1 %). Of the total new cases found in the entire population this sub-group contributed 17.8%. The smallest sub-group of tuberculin negative CD (0.5% of total population) contributed 2.2% of the total new cases. The total tuberculin positives which constituted 31.2% of the population contributed 76.3 % of the new cases. Of the total new cases 48.2% were contributed by all X-ray normals which was 88.7 % of the population.

Discussion

The incidence rates of pulmonary tuberculosis in the country have been reported on the basis of non-concurrent follow up of the population. The finding based on long term concurrent follow up of population are expected to be more reliable. This paper presents the incidence of sputum positive pulmonary tuberculosis in the total population and its six sub-groups which

were followed up completely four times over a period of five years. The sub-groups were formed on the basis of their tuberculin reactions and radiological status at first survey.

The age structure of population examined for five years and of that examined between any two consecutive surveys were not similar. Nevertheless the overall annual incidence rates of sputum positive disease in the total population and in the six epidemiological sub-groups followed up for five years were not different from those reported among similar sub-groups examined between I and II surveys.⁵ This finding is somewhat surprising.

The finding of similar incidence rates over a period of three months⁶ or one year on the basis of the analysis of material from 5-year follow up or 1½ to 2 years follow up⁵ is rather unexpected. The above observations assume importance in the sense that to obtain estimates of incidence the follow up of population for long

Table 5
Annual Incidence of Disease by Age, Sex and Tuberculin Status Among X-ray Normals of I Survey Followed up for 5 years.

Age Group	Tuberculin Positive			Tuberculin Negative		
	Number Followed up 5 years	New Cases in 5 years	Annual Rate Per Thousand	Number Followed up for 5 years	New Cases in 5 years	Annual Rate Per Thousand
5—14	759	2	0.52	6350	12	0.37
15—34	1858	15	1.58	3137	8	0.50
35—54	1468	17	2.27	1558	3	0.38
55 +	568	7	2.42	453	1	0.43
Total	4653	41	1.73	11498	24	0.41
Male	2505	29	2.27	5015	10	0.39
Female	2148	12	1.10	6483	14	0.43

Table 6
Annual Incidence of Culture Pos. Disease by Age, Sex and Tuberculin Status Among Radiologically Abnormals Classified as AB at I Survey Followed-up for 5 years.

Age Group	Tuberculin Positive			Tuberculin Negative		
	Number Followed up for 5 years	Cases	Annual Rate Per Thousand	Number Followed up for years	Cases	Annual Rate Per Thousand
5—14	55	2	7.13	213	—	—
15—34	191	8	8.21	240	1	0.82
35—54	330	9	5.35	286	—	—
55 +	256	10	7.66	214	4	3.66
Total	832	29	6.83	953	5	1.03
Male	450	20	8.71	355	4	2.21
Female	382	9	4.62	598	1	0.33

Table 7

*Annual Incidence of Culture Pos. Disease by Age, Sex and Tuberculin Status Radiologically Abnormals
Classified as C or D at 1 Survey Followed-up for 5 years*

Age Group	Tuberculin Positive			Tuberculin Negative		
	Number Followed up for 5 years	Cases	Annual Rate Per Thousand	Number Followed up for 5 years	Cases	Annual Rate Per Thousand
5—14	11	—	—	26	—	—
15—34	36	7	38.11	17	—	—
35—54	58	12	40.55	17	1	11.53
55 +	79	14	34.73	27	2	14.52
Total	184	33	35.15	87	3	6.76
Male	124	24	37.94	42	3	14.00
Female	60	9	29.40	45	—	—

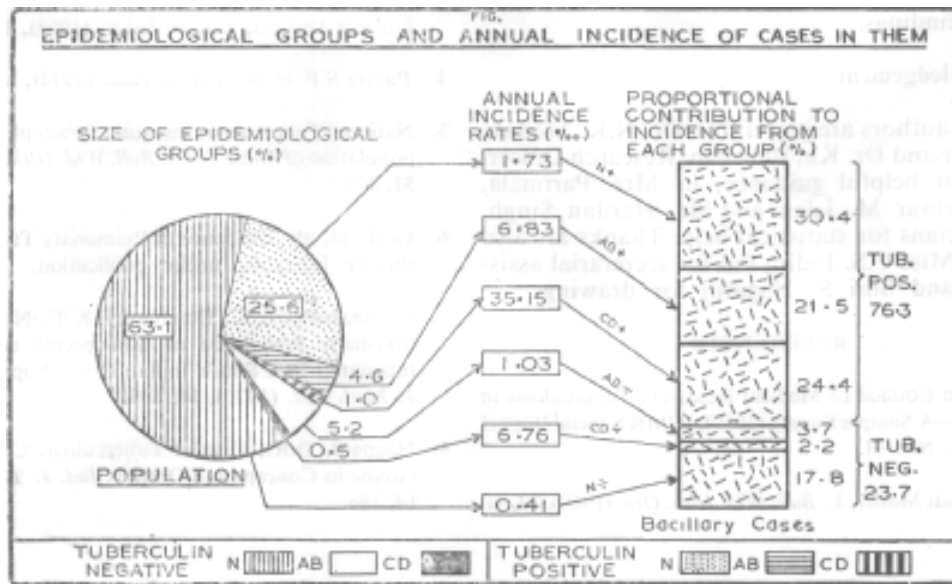
duration may not be necessary. On the other hand, short duration follow up has its advantages, namely minimum loss of study population and avoidance of prolonged organisational efforts necessary for a long term follow up. Further, the information required can be obtained without delay. It, however, must be borne in mind that for finding the incidence rates for a chronic disease like tuberculosis, a large population has to be examined always and repeatedly irrespective of the interval between the surveys.

The incidence of disease in the population with normal chest X-rays of this study and those reported by Pamra⁴ were similar. Among tuberculin positive X-ray normal sub-group the incidence rates increased with age and was the highest in age group 55 years and over. Lowering of resistance among persons in old age with long-standing experience with infection(s) could be a plausible explanation. The absence of increase in incidence with age among tuberculin negative X-ray normal sub-group supports the above contention. Further, from the similar incidence rates among persons in all the age groups of this sub-group, it could be inferred that the risk of new disease in them irrespective of age is same.

Among all the tuberculin negative persons, irrespective of X-ray status, the attack rate was

the highest in the age group 55 years and over as compared to those in the younger age groups (Table 4). This was due to the fact that out of a total of seven new cases that occurred in the old age groups of 55 years and over, six occurred among tuberculin negative with abnormal shadows (Table 6 & 7). It is likely that in this age group people with abnormal shadows of tuberculous nature were wrongly classified as non-infected on tuberculin test results, highlighting the possible limitation of this tool especially for the old age group.

The largest sub-group of population (63.1 %), that of tuberculin negative X-ray normals (Fig.) had the lowest incidence rate. The second largest sub-group was that of tuberculin positive X-ray normals. A substantial proportion of new cases (48.2%) arose from these two sub-groups which constituted 88.7% of total population. If this group is excluded from further surveillance, the provision for diagnosis, treatment and surveillance for the remaining 11.8% population with abnormal shadows can at best prevent only half of incidence cases that are expected to arise in the community in a year. For obvious reasons, the identification of this sub-group in the community is rather an insurmountable problem. Even if facilities to identify the sub-group are provided, the availability of drugs, the machinery



to distribute them and their acceptability by the patient will be further deterrent factors for adopting such a procedure on a countrywide basis.

The highest risk sub-group of tuberculin positive persons with CD shadows contributed 24.4% of the new cases. The surveillance and treatment of this sub-group, which is 1% of the entire population, might result in prevention of breakdown of about one fourth of new cases. If all the persons with CD shadows, that is 1.5% of the entire population, irrespective of their tuberculin test reactions are treated, then 26.6% of new cases will be prevented. The additional benefit by treatment of tuberculin negative persons with CD shadows would only be marginal (2.2%) and achieved by treating 50% more people (Fig.). However, the application of tuberculin test for identifying tuberculin positive individuals on a countrywide basis has many limitations, particularly for the persons in higher age groups (35 years and over) having more than 60% of total prevalence and incidence of the disease. The high prevalence of non-specific sensitivity and waning of natural allergy, adversely influence the sensitivity and specificity of tuberculin test. Thus, the reliability of tuberculin test for identifying tuberculin positive individuals is poor indeed! Further, variation in tuberculin testing and interpretation do not permit its application freely. Besides, as stated earlier, the operational problems of mass screening of population with X-ray and tuberculin are major constraints.

In view of these limitations, the sub-group of CD among symptomatics attending the gen-

eral health institutions irrespective of tuberculin status may be given treatment under the programme conditions, provided the interpretation of X-rays is reliable.

Summary

Out of 56,146 persons without BCG scar examined in 1961-63 for the first time, 22,468 were subsequently examined 3 times over a period of five years by tuberculin test, X-ray and sputum at intervals of 1½ years to 2 years. No organised anti-tuberculosis service was provided in the study area. Excluding 4,261 persons below 5 years of age and some others whose X-rays at first survey were unsatisfactory, among the 18,207 remaining persons aged 5 years and more, the annual incidence of sputum positive disease was 1.45 per thousand. The incidence of the disease in tuberculin positive group was 7 times as compared to that among tuberculin negatives. The attack rate of bacteriological disease was 0.79 per thousand among X-ray normals (N) of the first survey; it was 3.73 per thousand among persons with inactive tuberculous lesion and non-tuberculous shadows (AB) and 26.04 per thousand among the group of persons with active or probably tuberculous shadows (CD).

Of the total incidence cases, 76% were contributed by the tuberculin positives. The group of active or probably active shadows (CD) contributed 26.6% of the total new cases. The population without any radiological abnormality (N) contributed 48.2% of the new cases.

The paper discusses the implications of the above findings.

Acknowledgement

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Appendix Table

Annual Incidence of Culture Positive Disease by age, sex, tuberculin and Radiological Status at 1 Survey Among Persons followed-up for 5 years

	Normal						Non-TB or Inactive-TB						Active TB						
	Tuberculin Positive			Tuberculin Negative			Tuberculin Positive			Tuberculin Negative			Tuberculin Positive			Tuberculin Negative			
	Nos.	Annual Rate per 1000	Nos.	New Pos. Case	Annual Rate per 1000	Nos.	Nos.	New Pos. Case	Annual Rate per 1000	Nos.	New Pos. Case	Annual Rate per 1000	Nos.	Nos.	New Pos. Case	Annual Rate per 1000	Nos.	New Pos. Case	Annual Rate per 1000
5-14	M	395	0.50	3140	4	0.25	29	1	6.76	103	—	—	—	—	—	—	—	—	—
	F	364	0.54	3210	8	0.49	26	1	7.54	110	—	—	—	—	—	—	—	—	—
	T	759	0.52	6350	12	0.37	55	2	7.13	213	—	—	—	—	—	—	—	—	—
15-34	M	1030	1.71	1207	4	0.65	103	4	7.61	69	1	2.84	19	4	41.26	3	—	—	—
	F	828	1.42	1930	4	0.41	88	4	8.91	171	—	—	17	3	34.59	14	—	—	—
	T	1858	1.58	3137	8	0.50	191	8	8.21	240	1	0.82	36	7	38.11	17	—	—	—
35-54	M	756	3.11	473	1	0.41	172	7	7.98	89	—	—	36	7	38.11	9	1	21.78	—
	F	712	1.38	1085	2	0.36	158	2	2.48	197	—	—	22	5	04.55	8	—	—	—
	T	1468	2.27	1558	3	0.38	330	9	5.35	286	—	—	58	12	40.55	17	1	11.53	—
55	M	324	4.24	195	1	1.00	146	8	10.74	94	3	6.25	63	13	40.44	20	2	19.60	—
	F	244	—	258	—	—	110	2	3.56	120	1	1.63	16	1	12.25	7	—	—	—
	T	568	2.42	453	1	0.43	256	10	7.66	214	4	3.66	79	14	34.73	27	2	14.52	—
Total	M	2505	2.27	5015	10	0.39	450	20	8.71	355	4	2.21	124	24	37.94	42	3	14.00	—
	F	2148	1.10	6483	14	0.42	382	9	4.62	598	1	0.33	60	9	29.40	45	—	—	—
	T	4653	1.73	11498	24	0.41	832	29	6.83	953	5	1.03	184	33	35.15	87	3	6.76	—

HYPERSENSITIVITY PNEUMONITIS

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Abstract

It refers to pneumonitis on account of hypersensitivity to certain fungi, parasites etc. Allergic bronchopulmonary aspergillosis (ABPA) is one of the commonest cause of this disease. In a survey of incidence of pulmonary aspergillosis in 500 patients of various chest diseases, 18 (3.6%) cases of ABPA and 15 (3.0%) cases of probable ABPA were encountered. The basic pathology in majority of the cases was bronchial asthma and only one case each of pulmonary tuberculosis and chronic bronchitis suffered from this disease.

The diagnostic criteria for ABPA were as described by Henderson (1968). They consisted of isolation of aspergillus from sputum, transient pulmonary patches radiologically, asthmatic episodes with airway obstruction and FEV₁ less than 70 per cent of VC in one second presence of Type I and III hypersensitivity, blood and sputum eosinophilia and presence of specific antibody against aspergillus in the serum. The onset of probable ABPA had all the criteria of ABPA with element of doubt or one of the tests was not positive.

All the cases of ABPA fulfilled the criteria of Henderson (1968). Immunoglobulins were estimated in only 15 cases of ABPA. All the cases showed raised IgF., the mean being 7426 ± 695 Units/ml and the mean control being 191 ± 97 Units/ml. IgA was raised in 8 (53.3%) cases and the mean being 496 ± 34 mg% as compared to control the mean being 258 ± 48 mg%. IgG was raised in 2 (13.3%), the mean being 1996 mg% and the control mean was 965 mg%.

Introduction

It refers to pneumonitis on account of hypersensitivity to certain fungi, parasites etc. Allergic bronchopulmonary aspergillosis (ABPA) is one of the commonest cause of this disease. It is attributed to hypersensitivity reactions to antigens of the aspergillus species mainly aspergillus fumigatus. According to McCarthy and Pepys (1971) and Hochne et. al. (1973) it is fairly common in UK occurring in 10-20 per cent of asthmatics. In India it has been described by Pamra et al (1972) and Shivpuri and Aggarwal (1969).

The aim of the paper is :-

- (1) To present incidence of the ABPA in Indian Armed Forces.

- (2) To draw attention to the different tests for diagnosis of the disease.

Material and Methods

1. Subjects: The study comprised of 500 cases of various chest diseases as follows (Table I).

2. The diagnostic criteria of ABPA was same as laid down by Henderson (1968).

- (a) Isolation of aspergillus repeatedly for sputum.
- (b) Transient pulmonary patches radiologically.
- (c) Asthmatic episodes and airway obstruction and FEV₁ less than 70 per cent of FVC₁
- (d) Presence of Type I and III hypersensitivity (dual skin response).
- (e) Precipitin in the serum.
- (f) Sputum and blood eosinophilia.

Probable ABPA was suspected when the diagnosis of ABPA was doubtful or one of the tests was negative.

3. The following investigations were done :-

- (a) Immunodiffusion studies :- They were performed with three antigens including supernatants of aspergillus fumigatus, aspergillus nidulans and aspergillus flavus. They were performed by Ouchterlony agar gel double diffusion method. When the tests were negative, the patients sera were concentrated 4 times and retested. The results were recorded negative only after concentrations were carried out. Precipitin to any one of the three concentrated extracts constituted a positive test.

- (b) Intradermal skin test :- It was performed by injecting 0.02 ml of an aqueous extract of A. fumigatus and other three antigens and the reactions were read at intervals of 15-20 minutes, 6, 24, 48 and 72 hours and were described according to Gell and Coombs (1968) as Type I, III and IV. They were recorded positive or negative as described by Shivpuri and Aggarwal (1969).

Table 1

Subject	No. No.	Sex Male	Female	Age (Years)
—Pulmonary tuberculosis	200	190	10	20—65
— Bronchial asthma	200	110	90	14—63
— Bronchicetosis	14	6	8	14—46
— Lung abscess	28	22	6	16—52
— Bronchogenic carcinoma	8	8	0	55—76
— Chronic bronchitis with/or emphysema	19	17	2	44—74
— Pneumonia	16	12	4	19—42
— Pleurisy with effusion	15	13	2	20—36
— Normal	10			

(c) Sputum examination and culture for aspergillus :- Three early morning specimens of sputum were cultured on Sabourauds medium for aspergillus. Sputum eosinophilia was reported if eosinophils were more than 10 per cent of the total leucocyte count.

(d) Blood tests :- Total and differential leucocytes counts were done. Blood eosinophilia was considered if the absolute eosinophil count was more than 400/cmm. ESR was measured by the Westergren method.

Immunoglobulins IgA, IgG and IgM were measured by radial immunodiffusion and IgE by radioimmunoassay (Phadebas IgE test). The normal values were IgA 60-325 mg%, IgG 660-1900 mg%, IgM 45-205 mg% and IaE 100-1000 Units/ml.

(f) Pulmonary function tests :- FEV₁ and FVC₁ were measured. The lower limit of normal for FEV₁/FVC₁ was taken as 70 per cent. Reversibility of airway obstruction was determined 5 minutes after inhalation of salbutamol.

(g) Radiological investigations :- They included PA and lateral views and bronchograms.

(h) A standard medical history was obtained and thorough physical examination was done.

Results

1. Incidence of ABPA was noted in 18 (3.6%)

cases and probable ABPA in 15 (3.0%) cases. All the 18 cases showed precipitin against aspergillus, particularly aspergillus fumigatus, positive skin tests (Type I and III), aspergillus in sputum on culture and blood and sputum eosinophilia. They fulfilled all the criteria described by Henderson (1968). Of 15 patients of probable ABPA, only 10 (66.6%) showed precipitins against aspergillus, 13 (86.6%) showed positive skin test, 10 (66.6%) showed positive sputum culture, 12 (80.0%) showed blood eosinophilia and only 10 (66.6%) showed sputum eosinophilia. These cases did not fulfill all the criteria of ABPA. The basic pathology in most of the cases was extrinsic asthma and the patients were atopic. One case of pulmonary tuberculosis and one case of chronic bronchitis with emphysema showed typical ABPA.

2. Immunoglobulins were estimated in only 15 cases of ABPA. IgE was raised in all the cases, the mean being 7426±695 Units per ml and the control mean being 191±97 Units per ml. IgA was raised in 8 (53.3%) cases, the mean being 496±34 mg% as compared to control mean (258±48% mg%). TgG was raised in 2 (13.3%) cases with mean 1996±mg% and the control was 965 ±192 mg%.

Discussion

The diagnosis of ABPA was based on the criteria as described by Henderson (1968). All our cases fulfilled the criteria. In this disease there is usually a long history of asthma followed by

the appearance of a pulmonary infiltration which may be associated with fever and sputum plugs and may be expectorated. Safirstein et. al. (1973) described recurrent infiltrations lasting for days or weeks which appear in different parts of the lung mainly in the region of medium sized bronchii where they may be peribronchial or may be due to collapse of a segment or of a lobe or even whole lung. Scadding (1967) described a characteristic bronchiectasis appearing at the sites of infiltration and bronchogram shows normal filling of the bronchi peripheral to the dilation suggesting a localised reaction. McCarthy et al (1971) suggests that the patients of asthma who get repeated attacks of pneumonia should be investigated for aspergillus study. Henderson et. al. (1968) reports that in patients with early onset of asthma, the allergy to aspergillus fumigatus was one of the factors involved and there was an interval of about 10 years before the pulmonary shadows appeared. In patients with late onset asthma, the shadows appear in less than one year.

Pepys (1969) has suggested that atopic subjects become sensitized to aspergillus and dual type of hypersensitivity response develops. Type I (immediate) is mediated by IgE (reaginic) antibody and is responsible for wheal and flare skin reaction, eosinophilia and airway obstruction characterised by wheezing. According to Jorden et. al. (1971) Type III (Arthus) response is mediated by IgG (precipitating) antibody and is responsible for delayed Arthus skin reaction, pulmonary infiltrates and bronchiectasis. All our cases showed raised IgE and estimation of this immunoglobulin in ABPA may constitute a useful diagnostic test. All our cases showed precipitin test positive but IgG was raised only in two cases (13.3%). IgA was raised in 8 (53.3%). The exact significance of raised IgA is not known. It may reflect local production of immunoglobulins in the bronchial tree.

Golbert and Patterson (1971) reported suppression of allergic reaction during acute episodes of ABPA with steroids in adequate dosage. The long term steroid therapy is a safe and effective method of preventing recurrent pulmonary infiltrations due to aspergillus sensitivity and that is early use may prevent irreversible damage. Edge et. al. (1971) found disodium chromoglycate to be effective in some cases.

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PREVALENCE OF TUBERCULOSIS IN CERTAIN POCKETS IN THE CITY OF MADRAS

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Introduction

The advent of efficacious chemotherapy, the extensive practice of domiciliary treatment, the intensive use of B.C.G. and the country wide implementation of National Tuberculosis Control Programme besides an upward trend in the per capita income, resulting from the successive national five year plans, improvement in living conditions, and life expectancy, would be expected to have had their beneficial impact on the epidemiological trend of tuberculosis in our country. Against this one has to weigh the effect of the continued rise in our population, it having already crossed the 600 million mark, with consequential congestion, poor housing conditions with inevitable insanitation etc.

In view of the above observations an assessment of the prevalence of tuberculosis in certain areas and different income groups was undertaken as a pilot study in the year 1974-75 by the Government Chest Institute, Madras.

Plan of Action

Three areas in different parts of the city, where B.C.G. vaccination was not done earlier, were selected. One was Mangalapuram and Jagannathapuram contiguously located (Area A) in the south-west Madras. The second area (Area B) was the Railway colony at Perambur in the north west of Madras and the third one was the Navalur colony (Area C) in the central part of Madras.

Duly assessing the population of the areas A and B and their scatter at the rate of two families on an average in every household, the systematic sample was planned as the first family of every fifth house. The family occupying the first room/hall on the left while entering the house was reckoned as the first family. By this procedure the basic aim of maintaining it as a 10% systematic sample has been fulfilled and every family was given an even chance. In area 'C', a thickly populated area where a 25 % systematic sample was chosen, every fourth tenement was selected as a sample unit. In this area the individual hutments were all occupied by single families only.

The samples were classified under different family income groups:

1. Low Income Group (less than Rs, 200/- per month);

2. Low Middle Income Group (between Rs. 201/- and Rs. 500/- per month),
3. High Middle Income Group (between Rs. 501/- and Rs. 1,000/- per month); and
4. High Income Group (Rs. 1,001/- and above per month).

Area "A" did not have any high income group family and Area "C" comprised of only Low Income Group.

Members of the selected families were registered in Family Cards and for every individual member, a proforma was used to record the bio-data and the symptoms, if any, and the results of investigations.

Investigations

Tuberculin test was carried out by the trained BCG Technician for all those upto the age of 20 years with 1 TU of PPD RT 23 during the time of registration itself and the results were read by the same Technician after 48 to 72 hours. 70 mm. photo—and the results were read by the same Technician after 48 to 72 hours. 70 mm. photo-fluorograms were taken with the Mobile Mass Miniature Radiography Unit for all those above 5 years of age. For those who showed suspicious lesions in the 70 mm picture and for those under the age of 5 years large chest X-ray films were taken at the Chest Institute. The 70 mm. photo-fluorograms as well as the large X-rays were read by two Medical Officers independently with an umpire reading by the Director.

Spot and also an overnight collections of sputa for all those who showed suspicious radiological lesions were examined by smear and culture at the Laboratory of Tuberculosis Chemotherapy Centre, Madras.

In area "C" since houses were taken as units and members in each sample house were taken in, the total was 315 as against the anticipated 266.

Among the sample subjects less than 5 years olds constituted 14 % and the total coverage for investigations was 90 %.

Among the persons studied from the different areas, especially in the Low and Low Middle

Table I
Sample Data

S.No.	Details	Areas			Total
		A	L	C	
1.	Size of population	5000	7500	1063	13563
2.	Proposed sample size	500	750	266	1516
3.	Size of sample studied	424	624	315	1363
4.	No. of children (less than 5 yrs. old)	53	80	56	189
5.	No. over 5 yrs. of age	371	544	259	1174
6.	No. X-rayed	345	485	182	1012
7.	Coverage (6 as % of 51	92.99%	89.15%	70.27%	86.20%

Table II

Distribution according to age, sex and economic status

Age Grade	Sex	Economic Status				Total
		Low Middle	Low Middle	High	High	
0—4	M	47	35	6	—	88
	F	47	42	1	—	90
5-14	M	74	103	16	13	206
	F	92	75	16	12	195
15—24	M	47	53	13	11	124
	F	46	57	11	10	124
25—34	M	32	44	4	4	84
	F	46	47	11	9	113
35—44	M	30	37	9	13	89
	F	30	35	7	8	80
45—54	M	14	18	7	9	48
	F	21	11	7	15	54
55 +	M	15	17	3	6	41
	F	7	9	3	8	27
Total	M	259	307	58	56	680
	F	289	276	58	62	683

Grand Total : 1363

Income groups, the largest number was between 5 and 14 years. Both the sexes are evenly distributed not only in the age grouping but also in the different economic groups.

The prevalence of infection (induration of 10 mm and more as the index of infection) in the

age-group 0-5 years was 11.45% in the 5-14 years age group it was 23.89 % and in the 0-20 years age group it was 25.51%.

The proportion of children in the age group 5-14 years infected is significantly high, nearly twice as much as in the 0-5 years age group.

Table III

Tuberculin Reaction

Age Group	Induration in mm										Total
	0—2	2—4	4—6	6—8	8—10	10—12	12—14	14—16	16—18	18+	
0—5	97	39	7	4	—	7	2	4	1	5	166
5—10	75	44	13	3	3	4	3	4	4	20	173
10—15	40	42	9	6	4	7	5	2	9	17	141
15—20	23	14	5	5	5	15	12	8	6	15	108
Total	235	139	34	18	12	33	22	18	20	57	588

Table IV

Tuberculin Reaction distributed according to Areas and Income groups

Income Groups	Tuberculin Reaction	Areas			Total
		A	B	C	
Low	Positive	23	5	66	94
	Negative	65	18	90	173
Low Middle	Positive	28	16		44
	Negative	91	119		210
High Middle	Positive	6	1		7
	Negative	13	14		27
High	Positive		5		5
	Negative		28		28
Total	Positive	57	27	66	150
	Negative	169	179	90	438

The prevalence of infection was found to be highest (42.2%) in the low income group of Area "C" and lowest in the high middle income group of area "B" (6.7%), a statistically significant difference.

The prevalence rate of disease among children in the age group 5-14 years was based on active pulmonary tuberculosis including Hilar Adenopathy with or without parenchymatous lesion.

Table V

Hilar Adenopathy in the age group 5-14 years

Area	Sex	Income groups									
		Low		Low Middle		High Middle		High		X	P
		X	P	X	P	X	P	X	P		
A	M	21	2	36	1	7	—	—	—	64	3
	F	27	—	22	3	6	1	—	—	55	4
B	M	13	—	67	1	1	—	8	—	97	1
	F	13	—	53	3	10	—	7	—	83	3
C	M	30	1	—	—	—	—	—	—	30	1
	F	36	2	—	—	—	—	—	—	36	2

Notations : X: No. of persons X-rayed; P: No. positive.

Table VI

Radiological Assessment

Area	Income Group	Sex	Age Group										Total	
			15—24		25—34		35—44		45—54		55 +		X	P
			X	P	X	P	X	P	X	P	X	P		
"A"	Low	M	8	—	8	—	5	—	4	—	2	1	27	1
		F	17	—	12	—	8	—	6	—	3	—	46	—
	Low Middle	M	25	1	19	—	9	—	6	—	11	1	70	2
		F	20	1	9	—	13	1	8	1	5	—	55	3
	High Middle	M	9	—	1	—	1	—	3	—	1	—	15	—
		F	5	—	3	—	3	—	1	—	1	—	13	—
"B"	Low	M	9	—	1	—	3	—	2	—	3	1	18	1
		F	3	—	7	—	4	—	1	—	1	—	16	—
	Low Middle	M	21	1	23	—	25	1	12	1	4	—	85	3
		F	30	—	36	—	20	—	3	—	4	1	93	1
	High Middle	M	4	—	3	—	8	—	4	—	1	—	20	—
		F	6	—	6	—	4	—	6	—	2	—	24	—
High	M	2	—	3	—	7	—	5	—	3	—	20	—	
	F	6	—	6	—	5	—	8	—	4	—	29	—	
"C"	Low	M	11	—	15	—	14	1	2	—	7	2	50	3
		F	18	—	22	1	14	—	10	1	2	—	66	2

Notations : X: No. of persons X-rayed; P: No. of Radiologically active cases detected.

L: Low Income group; L.M.: Low Middle Income group;

H. M.: High Middle Income Group; and H: High Income group

M: Males; F: Females.

No significant difference is observed in the Prevalence rates of Hilar Adenopathy in the three areas, in the different income groups and in the two sexes. The prevalence rate of Hilar Adenopathy was 5.9%, 4.6%, and 2.2% in areas A, B and C respectively.

Out of 189 children less than 5 years of age registered, for 166 (84%) Tuberculin test was done and among these 19 (11.4%) were found positive reactors. They were further examined clinically and radiologically and none showed evidence of disease.

For purposes of radiological assessment as active cases of Pulmonary Tuberculosis both "probably tuberculous possibly active" and "probably tuberculous and probably active" (C & D classification of the National Sample Survey 1955-58) were taken together irrespective of the extent of the lesions and presence of cavities.

The prevalence rates were 3.10% in Area "A", 1.64% in Area "B" and 4.31% in Area "C". Taking the individual areas as well as the areas together there is no statistically significant difference in the prevalence rates between the two sexes.

The prevalence among the High and High middle income groups in the sample is "NIL". However, in the low and low middle income groups the prevalence rates were 3.59% and 2.97%, a statistically significant difference, which is also true of the individual areas. Comparison of the prevalence rates between the low and high middle income groups of all the areas shows a nearly significant difference.

Among the low and low middle income groups the prevalence rate found in the age group 5-14 years was 4% (including cases of Hilar Adenopathy) and in the 55+ age group it was 16.67%. The prevalence of active radiological cases of tuberculosis has an increasing trend with the rise in age.

The difference in the proportion of cases among the two sexes is not significant statistically not only in individual areas but also in all the areas taken together.

On Bacteriological examination, both by smear and culture of spot and overnight sputa, while the smears were all negative, five were positive by culture. This contributed for a proportion of 31.3% of the radiologically positive cases and 0.8% among the over 15 year olds. The proportion of infectious cases among the low income group was 1.8% and among the low middle income group it was .4%.

Discussion

In the current sample study, the prevalence of infection, in the less than 20 year olds showing an induration of 10 mm. and more on Tuberculin testing, for the age groups 0-4 yrs., 5-9 yrs. and 10-19 yrs. were found to be 11.4%, 20.23% and 38.5%. At Tumkur the proportions were derived as 2.7%, 13.7% and 32.6% for the three age groups (Raj Narain et al. 1961). The prevalence of infection in the age group of 10-14 yrs. was assessed as 28% in the current study. In the age groups of 0-4 yrs., 5-9 yrs. and 10-14 yrs. the proportions derived in Bangalore District were 1.6%, 7.2% and 14.1% (Raj Narain 1972).

Taking 14 mm. and above of induration size as the index of infection, the prevalence rates in the 0-9 yrs. and 10-19 yrs. age groups have been assessed as 11.5% and 22.9% respectively. For similar age segments the prevalence rates were reported as 6.8% and upto 18% respectively at Madanapalle (Frimodt J. Moller, 1960). The prevalence of infection in the age group 10-19 years in both sexes ranged from 13% and 46% in Kadambattur, Tamil Nadu (Bagga et al. 1974). The differences observed in the above rates of prevalence of infection in the different studies may be attributable to the fact that the other studies were in rural areas whereas this study has been in a metropolitan city with high density of population.

However, the increasing trend of infection with age is perceptible in the current and also in the other studies reported (Raj Narain 1963, 1972 and Bagga et al. 1974).

The overall prevalence of disease as evaluated in the present study was 26 per 1000 and among males it was 33 and among females 21 per 1000 in the over 15 year olds, the difference not being statistically significant. There was a steady rise with age. National Sample Survey (1958) showed that the prevalence rate of active Tuberculosis ranged from 13 to 25 per 1000 population. At Tumkur the prevalence rate of radiologically active disease was reported as 19 per 1000, respective figures for males and females being 25 and 12 per 1000. From New Delhi, the prevalence was reported as 16.8 for males and 17.5 for females per 1000 (Pamra et al. 1973). In Kadambattur the prevalence among the over 10 year olds was reported as 21 for males and 11 for females per 1000 (Bagga et al. 1974).

In the current study the prevalence rate was highest in Area 'C' (4.4%) and in the low income group (3.59%). Similar findings were reported by the Indian Council of Medical Research (1959), Pamra and Mathur (1968).

The present report which is more in the nature of a Pilot Sample Survey in certain pockets in an urban situation, though has its own limitations, does indicate the need for a wider evaluation. However, certain salient findings seem to warrant attention.

Summary

A study to assess the prevalence of Tuberculosis in certain pockets of the City of Madras was undertaken in 1974-75. The prevalence of infection among the less than 20 year olds was found to be 25.51 %, between 5 and 14 years of age it was 23.89 % and in the less than 5 years age group it was 11.45%. The prevalence of radiologically active disease was 2.08 % taking all the three areas together. It is highest in Area 'C' (4.40%) and lowest in Area 'B' (1.43%). Inactive cases constituted 0.2%. The proportion of bacillary cases was found to be 0.8% among the over 15 year olds.

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Summaries of Papers Presented at the Thirtysecond National Conference on Tuberculosis and Chest Diseases

GUEST LECTURE ON 'NATIONAL TB CONTROL PROGRAMME, INCLUDING THE ROLE OF TB ASSOCIATIONS AND OTHER VOLUNTARY ORGANISATIONS IN THE WORKING OF THE PROGRAMME'

C.W.L. JEANES

(Being published in full)

TUBERCULOSIS TRENDS IN AN URBAN COMMUNITY

NEW DELHI TB CENTRE

(Paper being published in full)

INCIDENCE OF SPUTUM POSITIVE TUBERCULOSIS IN DIFFERENT EPIDEMIOLOGICAL GROUPS ON FIVE YEAR FOLLOW UP OF A RURAL POPULATION IN SOUTH INDIA

G.D. GOTHI *et al.*

(Paper being published in full)

PREVALENCE OF PULMONARY TUBERCULOSIS IN URBAN POPULATION OF AGRA CITY

T.B. CENTRE, AGRA

A population of about 19,000 living in Tajganj ward of Agra city was surveyed. Tuberculin test results were available for 66.5%. X-ray coverage was 71.2%. Sputum examination could be carried out in 93.3 % of the eligibles. The prevalence of tuberculous infection in this population was 55.9%; prevalence of bacillary disease 0.89%. Prevalence of suspected cases of pulmonary tuberculosis (on radiological evidence) was 3.3% by one reader and 2.9% by the second reader.

STUDY OF PREVALENCE OF PULMONARY TB AMONG CHHENCHU TRIBE

T. RAMA RAO

Two thousand three hundred and eleven out of a population of 3,000 of Chhenchu Tribe in Sirsailam district of Andhra Pradesh were covered in a symptomatic survey. 83 persons of more than 12 years in age had symptoms referred to chest. Of these 83 persons, sputum was found positive in 8 persons.

(Special lecture by Dr. K.S. Sanjivi being published in full)

NATIONAL TUBERCULOSIS PROGRAMME (I) CASE-FINDING AND TREATMENT ORGANISATION

S.P. PAMRA

With the help of figures taken from the quarterly reports of the DGHS, Dr. Pamra showed that case-finding especially in rural areas is considerably deficient. Peripheral institutions seem to refer suspects to the DTC for diagnosis rather than examining the sputum on the spot. According to him tuberculosis, seems to be nobody's responsibility instead of being the responsibility of the entire infra and supra-structure of the district as was visualized when the national programme was formulated. Similarly, retrieval of defaulters and follow-up of treatment cases was also very deficient. Although the programme was a felt-need oriented one, yet many patients with symptoms did not

attend the nearest health facility. In order to improve coverage both in respect of diagnosis and treatment. Dr. Pamra advocated a change in the strategy whereby one or two para-medical workers in every PHI may be assigned specifically the responsibility of all tuberculosis work.

(II) PARTICIPATION OF VOLUNTARY ORGANISATION

B.M. CARIAPPA

Mr. Cariappa traced the history of voluntary effort in our country and indicated the spheres of activity of the voluntary organisations at present viz. educating people and health personnel of all categories, assistance where needed and providing voluntary workers to check drug default and promote case-finding in rural areas. He stressed the fact that voluntary organisations and Governmental agencies are comrades-in-arms in the fight against tuberculosis, each supplementing the efforts of the other. The contribution of the Tuberculosis Association of India towards the assessment of the national control programme through Indian Council of Medical Research and short course chemotherapy study were also highlighted.

(III) BCG VACCINATION STRATEGY

KUL BHUSHAN

Dr. Kul Bhushan traced the changes in the strategy of BCG vaccination since 1951, the reasons which prompted these changes and also outlined the future strategy for BCG vaccination. Hereafter the duty of the existing BCG technician will not only be to vaccinate children but also to train multi-purpose health workers (MPW) in the technique of vaccination. One BCG technician will be responsible for training MPWs of 2 or 3 primary centres in about a year and a half. One male and one female MPW will be trained simultaneously for two weeks covering the theoretical as well as practical aspects. Each set of one male and one female MPW will go on registering new births in their area and vaccinate, in rotation for one month in a year. This would limit the requirements of BCG kits to two per PHI.

A COMPARISON OF ALTERNATIVE PROCEDURES FOR THE PREVENTION AND RETRIEVAL OF DRUG DEFAULT IN THE DOMICILIARY TREATMENT OF PULMONARY TUBERCULOSIS

NEW DELHI TB CENTRE

In order to study the contribution of home visiting towards regularity in drug taking by patients in Delhi, newly diagnosed patients were randomly allocated to 3 groups. In one group the health visitors visited the patient 1 to 3 days before; the due date of drug collection, in the second group the visit was paid only to the defaulting patients within 3 days of default. If the default still continued in these two groups, 2 more visits were paid during the next two weeks. In the third or the control group there was no home visiting for drug default. The patients were motivated at each visit to the clinic. Taking 80% regularity as a line of demarcation, results in the first group were significantly better than in the other two groups in the early stages of treatment. However, the advantage was somewhat lost during the late stages of treatment. This advantage was at the cost of 15.5 home visits per patient in the first group against only 4.2 in the second group in one year. The result of writing letter instead of personal visit are also being investigated and interim results tend to show that letter writing may be as effective as home visiting in an urban area.

TIMINGS OF HOME VISITS AND THEIR IMPACT ON DRUG DEFAULT

T.B. CENTER, AGRA

122 pulmonary tuberculosis patients in the city of Agra were divided into 3 groups. In one group of 51 patients a visit was paid 1 to 3 days before the due date. In the second group of 48 patients, visit was paid 1 to 3 days after the default and in the third group of 25 patients no home visiting was permitted. 85% of the patients in group 1, 71% in group 2 and 64% in group 3 had a regularity of 80%. The authors conclude that home visiting does not seem to contribute significantly to regularity.

A SOCIOLOGICAL STUDY ON REASONS FOR INITIAL DEFAULT

K.V. KRISHNASWAMI, *et al.*

Out of 7,039 symptomatics, 732 were initial defaulters. Of these 432 reported during the "visit awaited" period and for the remaining defaulter action was taken. The main reasons for default were temporary absence from the city because of family reasons, *e.g.* marriage, funeral, sickness; reasons pertaining to job and ill-health. Difficulty in attending the clinic was not a significant reason.

PSYCHOMETRY OF DRUGS DEFAULTERS

V.K. ARORA and S.M. AGRAWAL

Fifty confirmed cases of pulmonary tuberculosis, 10 to 70 years in age attending Bokaro Chest Clinic were divided into two equal groups, the criterion of division being 80% regularity in drug taking. Questionnaire based on assessment of personality factor was administered to each patient and the results were analysed by a psychiatrist. Regularity in drug taking does not seem to vary with age, sex, extent and severity of disease and socio-economic condition. Patients with an outgoing personality, venturesome, tough-minded and shrewd tend to be irregular more often than weak-minded, sensitive, dependent and worrying type of persons.

ROLE OF PSYCHOSOMATIC FACTORS IN PULMONARY TUBERCULOSIS

C.C. MUKHOPADHYA and BAPUJI RAO

Life history of 30 bacteriologically proved cases of pulmonary tuberculosis was studied in depth with psychosomatic approach and special attention to life situations preceding the onset of disease. Thirty healthy controls were also studied. Adverse life situations conducive to mental trauma operated significantly more in the patients than in the control group. Break in family link, deprivation of love and affection were more often found in tuberculous cases than in controls. Dependency, depression, sexual neurosis, guilt reaction, anxiety etc. were more often associated with disease.

STUDY OF LOST PATIENTS IN DISTRICT TUBERCULOSIS PROGRAMME IN POONA DISTRICT

H.V. BAHULKAR *et al.*

A study was undertaken to know the fate of 532 'lost' patients of Pune D.T.C. from 1966 to 1973. 34.8 % were dead at the time of study in 1976. 24.8 % could not be traced because of wrong address. 25% of the patients took treatment elsewhere and the remaining 16% were not really 'lost' cases (they were wrongly counted as 'lost' because of incomplete entries on the treatment cards). The authors conclude that home visiting in big cities is not practicable and efforts to take correct address and initial motivation are more rewarding.

PSYCHOLOGICAL STUDY OF HOSPITALISED TB PATIENTS

K.C. MATHUR *et al.*

124 male patients were interviewed by a psychiatrist and were also given an independent personality test by a clinical psychologist. 27% of the patients gave evidence of depression; 5% each had schizophrenia and anxiety neurosis. About 7% had other minor disturbances and 56% showed no evidence of psychological disorder. 70% of the patients first consulted general practitioners and 30% consulted chest specialists to begin with.

PANEL DISCUSSION ON 'ROLE OF SURGERY IN THE MANAGEMENT OF RESPIRATORY DISEASES'

H.B. DINGLEY (moderator), N. BALSALAM, T. THOMAS, G.M. MASCHARENHAS
M.M. SINGH and M.S. AGNIHOTRI

Surgery has a definite role in the management of pulmonary tuberculosis. If the cavity does not close and sputum remains positive after 6 to 9 months of adequate chemotherapy, it is advisable

to review the case for surgical intervention. Diabetes is not a contra-indication for surgery if it is under control. If the patient is pregnant, surgery may be withheld, if possible, but it could be carried out in the first trimester of pregnancy, if absolutely necessary. Age, except the extreme viz. above 70 years, is also not a contra-indication.

Resective surgery is the treatment of choice except in those where there is some disease in the contra-lateral lung also, in which case thoracoplasty is preferred. Surgical treatment has a more definite role in the management of non-tuberculous respiratory disease.

EFFECTIVENESS OF CASE-FINDING AND TREATMENT IN N.T.P.—A SIMPLE MODEL

V. SIVARAMAN

A simple model has been described for calculating the reduction in prevalence of tuberculosis in situations where the national tuberculosis programme is operating. The author reports 30.7% reduction in prevalence rate but the calculation is based only on the inflows from sputum positive and sputum negative active case-groups only. Inflow from other categories *e.g.* X-ray negatives, inactives and outflow due to death etc. are not taken into consideration. The use of the model for resource allocation and decision-making is also discussed.

FATE OF INACTIVE PULMONARY TUBERCULAR LESIONS (A 10 YEAR FOLLOW UP IN AN URBAN AREA)

A.K. SIL And P.K. SEN

502 inactive cases were followed for 10 years from 1964 to 1974 from an urban health centre in Calcutta. Only 206 cases completed 10 years follow up. Most of the cases were lost because of migration. Periodic check-up was carried out by radiological examination and direct smear examination of 3 consecutive 24 hours collection of sputum specimens. No cultures were put up. 19 % of the patients had a reactivation, mostly in the 2nd to the 8th year. There was no reactivation in the age group 0 to 14 years. The authors conclude that it is better to observe the inactive cases rather than to treat them for the sake of preventing 19% re-activations.

MEDIAN AGE AT ONSET OF ASTHMA AND ALLERGIC RHINITIS

P. RAVINDRAN *et al.*

(Paper not received)

GUEST LECTURE ON 'RIFAMPICIN REVISITED AFTER TEN YEARS

G. DADDI

(Text not received)

A SHORT-TERM CHEMOTHERAPY TRIAL IN PULMONARY TUBERCULOSIS

RESEARCH COMMITTEE OF THE TUBERCULOSIS ASSOCIATION OF INDIA

The paper incorporates the third interim report on the Short-Term Chemotherapy Trial being carried out at 3 institutions in Delhi under a joint protocol. (The three drug regimens under study are (A) INH, SM, PZA, and Ethambutol (20 weeks), (B) INH, SM, Rif. & Ethambutol (20 weeks) and (C) INH, SM, (8 weeks) followed by INH & Thiacetazone (72 weeks). Bacteriological results at 20 weeks were nearly the same in all three regimens (conversion rates: 92% to 98%) but during subsequent periods reversions were much higher in Group A than in the other two (52 weeks: A: 22%, B: 9%, C: 8%, 80 weeks: A: 29%, B: 14%, C: 9%). Radiologically too, results at 80 weeks were superior in groups B & C as compared to group A.

MADRAS STUDY OF SHORT-TERM CHEMOTHERAPY

Part I: Clinical Aspects

O. NAZARETH

411 patients were randomly allocated to 3 regimens. In all the three regimens there was an initial intensive daily phase of 2 months and this was followed by a twice weekly intermittent phase of 3 or 5 months. In the first regimen, patients were given Rifampicin, Streptomycin, INH and PZA in the initial phase and Rifampicin was excluded in the twice weekly phase of 3 months. The second regimen was similar to the first in the daily phase but the twice weekly phase was longer by 2 months. Rifampicin was excluded altogether from the third regimen. Half the patients in each regimen, selected at random were prescribed prednisolone as an adjuvant. All the three regimens were 100% effective. Streptomycin had to be discontinued because of adverse reaction in 4%, INH in 1 % and PZA in 1 %. Jaundice was similar in Rifampicin and non-Rifampicin regimens. Relapse occurred in 6 % in regimen 1 and 3 % in regimen 3. Rifampicin regimen for 7 months was most effective and non-Rifampicin regimen was only marginally inferior. The administration of Prednisolone did not affect the speed of sputum conversion in the Rifampicin regimen but it appears to have slightly enhanced the speed of sputum conversion in non-Rifampicin regimen.

Part II: Pharmacological Aspects

C. ALEXANDER

Patients behaved as homogenous group in respect of plasma levels of Rifampicin. The plasma Rifampicin levels are not influenced by the rate of inactivation of INH. There appears to be interaction between prednisolone and INH in slow inactivators of INH, and prednisolone and Rifampicin, but the consequent reduction in blood levels was small and did not affect the results of chemotherapy.

Part III: Bacteriological Aspects

S. SUBBAMMAL

The three short course regimens were highly effective in patients infected with drug-sensitive bacilli. Failure of chemotherapy occurred only in patients with drug-resistant bacilli. The presence of more than 0.1 % of bacterial population resistant to both streptomycin and INH carried a poor prognosis with the 3-drug regimen. The prognosis was better in patients treated with 4-drug regimen.

SHORT-TERM CHEMOTHERAPY

M.L. MEHROTRA

381 patients were randomly allocated to 2 regimens. In the first regimen patients were given streptomycin, INH and thiacetazone daily for 4 weeks in the hospital and streptomycin was omitted for the subsequent 76 weeks of domiciliary treatment. In the second group streptomycin, INH, PZA and Ethambutol were given daily for first 4 weeks in the hospital. INH and Thiacetazone alone were given on a domiciliary basis for the next 32 weeks and lastly streptomycin, INH, PZA and Ethambutol were again given for 2 weeks in the hospital, to be followed by placebo during the next 40 weeks. No relapses were seen in group I but in group 2 two relapses occurred in first 6 months out of 64 patients and 2 more relapses in the subsequent 6 months out of 43 patients who had completed the study. Three relapses occurred in the first year and one the second year. In 3 the bacilli were sensitive at the time of relapse.

SHORT-TERM CHEMOTHERAPY

A.G. PATEL

52 previously untreated direct smear sputum positive male patients between 20 and 55 years in age were treated with streptomycin, Rifampicin and INH daily for first 4 weeks, then once weekly for the next 9 weeks and with streptomycin and INH once a week for the next 2 months without Rifampicin. There were no controls. All the 43 regular patients were converted by culture. 32 out of 43 patients have been followed for 3 to 8 months and only one had a bacteriological relapse. One more patient had a radiological relapse without positive sputum. Both patients relapsed in the first

3 months after completion of treatment. One patient had jaundice. There was no case of Flu. Total cost of drugs was 350 per patient.

IS ONE YEAR'S TREATMENT ENOUGH?

NEW DELHI TB CENTRE

343 patients who were bacteriologically converted at the end of one year's treatment were randomly allocated to 3 groups. In one group treatment during the second year was with placebo; in the second with INH alone and in the third group, two drugs were continued. Radiological stability was attained and maintained for 6 months and thereafter INH alone was given to complete a total of 24 months treatment. All patients were previously untreated and bacteriologically positive at the start of treatment. The placebo group did not fare any worse than the other two groups where the drugs were continued beyond 12 months. The overall rate of worsening was about 10%. The factors conducive to subsequent worsening were found to be extensive residual lesion or residual cavitation at the end of treatment and slow conversion of sputum. Of those who were not converted after one year's chemotherapy, only 1/3rd could be converted subsequently with standard drugs alone.

ISOVIN THERAPY IN PULMONARY TUBERCULOSIS

S. NAG *et al.*

60 previously untreated sputum positive patients of pulmonary tuberculosis were put on streptomycin, PAS and Isovin. The dose of Isovin was 1 gram per day in half the patients and 2 gms per day in the remaining half. A control group of 30 patients was given streptomycin, PAS and INH. All patients were followed up for one and a half years. The results were equally satisfactory in both groups. Patients getting Isovin 2 grams daily had somewhat rapid conversion. Except for 3 patients developing mild itching, Isovin did not give any appreciable adverse effects. Isovin may be more useful in bi-weekly regimen because higher doses are equally well tolerated.

WANDER-TAI ORATION ON 'NATURAL HISTORY OF TUBERCULOSIS'

G.D. GOTHI

(Being published as a supplement)

GUEST LECTURE ON 'RECENT TRENDS ON TUBERCULOSIS THERAPY MYCOBACTERIOSIS TREATMENT BY RIFAMPICIN'

B. MARIANI

(Text not received)

MANAGEMENT OF TUBERCULOUS EMPYEMA AND PYOPNEUMOTHORAX

R.P. CHORDIA *et al.*

50 patients of tuberculous empyema and pneumothorax admitted in Sassoon General Hospital, Pune, treated in 1974-75 are reported. All patients were treated initially by aspiration and inter-costal tube drainage under water seal. Inter costal drainage with rib resection and radical surgery e.g. pleural pneumonectomy was carried out in failures. Nine patients responded to repeated aspirations. Twentyfive had complete lung expansion after inter-costal drainage. Seven of the remaining 16 were subjected to radical surgery while the other 7 either refused surgery or were unsuitable. Irregular treatment of the original parenchymal lesion, inadequate drainage of pus, thick pleura, persistence of broncho-pleural fistula, secondary infection of pleural cavity and tuberculous lesion of the ipsi and contra-lateral lung are responsible for bad prognosis as well as failure of conservative treatment.

INCIDENCE OF BRONCHIECTASIS IN TREATED CASES OF RESPIRATORY TUBERCULOSIS

HARISH KUMAR

48 successfully treated patients of pulmonary tuberculosis who continued to attend the New Delhi TB Centre because of persistent cough, expectoration, and in some cases, haemoptysis inspite

of arrested lung lesion were investigated. Length of follow up after completing anti-tuberculous treatment was 1 to 17 years. One patient had chronic bronchitis/bronchiectasis when original pulmonary lesion was detected. Bronchography revealed bronchiectasis with bronchial distortion in 33 and bronchial distortion without dilatation in 12. The bronchogram was normal in the remaining 3. Bronchiectasis was seen more often in extensive residual lesion and/or residual thin walled cavity though pre-treatment extent of cavitary status did not seem to influence the subsequent occurrence of bronchiectasis. Patients complaining of haemoptysis showed bronchiectasis more often. Almost complete radiological clearing of a lesion does not exclude the presence of fibrosis at the site of original lesion.

DIABETES IN TUBERCULOSIS PATIENTS

A.B. ROYCHOUHDURY and P.K. SEN

Among 960 tuberculosis patients admitted in K.S. Ray Hospital, Calcutta in 1975-76, 20.7% had diabetes and 6.55% potential diabetes. A blood sugar level above 141 mg% was taken as evidence of diabetes and 131 to 140 as potential diabetes. The most aged diabetic was 82 years old and the youngest 4 years old. Out of 192 diabetics, only 93 had sugar in the urine. On the other hand, out of 762 who were labelled as non-diabetic according to blood sugar criterion, 38 had sugar in the urine. These 38 cases were probably cases of renal glycosuria.

DIABETIC PULMONARY TUBERCULOSIS -- A RADIOLOGICAL ENTITY

O.P. MITAL, S.K. KATIYAR and S.K. SINGHAL

Radiographic characteristics of 50 sputum positive cases of pulmonary tuberculosis with diabetes were studied. The lesion was fluffy and exudative in 92 %. The opacity was continuous with the hilum in 94 %. 28 % showed cavity with a fluid level. Disease in the lower lung field was seen only in 10%. 72 % had cavitary disease, nearly 1/3rd of which had multiple cavities. The size of the cavity was more than 4 cm in 25 cases. Most of the cases were above the age of 40 years.

HYPERSENSITIVITY FOR PNEUMONITIS

K.L. SOBTI *et al.*

(Paper being published in full)

TUBERCULOSIS IN INDUSTRY

P.A. DESHMUKH and T. SHAW

New cases of pulmonary tuberculosis diagnosed between 1970 and 1976 out of about 37,000 industrial workers (passive case-finding) in Jamshedpur have been reviewed, year wise. 53% of the cases were sputum positive; 22 to 36 % were far advanced and 56 % completed one year's treatment in 1970 as against 85 % in 1976. The overall rate of fresh disease has remained more or less unchanged at 4 per 1,000. However, it was significantly higher than the overall rate in the case of those working in refractories with highly siliceous atmosphere.

PREVALENCE OF PULMONARY TUBERCULOSIS AMONG INDUSTRIAL WORKERS

K.V. KRISHNASWAMI, M. ABDUL RAHIM and R. PARTHASARATHY

Nearly 4,000 persons from 7 different industries were examined. The prevalence of disease both bacillary and abacillary was on the whole more in industrial workers. No correlation however was found between a particular type of industry and higher prevalence. Factors like age, over-crowded tenements, economic status etc. also influence the prevalence in addition to working in an industry.

TUBERCULOSIS IN INDUSTRY

C. SRINIVASA RAO

5591 workers in mica mines, silk and paper mills were examined. 352 out of these were found to be tuberculous. Sputum was positive in 53 only. 83 persons in mica mines showed evidence of silicosis. 6 persons showed evidence of silico-tuberculosis. The prevalence of disease was more amongst underground workers.

**TUBERCULOSIS IN WORKERS ENGAGED IN PHOSPHOROUS INDUSTRY—
AN ANALYSIS BASED ON AN M.M.R. STUDY**

A.L. ANAND

874 workers in phosphorous industry were x-rayed. Fifteen cases of tuberculosis were found amongst 846 males and none in the 28 females. Sputum was positive in 2 out of 15 only.

TUBERCULOSIS IN INDUSTRY

A. CHAKRAPANI RAO

Nearly 1,000 workers in 3 Jute mills were examined. 3.4% were found suffering from active pulmonary tuberculosis. Majority of them were 21 to 50 years old. The amount of disease was somewhat more in spinning and batching and preparing sections. 36 % of the patients were sputum positive. Most of the tuberculous persons had been working for more than 5 years.

**RELATIONSHIP BETWEEN DELAYED HYPERSENSITIVITY AND CELL MEDIATED
IMMUNITY IN PULMONARY TUBERCULOSIS: A CLINICAL EXPERIMENT**

M.S. AGNIHOTRI, U.C. CHATURVEDI and S.K. PANDEY

Both tuberculin test and DNCB skin sensitization tests depend on skin reactivity and are mediated by T lymphocytes. There are different sub-types of T cells which initiate one or the other characteristic of CMI and delayed hypersensitivity. Skin related tests were carried out to assess DH and CMI and showed a direct association between the two in pulmonary tuberculosis.

A QUALITATIVE TEST FOR DETERMINATION OF ACETYLATOR PHENOTYPE

M. KANNAPIRAN

Isoniazid and sulphadimidine are acetylated in the liver by similar enzymatic processes and the rate of acetylation of both is parallel. A qualitative test using sulphadimidine, therefore offers a simple, convenient and efficient method for pheno-typing isoniazid acetylators, capable of application even under field conditions.

ISONIAZID INACTIVATION IN INFANTS AND CHILDREN IN INDORE REGION

B.C. CHAPPARWAL *et al.*

(Paper not received)

LABORATORY STUDIES IN TUBERCULOSIS OF THE SPINE

TB CHEMOTHERAPY CENTRE

180 patients with clinical and radiological evidence of tuberculosis of the spine were studied from 1975 to 1977. 1/3rd of the patients were 2 to 15 years old. Bacteriological confirmation of the diagnosis was available in 70 % and histopathological confirmation in 88 %. Potent anti-tuberculous drugs given before surgery appear to affect the bacteriological diagnosis significantly. Combination of L.J. medium, L.J. with sodium pyruvate and Kirschner's medium yielded the maximum number of positive cultures.

TUBERCULIN & B.C.G. TEST

H.B. DINGLEY

The object of the paper is to compare the efficiency of BCG vaccine in comparison to PPD RT 23 for determining tuberculous infection. Of the 512 children suffering from tuberculosis on clinical and radiological evidence, 48.8 % gave a reaction of 10 mm or more to 1 TU PPD RT 23 and 93.1 % gave a reaction of 5 mm or more with BCG. The percentages in bacteriologically confirmed patients were 92% and 100% respectively. An advantage of using BCG for tuberculin test is that a child, if uninfected, simultaneously gets BCG vaccinated as a prophylactic measure.

HIGH PREVALENCE GROUPS WITH PULMONARY TUBERCULOSIS

K.V. KRISHNASWAMI, M. ABDUL RAHIM, N. SETHURAMAN and R. PARTHASARATHY

2098 rikshaw drivers and handcart-pullers, 1535 patients of a mental hospital, 363 economically backward persons and 585 residents of beggar homes were examined. 7.34% in the first group, 10.9% in the second group, 3.31 % in the third group and 7.17% in the last group were found to have active pulmonary tuberculosis. The percentage of sputum positive patients was 1.95% in the first group 1.1 % in the third group and 1.85% in the fourth group. Sputum examination was not carried out in the second group of mental hospital patients.

RECOMMENDATIONS FOR 6TH FIVE-YEAR PLAN

Central set-up

Tuberculosis continues to be the most important public health problem in India. Since the district tuberculosis programme has not still been introduced in all the districts in the country the Tuberculosis Association of India recommends that steps should be taken to introduce the programme in all the districts as expeditiously as possible.

2. In order to facilitate above recommendation and to improve the working of the programme in general, it is recommended that the programme should be a centrally sponsored one,

3. To bring about an effective implementation of the national tuberculosis programme it would be advisable to bring Health on the concurrent list of subjects in the constitution.

4. The Tuberculosis Adviser to the Government of India should be re-designated as Director of the national tuberculosis programme with the status of Deputy Director-General.

5. The Tuberculosis Association of India strongly recommends that the second national sample survey should be undertaken as early as possible. It is essential to know whether the epidemiological status of tuberculosis has changed in any way since the last survey carried out in 1955-58.

6. Free supply of drugs to all tuberculosis patients in the country being the responsibility of the state, adequate funds should be provided for anti-tuberculous drugs. Steps should be taken to prevent shortages of standard drugs viz. streptomycin, INH. and thiacetazone. Some provision should also be made for the supply of reserve drugs. The manufacture of anti-tuberculous drugs should be encouraged in the country with a view to bring down the prices of some of the costly reserve drugs substantially.

Regional set-up

7. Three more regional centres should be started so that along with other two already existing, the five regional centres would be able to supervise the development of the national programme in the entire country. Sufficient funds should be provided for the regional centres to enable the staff to visit the district centres and the peripheral institutions frequently for improving their functioning.

State set-up

8. Tuberculosis control officers in the states should be of the rank of Deputy Director/Joint Director of Health Services. They should have requisite post-graduate qualification in tuberculosis and should have worked as district tuberculosis officers for a minimum period of 5 years.

9. The tuberculosis problem in large metropolitan cities is different from that of the district headquarters' towns. The existing pattern of one DTC per district therefore will not suffice for those districts which include a metropolitan city of population over 5 lakhs. The Association recommends that these metropolitan cities should be considered as separate units for purposes of tuberculosis control and the urban tuberculosis control programme already recommended by the Tuberculosis Association of India should be implemented in these big cities.

10. The Indian Council of Medical Research Expert Group's assessment had shown that the bed strength was deficient in some of the states particularly U.P., Orissa, Assam, Haryana and Madhya Pradesh. It is, therefore, recommended that additional beds for treatment of tuberculosis should be provided, preferably in the district hospitals, in these States. If there are any unutilised beds in hospitals/Sanatoria run by voluntary organisations because of financial difficulties, Government should subsidize these beds instead of starting new beds.

District set-up

11. It is recommended that district tuberculosis officer should have the same status, designation and salary grade as the other deputies of the administrative head of the district to enable him to exercise effective control over the peripheral health institutions, since the doctors incharge of the peripheral health institutions belong to the same grade as the district tuberculosis officer at present. It is desirable that the medical officer incharge of the district TB centre should have post-graduate qualification in tuberculosis and chest diseases.

12. The district tuberculosis officers must enlist active cooperation of the Central and State Tuberculosis Associations and their branches, other voluntary organisations such as those of women, ex-servicemen, Rotaries, Lions, etc., community leaders, school teachers and members of youth organisations. These organisations will assist the district tuberculosis programme in

respect of health education, motivation, defaulter action and better utilization of available facilities.

Peripheral set-up

13. The Association is strongly of the view that case-finding especially at the periphery should be stepped up considerably and immediately. The previous strategy having more or less failed so far, it is felt that one or two paramedical personnel in every peripheral institution should be specifically entrusted with the responsibility of collection and examination of sputum and treatment etc. These workers though under the administrative control of the medical officer incharge of the peripheral health institution should be answerable to the district tuberculosis

officer for this work. This arrangement should be followed for at least 20 years for the present.

14. A large number of microscopy centres in every district are essential for stepping up case-finding programmes. The number of microscopy centres in some districts in the country is woefully inadequate. It is recommended that the number of microscopy centres should be considerably enhanced and every primary health centre must have at least one microscope.

15. It is desirable that x-ray facilities should be provided in all towns with a population of about 50,000. Such facilities besides helping case-finding and assessment in tuberculosis will also be useful for medical and surgical work in general.

RESOLUTIONS OF THE 32ND NATIONAL CONFERENCE ON TB AND CHEST DISEASES

(i) It has come to the notice of several workers in the field of tuberculosis that valuable and expensive drugs like Rifampicin, Ethambutol, etc. are being used indiscriminately by general practitioners and even unauthorised individuals. This Conference therefore requests that the Tuberculosis Association of India recommends to the Government to make such drugs available only to institutions dealing with tuberculosis and to specialists.

(ii) The Conference on TB & Chest Diseases workers recommend that it is necessary to conduct a random sample epidemiological survey to obtain more comprehensive data regarding tuberculosis in the country for the following reasons:

(a) Last morbidity survey was conducted only in 1955-56.

(b) It is true that a few isolated surveys have been conducted since the last comprehensive morbidity survey. We consider they do not represent the whole country.

(c) Unless the present epidemiological status of TB is determined, we will not be in a position to adopt effective control schemes.

(d) The Technical Committee of the State TB Associations and of the Tuberculosis Association of India consist of eminent experts in the field of tuberculosis. It is therefore desirable that the Governments concerned may kindly recognise these bodies as Honorary Advisers to the Health Administrators.

(iii) This Conference resolves that in order to give undergraduates and post-graduates in general medicine adequate training in the field of tuberculosis, they should be posted to TB Centres for at least one month. In regard to post-graduate training for the speciality of TB & Chest Diseases, TB training centre should be recognised as one of the main training centres and the Chief of the Centre should be recognised as a Professor or Reader according to his experience and qualifications.

(iv) Realising that the national tuberculosis programme is integrated with the general health services of the country and that work especially in respect of case-finding is not satisfactory at the peripheral health institutions, this Conference requests that the Tuberculosis Association of India may approach the health administrations in all States and Union Territories to see that the staff of the peripheral institutions take active

interest in the working of the National TB Programme with a view to step up its activities.

Drs. P.A. Deshmukh and M.S. Agnihotri were elected as members of the Central Committee of the Tuberculosis Association of India.

Dr. M.M. Singh proposed a vote of thanks.

TECHNICAL COMMITTEE MEETINGS

The Technical Committee of the Tuberculosis Association of India met on the 22nd and on the 27th November.

(A) It accepted the invitation of the Madhya Pradesh State TB Association to hold the 33rd National Conference on Tuberculosis and Chest Diseases in Bhopal in 1978.

(B) The Committee suggested the following subjects for discussion at the next Conference:

1. National TB Control Programme with particular reference to the 6th Five-Year Plan.
2. Chemotherapy.
3. Air Pollution.
4. TB in Children.
5. Community participation in TB programme.
6. Manpower requirements and the training of personnel for TB Control Programme.
7. Lab. support for TB Control Programme.
8. Non-Pulmonary TB
9. Bronchial Asthma.
10. TB of the Central Nervous system including TB Meningitis.

(C) The Committee expressed the unanimous opinion that teaching of tuberculosis for the under-graduates and post-graduates was not given the importance it deserved in the revised recommendations of the Medical Council of India regarding medical education. Since tuberculosis is the biggest health problem in India at present and the aim of the M.B.B.S. Course is to produce basic doctors sufficient importance must be given to this disease entity in the curriculum. The Committee decided that the Medical Council of India be requested once again to incorporate the recommendations made by the Association earlier.

(D) The Committee reviewed the question of tuberculous patients under treatment resuming their normal avocations and finalised the

criteria for this purpose. The following is the text of the criteria :

(I) For patients being taken off work at the time of diagnosis and starting treatment —

The patients should be taken off work only if any of the following conditions are present:

(i) Sputum positive by direct smear (sputum should not be considered negative by direct smear unless atleast 2 specimens, one of which must be an overnight collection are found negative by direct smear.

(ii) Marked toxæmia.

(iii) Patient being physically unable to carry out his normal quota of work.

(B) For allowing the patients to return to duty —

Patients who have been taken off work may be allowed to resume duty when *all* the following conditions have been met :

(i) They have completed at least six weeks of regular chemotherapy with two drugs.

(ii) Two specimens of sputum (at least one of which must be an overnight collection) are negative by direct smear.

(iii) No toxæmia (presence of little cough and sputum are no bars).

(iv) They should be physically capable of carrying out normal duties.

(C) For initial recruitment —

These by and large, depend on the conditions laid down by the employers. As far as Government service is concerned, no person is eligible for recruitment if he has a tuberculous lesion judged as active radiologically or bacteriologically. A lesion will be considered as active if sputum is positive by direct smear or there is a change radiologically in the lesion in two successive skiagrams taken at an interval of at least six weeks. Radiological change may be for better or for worse. A person with an inactive lesion is not debarred from initial recruitment. Therefore, patients with minimal lesion of doubtful activity have to be kept under observation for atleast six weeks to assess the stability of lesion radiologically. Furthermore, for initial recruitment a patient must be sputum negative by direct smear on atleast three consecutive days if there is a lesion in the lungs.

Ind. J. Tub., Vol. XXV, No. 2

Since different criteria are being followed at different places at present leading to confusion and since the above criteria have been adopted unanimously by the Technical Committee which includes the Tuberculosis Adviser to the Government of India, the Technical Committee recommends that the Tuberculosis Association of India may request the Government of India to take steps to ensure that all Medical Officers working in the Central and State Governments, C.G.H.S., E.S.I., Railways, Public Undertakings, Local Bodies, etc. follow these criteria in future.

(E) The Committee laid down certain indices for judging the National TB Control Programme and to provide a machinery for continual assessment of the Programme as follows :

1. Implementation of the Peripheral Health Institution (PHI)

It is expected that during the first year, after sanctioning of the DTP, TB case-finding and treatment in 20 per cent of the implementable PHI should be implemented, in the second year another 20 per cent and the remaining PHI should be covered within next two or three years. Expected implementation could be matched against the actual implementation for assessment/supervision.

2. BCG Vaccination Expectation

(a) Number of technician days: Each technician is expected to put in 24 days in a month.

(b) Each technician on house-to-house BCG vaccination programme is expected to register about 200 persons and give vaccinations to 80 persons. This should be compared with the actual performance of each technician in terms of persons registered per technician day, persons vaccinated per technician per day (output) and coverage of the eligibles. Where the work is also done in schools and among new-borns (maternity homes etc.) their figures should be noted separately for each technician day.

3. Case-finding

(a) At the DTC : Of the total new patients X-rayed at the DTC, 30 per cent are expected to be diagnosed as suffering from pulmonary tuberculosis. This proportion will go up when the X-ray examination, due to scarcity of films, is offered to selected few patients only.

(b) Of the total new out patients attending at the DTC, 5 per cent are expected to be positive for AFB on sputum microscopy.

(c) At peripheral health institution : Of the total new output patient attendance 2-3 per cent should be selected for sputum examination. 10 per cent of the total sputum examination should be positive.

These indices to be compared with actual performances.

4. Treatment

(a) *Proportion of new patients put on treatment* : Expectations 100 per cent but at the DTC where the results are given after two or three days of X-ray examination, about 70 per cent are put on treatment. Whereas at the PHIs, generally the diagnosis is on the basis of examination of the spot specimen of sputa, all the newly diagnosed patients are to be put on treatment on the same day. Therefore, there should not be any initial defaulter.

(b) *Patients completing treatment* : All put on treatment are expected to complete treatment but under the programme condition it is observed that about 40 per cent complete 12-18 months of treatment.

5. Supervision

The information about the supervision of various PHIs is collected from the DTC. Each PHI is expected to be visited once in 3 months by the DTC staff for supervision. In other words, 100 per cent of the PHI should be supervised once in 3 months.

All the above expectations (indices) to be compared with actual performance to note the quantity of work.

(F) The Committee finalised the standard definition of 'default' as follows:

A patient may be termed as a defaulter if he was late by one week in collecting the drugs as far as oral therapy was concerned and if he misses two consecutive turns in intermittent supervised treatment. The patient may be considered regular if he completes 12 monthly collections in 15 months or collects 80 per cent of the drugs that he should have collected during that period.

It was suggested that this may be brought to the notice of all TB workers for their guidance and also to ensure that while presenting papers at our National Conferences in future these standards may be adhered to.

GUIDELINES FOR TUBERCULOSIS PREVALENCE — SURVEY IN SMALL INDUSTRIAL AND OTHER GROUPS

State Tuberculosis Associations planning to carry out tuberculosis prevalence surveys in one or more districts in their state are requested to keep in mind the following guidelines. These guidelines describe only the outlines, and details may be filled in according to local requirements in consultation with a statistician :-

1. Since the survey cannot be carried out without mass miniature radiography equipment, either mobile or static, the first step should be to pick out districts where such facilities are available. Care should also be taken that basic laboratory facilities are also available for carrying out bacteriological examinations relating to TB.

2. Due to paucity of resources it may be desirable to limit the survey to a bigger sample of any one group at a time rather than small samples from a number of them. It would be advisable to select one main industry which is widely prevalent in the area and is fairly labour-intensive. If a choice exists, it would be preferable to select an industry where there is a considerable concentration in a few localities since this would be of great advantage from the operational point of view. Some small scale industries suitable for survey are bidi makers, handloom workers, persons exposed to silica or metal dusts, workers in mines, plantation, etc.

3. The next step should be to find out roughly the number of persons employed by the industry in the district/ If the total number of such workers is in the neighbourhood of 5,000 or less it would be best to include all of them in the survey. If the number is more it would be advisable to select one or more representative localities, with the help of a statistician, to yield about 3,000 to 4,000 persons to be included in the survey.

4. Once the unit to be surveyed has been selected, the next step should be to carry out a census of persons working therein, in a register and to make x-ray cards. For the type of information to be entered in the census register and the x-ray card reference may be made to the chapter on "Epidemiological Techniques" in the Test Book on Tuberculosis published by the Tuberculosis Association of India. Besides identifying details this information should cover the actual nature of work, duration of service, history of previous illness (including sputum examination, if any) anti-TB treatment if any, as well as history of any symptoms present, specially those referable to the chest.

5. In order to secure maximum co-operation

from the workers, there must be elaborate briefing session when the nature of examination, utility of its results etc. must be fully explained. Full cooperation of their leaders should be assured before starting the surveys and as a matter of fact one or two leaders of workers should be a part of the survey team. Without total involvement of workers, coverage will not be adequate.

6. A date and time should be fixed for x-ray examination of all workers in consultation with the appropriate authorities taking into consideration the convenience of the workers. A mobile x-ray unit is more convenient as it can be taken to the place of work and disruption of work is minimal. If mobile x-ray unit is not available, a transport from the place of work to x-ray centre and back will have to be provided for the workers.

7. It is important to ensure that as high percentage of workers as possible attend for the x-ray examination. This should not be below 90 % in any case since a lower coverage would vitiate the validity of the findings.

8. The miniature x-rays should be read by two independent assessors according to a uniform code (Appendix I). Persons suspected of chest abnormalities by one or the other reader should be required to undergo further investigations especially bacteriological to assess the aetiology and activity of the lesions. This should cover examination of sputum by direct microscopy on at least two specimens, one a spot and the other preferably overnight collection. If culture facilities are available, the examination should include sputum/laryngeal swab culture examination as well.

9. Final diagnosis in direct smear negative cases should be based on radiological and bacteriological findings and a short period of clinical observation to exclude non-tuberculous pathology. Assessment of activity especially in minimal lesions should be made after a period of about 3 months during which at least one more x-ray and bacteriological examinations should be carried out. Criteria of classification are enclosed (Appendix II).

10. Modalities for treatment of cases which would be discovered as a result of the survey should be finalised before-hand. A list of infectious cases should be provided, confidentially, to the administrative authority of the group covered by the survey. It should be ensured in advance that TB patients discovered during the survey shall not be subjected to any victimisation by their employers on grounds of being found tuberculous.

11. All records of the survey should be meticulously maintained and preserved for at least 2 years after which it would be desirable to

resurvey the entire group to get an idea of the incidence and behaviour of disease in this group.

12. A statistician of experience in this field should be associated with planning and conduct of the survey and analysis of data. If a statistician of requisite experience is not available locally, the Tuberculosis Association of India or the National Tuberculosis Institute may be requested for assistance in this respect.

APPENDIX I

Suggested code for miniature film reading

0. Technically inadequate
1. Normal
2. Pleural/pulmonary calcification only, insignificant.
3. Diagnosis deferred — for observation
4. Presumably tuberculous (Parenchymal)
5. Presumably tuberculous (Hilar/Mediastinal glands)
6. Pleural effusion
7. Pleural fibrosis
8. Thoracoplasty/Resection done
9. Presumably non-tuberculous including cardiac condition.

APPENDIX II

All persons diagnosed pulmonary tuberculosis are to be categorised into the following groups :-

1. Active bacillary — sputum(-) by direct smear or culture any time during the period of observation.
2. Active abacillary — where all sputum/laryngeal swab direct smear and cultures are negative throughout the observation period, but the lesion is considered as active and needing treatment on radiological and clinical evidence.
3. Inactive — where the lesion on several radiological examinations appears to be stable, all sputum/laryngeal swab cultures are negative during the period of observation and absence of any symptoms pertaining to chest.

If the parenchymal lesion is finally assessed as active and tuberculous (I & II above) extent and type of disease should be assessed by the one appropriate letter of both groups.

<i>Extent</i>		<i>Severity</i>	
M	: Minimal	N	: No cavity
A	: Moderately advanced	D	: Cavity doubtful
E	: Extensive	C	: Cavity definite

For example—AD will stand for moderately advanced disease with a doubtful cavity.
EN will stand for extensive disease without any cavity.

Dr. K.S SANJIVI



Dr. K.S. SANJIVI

Dr. K.S. Sanjivi has had a distinguished record of service under the Government of Madras for thirty years. He retired as Professor of Medicine, Madras Medical College and first Physician, General Hospital and is now Professor Emeritus, Madras Medical College.

He has been an examiner for M.B.B.S., Diploma in Chest Diseases and for M.D. of several Universities in India (Bombay, Nagpur, Andhra, Lucknow, Punjab, All India Institute of Medical Sciences, Delhi). He has been member of several advisory committees and Scientific Advisory Board of the Indian Council of Medical Research. He has been a member of the International Project Committee of the Tuberculosis Chemotherapy Centre, Madras from its inception. He has served on several national Committees. He was a member of the Technical Committee from 1953 to 1960 and again in 1964-65 and President of the 14th National Conference on Tuberculosis and Chest Diseases in 1958. He has taken part in several national and international conferences.

He has several publications to his credit and is recipient of several awards and is associated with a number of Scientific Committees. He is the Founder-Director of Medical and Mini Health Centre Projects of Voluntary Health Services, Madras and is rendering yeoman service to the community. In recognition of his meritorious services to the anti-TB cause, the Tuberculosis Association of India decided to award its Gold Medal to him in 1977.

Obituary

*Doctors all for humans' sake
Honour be yours and fame,
Honour as long as mankind lasts,
To Sikand's peerless name.*

Dr. B.K. SIKAND

On 9-3-1978 Dr. B.K. Sikand passed away after a short illness of about 3 weeks. Doyen of tuberculosis workers, a clinician *par excellence* a teacher, a research worker, a humanist and a social worker, nationally and internationally recognised, his sad demise is mourned by innumerable friends, colleagues, co-workers, patients and all others who knew him.



Dr. B.K. SIKAND

Dr. Sikand was born on 28th February, 1899 at Nabha (Punjab). After qualifying for the M.B.B.S. degree from King Edward Medical College, Lahore in 1921 with credit, he served as a short-service commissioned officer in the Indian Army. On release from the Army he proceeded to U.K. Apart from obtaining post-graduate qualification in public health, he spent some time in Brompton Hospital, London and specialized in tuberculosis and chest diseases. On returning home he joined as Secretary of the King George's Anti-Tuberculosis Fund which merged with the Tuberculosis Association of India when it was established in 1939. Dr. Sikand was the first Secretary of the Tuberculosis Association of India and worked in that capacity till 1940 when he was appointed as the Medical Superintendent of the New Delhi TB Clinic (now New Delhi TB Centre). After retirement from the New Delhi Centre in 1966, he kept up active practice in the speciality.

When Dr. Sikand along with some other contemporaries advocated domiciliary treatment (then called 'Organised Home Treatment') as our approach to the vexing problem, the scheme was so revolutionary that few were willing to accept it. The Tuberculosis Association of India therefore, established the New Delhi TB Clinic

(now known as New Delhi TB Centre) to prove its feasibility, acceptability and utility by actual field run. Dr. Sikand was requested to take charge of this institution. The success achieved is history now. He saw fruition of his ideas within his life time. Even those who scoffed at the idea, became its advocates. Domiciliary treatment became the accepted policy of the Government of India. Clinics were started all over the country and the New Delhi TB Clinic became a model clinic. Whatever contribution this institution has made to the fight against tuberculosis and whatever reputation it enjoys at home and abroad, is to a very large extent, if not entirely, due to its founder and first Director, Dr. Sikand. He nurtured this institution for 25 years and expanded its activities greatly. As long as this institution exists, it will be a standing memorial to Dr. Sikand.

Realizing that tuberculosis was not merely a medical but also a social problem, he took up in right earnest the task of bringing about the involvement of the society itself in the fight against tuberculosis in collaboration with the medical agencies since it was beyond the means of the Government to provide economic assistance. The Care & After-Care Committees that he set up in Delhi to provide socio-economic relief to the needy patients have enabled many unfortunate patients to successfully complete the treatment, which otherwise would not have been possible. The Committees are still the most active of their type in the whole country and an example to others.

Dr. Sikand was responsible for many research projects on domiciliary treatment, epidemiology, bacteriology of tuberculosis and BCG vaccination. He was for many years a member of the Expert Group of the Indian Council of Medical Research for Tuberculosis. He was a member of the Committee which was responsible for the conduct of the first national sample survey on the prevalence of pulmonary tuberculosis. For many years he was a member of the Standing Technical Committee of the Tuberculosis Association of India and its Chairman in 1959. He also presided over the national tuberculosis workers conference in 1959. The Tuberculosis Association of India honoured him with its highest award — the Gold Medal in 1970.

NEWS AND NOTES

ANNUAL MEETINGS

The 39th Annual General Meeting of the Association was held on Thursday, the 20th April, 1978 in the Conference Hall of the Association, 3, Red Cross Road, New Delhi and was followed by a meeting of the Central Committee of the Association on the same day.

A meeting of the Technical Committee of the Association was held on the 19th April, 1978. The Conference of Secretaries of State TB Associations was held in the afternoon on 20th April, 1978.

KHUSHI RAM SHIELD

The Association has decided to award the RAI SAHEB KHUSHI RAM SHIELD for 1977 to the Bengal TB Association. The Association has also decided to award Certificates of Merit for good performances to the Associations of Tamil Nadu and Karnataka.

SEAL SALE AWARDS

The Association awarded the TB Seal Shield for highest collections in the 27th Campaign to the Kerala TB Association and the Runner-up-Cup to the Tamil Nadu TB Association. The Cup for the best performance made by smaller States and Union Territories was won by the Goa, Daman and Diu TB Association. Certificates of Merit for improved collections was awarded to Andhra Pradesh, Tripura and Delhi TB Associations.

NATIONAL CONFERENCE

The Thirtythird National Conference on Tuberculosis and Chest Diseases will be held in Bhopal (Madhya Pradesh) in November/December, 1978. Subjects selected by the Programme Committee for discussion at the Conference include: (1) National Tuberculosis Control Programme with reference to the 6th Five Year Plan, (2) Chemotherapy, (3) Air Pollution, (4) Tuberculosis in Children, (5) Community participation in Tuberculosis Programme, (6) Manpower requirements and the training of personnel for Tuberculosis Control Programme, (7) Laboratory support for Tuberculosis Control Programme, (8) Non-Pulmonary TB, (9) Bronchial Asthma and (10) Tuberculosis of the Central Nervous system including TB meningitis.

Those who wish to present papers at the

Conference may send in the titles of their papers along with an abstract immediately to the Secretary-General, TB Association of India, 3, Red Cross Road, New Delhi-110001.

CHANCHAL SINGH MEMORIAL AWARD—1978

The Tuberculosis Association of India will award a cash prize of Rs. 500/- to a TB worker preferably below 45 years of age for an original article not exceeding 30 double-spaced foolscap typed pages (approximately 6,000 words excluding charts and diagrams) on a subject relating to Tuberculosis. Papers may be sent, in quadruplicate, to reach the Tuberculosis Association of India office latest by 31st August, 1978.

ESSAY COMPETITION

The Tuberculosis Association of India will award a cash prize of Rs. 300/- to a final year medical student in India for an original essay on Tuberculosis, adjudged best by a special committee of this Association. The subject selected for the 1978 competition is 'Epidemiology of Tuberculosis'. The essay should be written in English typed in foolscap size, double-spaced and should not exceed 15 pages (approximately 3,000 words excluding tables, diagrams, etc.) Four copies of the manuscript should reach the Secretary General, Tuberculosis Association of India, 3, Red Cross Road, New Delhi-110001, not later than 31st August, 1978 and should be forwarded through the Dean or Principal of the College/University.

HEALTH VISITORS' COURSE

The 1978-79 TB Health Visitors' Course will commence in July 1978 at the New Delhi TB Centre, New Delhi. The course will be of nine months' duration, which include both theoretical and practical training and also ten days' stay in a rural centre. The minimum qualification for admission to this course is Higher Secondary/Pre-University with Science or Hygiene and Physiology in matriculation. Application for admission to this course should reach the Secretary-General, TB Association of India 3, Red Cross Road, New Delhi-1 by 15th May, 1978.

SEMINAR/CONFERENCE

The 6th Punjab State TB Conference and celebrations of the Golden Jubilee of Dr.

Khushdeva Singh's career in TB work was held in the Government Medical College auditorium Patiala, on 12th February, 1978. Shri Des Raj, Minister for Health and Family Welfare, Punjab presided.

A symposium on 'Recent trends in the Chemotherapy of TB' was held in the auditorium of Niloufer Hospital, Hyderabad by the TB Association of Andhra Pradesh, under the Moderatorship of Prof. K.V. Krishnaswami. Dr. S.N. Mathur, D.H.S., A.P., presided. Dr. P.V. Benjamin Oration was delivered on the occasion by Dr. K.V. Krishnaswami. Shri B.M. Cariappa, Secretary-General, TB Association of India, participated in the function.

The 16th Maharashtra State TB and Chest Diseases Conference was held from 25th to 27th March, 1978 at Nasik in cooperation with the I.M.A. and District TB Association, Nasik. A Souvenir was also brought out on the occasion.

The TB Association of Goa, Daman & Diu proposes to hold a two-day seminar on TB sometime in the 3rd week of June, 1978.

SHIBIRS

The Maharashtra State Anti-TB Association organised TB Shibirs at Eklhare Power Station in Nasik District, Sangamner in Ahmednagar District and at Bel Air Sanatorium, Panchgani, District Satara. The team of specialists and technicians examined a total of 1,265 persons, screened 429, X-rayed 97 positive cases, sputum examined 73 and vaccinated 2,523 persons. It also organised another shibir at Khajurbhatti Municipal School in cooperation with Lions Club of Chunnabhatti. A total of 380 persons were examined.

G.B. PAI



Shri G.B. Pai, a noted philatelist and a Trustee and Honorary Legal Adviser of the TB Association of India has been elected as President of Supreme Court Bar Association. The Association congratulates Shri Pai on this distinction.

OBITUARY

Sir Sobha Singh, a well-known citizen of India passed away in New Delhi on 19.4.1978 at the ripe age of 90. In addition to his multifarious connections and activities, Sir Sobha Singh was a friend of the Tuberculosis Association of India. In the early fifties when the Lala Ram Sarup TB Hospital was under construction, his advice was freely available to the Association. On account of his deep interest in the work of the Association the President of India, in his capacity as Patron of the Association, nominated Sir Sobha Singh in 1966 as a member of the Central Committee of the Association. Sir Sobha Singh served in this capacity and as a member of the Executive Committee of the Association from 1966 to 1972. In his passing away the Association has lost a friend and well wisher. The Association conveys its deepest condolences to the bereaved family.