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Editor:
Dr. P.K. Sen

Co-Editors:
Dr. M.D. Deshmukh
Dr. N.L. Bordia

Associate Editors:
Dr. H.B. Dingley
Dr. S.P. Pamra

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News & Notes

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The Indian Journal of Tuberculosis

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THE 31ST NATIONAL CONFERENCE

Looking back over a period of years the Tuberculosis Association of India has reasons to be happy that the decision to hold the annual national conferences in different parts of the country was a wise one and has been yielding good dividends. This decision opened up opportunities to tuberculosis and chest diseases workers to get some ideas of the working of the control programme in different States and to have glimpses of the culture and heritage of people in different parts of the country. It enables workers in the host organisations to meet "comrades-in-arms" from other States and exchange notes on technical and organisational matters relating to tuberculosis control. In all these respects, the 31st national conference on Tuberculosis and Chest Diseases held last November in Lucknow provided good fare to over four hundred workers who attended it.

Inaugurating the conference in the Convocation Hall of the King George Medical College before a large gathering, Dr. M. Chenna Reddy, Governor of Uttar Pradesh, made an impassioned plea that our specialists should prepare a dynamic time-bound programme for the control of tuberculosis. Sri Prabhu Narain Singh, Minister for Health and Justice, while extending a warm welcome to delegates, gave a birds-eye-view of the development and working of the control programme in the State. Dr. Tahir Mirza, a veteran in the field and President of the conference pinpointed shortfalls in the BCG vaccination programme, case-finding and treatment and in some other essential constituents of the control programme. Delegates were entertained to two very interesting cultural programmes which were typical of Uttar Pradesh.

It is noteworthy that during the past few years all the sessions of the Conferences are very well attended, and the Lucknow Conference was no exception. Even the early morning and post-lunch sessions which are usually noted for 'default' by delegates were well-attended. This reflects the interest which delegates took in the proceedings and the high order of the programme worked out by the Technical Committee of the Association.

Delegates were treated to an inspiring special lecture by Dr. B.N. Sinha, the well-known orthopaedic surgeon and President of the Medical Council of India, who chaired the session on extra-pulmonary tuberculosis. He referred to the changing trends in tuberculosis, particularly in the management of osteo-articular tuberculosis. He dwelt at some length on medical education and emphasised the old adage that "if the pupil has not learnt it is the teacher

who has not taught". He made a very welcome announcement that the Medical Council of India would be prepared to consider requests for fellowships and grants for research projects pertaining to tuberculosis.

Dr. M.L. Mehrotra, whom the Association selected for the Wander-TAI Oration gave an interesting discourse on 'Revolutions in Tuberculosis'. He traced the various developments in the field of tuberculosis from the discovery of the bacillus by Robert Koch to the latest in short-term chemotherapy.

The scientific sessions spread over 25 hours during the five-day meet brought out some consensus and constructive suggestions. While initiating the discussion on the National TB Control Programme Dr. R. Viswanathan suggested that the Association should set up a compact working group to make concrete proposals for a time-bound dynamic control programme to implement the suggestions given by Governor Chenna Reddy. Mr. S.S. Nair suggested that explicit indices for effectively judging the programme in different spheres be laid down and a machinery provided for continual assessment. Regarding chemotherapy, the consensus was that short-term chemotherapy has proved effective, but its duration and the number and type of drugs have to be worked out. An important fact that was highlighted was that most of the relapses and/or re-activation are not due to resistant but to sensitive bacilli and therefore not necessarily an indication for costly reserve drugs. If treatment with standard drugs failed, experts felt, chances are that newer drugs may also fail unless the causes which lead to failure of earlier standard treatment were attended to. As regards default by patients in taking drugs, the general feeling was that often irregular and inadequate supply of drugs, lack of effective motivation and supervision, want of dedication and understanding of the patients' problems on the part of those responsible for treating patients are some of the important factors which have to be attended to.

For the past few years the Technical Committee has been giving greater attention to non-tuberculous chest conditions in preparing the programme. There was a session on Fungus Infections of the Lungs at the Lucknow Conference. The papers presented vividly brought out the importance of fungal infection and provided good orientation to the participants. A full session was devoted to air pollution and smoking hazards which was chaired by Dr. B.B. Chatterjee, Associate Professor and Head of the Section of Sociological and Industrial Hygiene, Calcutta. Dr. Chatterjee referred to air pollution especially in the metropolitan cities like Calcutta, Bombay, Delhi and Madras which are bidding fair to compete with western cities notorious for their air pollution, but added that air pollution in India had not yet reached alarming proportions.

A disappointing feature of the Lucknow conference, however, was that a number of speakers selected to present papers did not turn up at the last moment. The programme committee has a difficult task in selecting the speakers as all those who wish to present papers cannot be accommodated within the time available. The programme is finalised after receiving acceptance from the selected workers. If these persons drop out at the last moment and do not inform the Association sufficiently in advance, not only the programme schedule is upset but, what is worse, some others who could have been

selected in their place, if their withdrawal was known, are deprived of opportunities to participate in the conference.

The Lucknow meet demonstrated that younger workers have been showing great interest in the national conferences, both in regard to preparing papers and participating in the discussions. Another noteworthy feature was that lady workers came forward with constructive suggestions to help the anti-TB movement. We are confident that delegates left Lucknow for their respective places with the satisfaction that the conference was amply rewarding and well-worth the time, energy and money spent on this yearly pilgrimage.

Some of the papers presented at the Conference and summaries of other papers are given in the following pages.

SHORT-TERM CHEMOTHERAPY OF PULMONARY TUBERCULOSIS — A CONTROLLED TRIAL

THE RESEARCH COMMITTEE OF THE TUBERCULOSIS ASSOCIATION OF INDIA

A co-operative trial on the short-term chemotherapy of pulmonary tuberculosis is being carried out by the Research Committee of the Tuberculosis Association of India since March, 1974. A preliminary report based on the first interim analysis was published in the Indian Journal of Tuberculosis, Vol. 23, No. 2 (April, 1976). The present communication is based on the second interim analysis which was carried out in August, 1976.

The trial is being conducted simultaneously at three institutions in Delhi viz. L.R.S.T.B. Hospital, Mehrauli, R.B.T.B. Hospital and New Delhi TB Centre. In all, 227 patients have been included in the study and allocated at random to one of the 3 drug regimens detailed below :

Group A INH + Streptomycin + Ethambutol + Pyrazinamide for 20 weeks; Placebo (Calcium Lactate) 21 to 80 weeks.

Group B INH + Streptomycin + Ethambutol -f- Rifampicin for 20 weeks; Placebo (Calcium Lactate) 21 to 80 weeks.

Group C INH -f- Streptomycin for 8 weeks; INH and Thiacetazone from 9 to 80 weeks.

The dosages of the drugs are as follows :

	0.75 g daily
I.N.H.	300 mg once daily
Ethambutol	25 mg/kg for first 6 weeks and 15 mg/kg thereafter, once daily
Pyrazinamide	750 mg B.D.
Rifampicin	600 mg once daily
Thiacetazone	150 mg once daily.

All patients are residents of Delhi between 15 to 45 years of age, previously untreated, with positive sputum on at least 2 days. Pregnancy, extra-pulmonary tuberculosis, non-tuberculous co-existing diseases, poor general condition and involvement of more than four zones and weight below 36 kg. made patients ineligible for the trial.

* The Research Committee consists of Dr. R. Viswanathan (Chairman), Dr. S.P. Pamra, Dr. H.B. Dingley and Dr. M.M. Singh.

The first 20 weeks' treatment in groups A and B and the first 8 weeks' treatment in group C was carried out in hospital. For the remaining period of treatment: patients collected 4-weekly supplies of drugs from the domiciliary treatment service. After discharge from hospital, the patients were carefully followed up in their homes to ensure regularity.

Changes in chemotherapy were made permissible with the concurrence of the Research Committee and only in those patients who showed either major toxic reactions or definite clinical or radiological deterioration, or if the sputum continued to be positive up to 26 weeks.

Of the 227 patients included in the study, 12 had to be excluded in the light of later information that they did not satisfy the protocol. Some of these had in fact had earlier treatment for tuberculosis and had withheld this information at the time of intake. Another 35 patients were excluded from the main analysis either because they were initially resistant to one or other of the drugs or because their bacillary resistance status was not known at the time of compilation of this report due to recent induction into the study. The main analysis therefore is confined to 180 patients (A : 60, B : 61, C : 59) with bacilli initially sensitive to all the drugs used.

Results

Table 1 shows the results of bacteriological assessment at the completion of 20 weeks after which period anti-tubercular treatment in groups A & B was to cease. The percentage of patients who became negative by smear and culture was 96.2 in group A, 96.4 in group B and 84.3 in group C. Results in groups A & B were significantly superior to group C at this stage ($P < 0.05$).

For 44 patients in group A, 50 in group B and 40 in group C, bacteriological assessment is available on the completion of 40 weeks' treatment. Sputum conversion rates in the 3 groups are 88.9%, 90.0% and 90.2 % respectively. These are not significantly different from each other ($P > 0.90$).

There were a number of reversions among patients whose anti-TB treatment had stopped at 20 weeks, specially in group A. Mainly as a result of these, the picture had changed consi-

derably by the end of 52 weeks at which stage the conversion rates in the three groups stood at 77.8%, 90.9% and 91.9% respectively (The number of patients available for assessment at this stage was 126; 45 in group A, 44 in group B and 37 in group C). Groups B & C are not significantly different from each other but they are both superior to group A ($P < 0.001$).

Table 1
Bacteriological Results at 20 weeks

No. Assessed	S— C—	S—C	S+ C—	S+ C+
Group A 53	51 (96.2%)	1 (1.9%)	—	1* (1.9%)
Group B 55	53 (96.4%)	1 (1.8%)	1 (1.8%)	—
Group C 51	43 (84.3%)	3 (5.9%)	1 (2.0%)	4 (7.8%)

S=Direct Smear; C=Culture

Table 2 shows the extent of bacteriological reversions in groups A & B after completion of 20 weeks' treatment. It can be seen that as many as 20.4 % of the patients in group A had reverted up to 52 weeks compared to 7.1 % in group B. The results indicate that group A (which includes PZA among other drugs) fared much worse than group B (which included Rifampicin). As already noted earlier, results in group B (which had only 20 weeks' treatment) were quite as good as group C which was still continuing treatment at 52 weeks.

Table 2

	<i>Bacteriological Reversions After 20</i>		
	40 weeks	52 weeks	
No. Assessed	Reversions	No. Assessed	Reversions
Group 44 A	4 (9.1%)	44	9 (20.4%)
Group 48 B	4 (8.3%)	42	3* (7.1%)

* This does not include 1 reversion at 40 weeks as the patient had not completed 52 weeks' observation at the time of compilation of report. Radiological changes at 20 weeks are shown

in Table 3. It would be noticed that group A shows the best results at this stage. However, with the passage of time this advantage is completely lost as one can see from Table 4 which gives the radiological status at 52 weeks. Groups B & C, if anything, appear to have a slight edge on group A. In view of the superior bacteriological results noted earlier this advantage becomes even more significant.

Table 3
Radiological Changes at 20 weeks

No. Assessed	Marked Improvement	Slight or no Improvement	Worse
Group A 53	43 (81.1%)	9 (17.0%)	1* (1.9%)
Group B 55	39 (70.9%)	16 (29.1%)	0 (0.0%)
Group C 51	36 (70.6%)	13 (25.5%)	2 (3.9%)

* Includes 1 Death

Table 4
Radiological Changes at 52 weeks

No. Assessed	Marked Improvement	Slight or no Improvement	Worse
Group A 44	36 (81.8%)	2 (4.5%)	6* (13.6%)
Group B 43	38 (88.4%)	5 (11.6%)	0 (0.0%)
Group C 34	29 (85.3%)	1 (2.9%)	4 (11.8%)

* Includes 1 Death

It is too early to draw any firm conclusions from the interim analysis but it appears not unlikely that group B (which includes Rifampicin among other drugs) may be suitable for short-term chemotherapy. It is of interest to note that apart from bacteriological stability achieved, radiological improvement among patients in this group continued beyond 20 weeks at which stage active treatment had stopped.

DETERMINATION OF THE APPROPRIATE INDEX AND TIME FOR ASSESSING THE EFFECTIVENESS OF A TUBERCULOSIS CONTROL PROGRAMME

S.S. NAIR

(From National Tuberculosis Institute, Bangalore)

Some Problems in Assessment

The long-term objective (goal) of National Tuberculosis Programme (India) is "to reduce the problem of tuberculosis in the community sufficiently quickly to the level where it ceases to be a public health problem. At present, it is difficult to enunciate this goal in more precise or quantifiable terms".* This definition of the goal, probably applies to the tuberculosis programmes in most of the countries.

The goal, as stated above, is not suitable for assessing the effectiveness (i.e., extent of achievement of the goal) of the tuberculosis programme. Two of the questions that arise viz., how to measure reduction in the problem and when can tuberculosis be considered to be *not* a public health problem have been answered to some extent by the WHO Expert Committee on Tuberculosis (1959). They had considered, rather arbitrarily, that tuberculosis ceases to be a public health problem when the prevalence of natural reactors to tuberculin among children of age 14 years is less than 1%. It could be inferred that the three other epidemiological indices for measuring the problem (or the reduction thereof) viz., prevalence and incidence of disease and incidence of infection have not been considered to be as suitable as prevalence of infection. One reason for this could be that prevalence or incidence of disease can be established only by expensive epidemiological surveys in countries where notification of tuberculosis cases is incomplete. To establish incidence of infection, repeated tuberculin testing may be necessary and their interpretation poses many difficulties e.g., the enhancing effect of repeated testing (Raj Narain, *et al* 1965 and 1966).

But the index suggested by the WHO Expert Committee is also not easy to apply. In countries where BCG vaccination is carried out, prevalence of natural infection at age 14 cannot be established by tuberculin testing. To overcome this difficulty, it has been suggested by some tuberculosis workers to withhold vaccination from some areas and/or to consider prevalence of infection in very young children (age 0-4 years). The former cannot be justified as a long-term arrangement. The latter presupposes vaccination through mass

campaigns which take 5 years or more to cover the area and requires surveys of very large populations to get adequate number of children for examination. Further, tuberculin reactions become more unreliable in areas with non-specific sensitivity. The distortion by the latter can be quite considerable even in younger age groups. Chakraborty *et al*, (1976) have reported a prevalence rate of 2.1% for tuberculous infection in 0-4 year children and 12.9% (about 6 times) for infection by other mycobacteria giving rise to non-specific sensitivity. Moreover, the question arises, what level of infection in such children could, even arbitrarily, indicate that control of tuberculosis has been achieved?

Kul Bhushan, *et al* (1970) and Gothi, *et al* (1974) have shown that the percentage of BCG vaccinated persons who show indurations of 14 mm or more after 4-6 days at the site of vaccination estimates closely the percentage infected in different age groups. In areas where BCG vaccination is in progress and tuberculin test is of no use, the prevalence of infection could therefore be estimated by measuring the induration after 4-6 days at the site of vaccination. This method is operationally simpler because only one visit by an assessment/surveillance team (to read the vaccination induration) is adequate against two visits (one for testing and the other for reading) required for estimating prevalence of infection by tuberculin testing. Hence, it is worthwhile to investigate further the pros and cons of this method. If considered to be more suitable, by using this method, prevalence of infection at age 14 or age group of 10-14 or 15-19 years can be ascertained for purpose of surveillance and/or assessment.

The above considerations relate to the selection, of indices for measurement of the problem and the reduction thereof. Enough attention has not been given to the number of years required for control of tuberculosis or the extent to which reduction of the problem can be achieved at intervals of 5 or 10 years. Thus, there is a need to have a proper definition of the objectives of a tuberculosis programme which should state clearly not only the index (or indices) to be used for measurement of the tuberculosis problem but also the expected or desired values of this index (or indices) at specific points of time, after implementation of the programme. These are essential

* Introduction to the National Tuberculosis Programme Manuals.

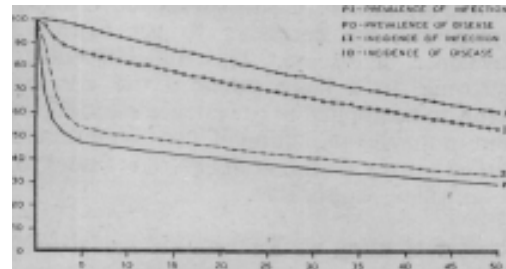
pre-requisites for assessing the effectiveness of the programme.

There is another serious problem in assessment, i.e., to find out how much of the problem reduction actually observed is due to the impact of the programme and how much due to (or in spite of) the natural trend (downward or upward) in the tuberculosis problem. Fig. 1 illustrates how wrong conclusions regarding the impact of a programme can be drawn if the natural trend is not taken into account. Thus, repeated tuberculosis surveys alone are not sufficient for assessment of programmes. The generally used method of keeping a control group for this purpose is not feasible for tuberculosis. One alternative is to obtain the natural trend from the predictions which could be made from an epidemetric model which is constructed to represent the tuberculosis situation in the area.

ence of infection and disease and incidence of infection and disease do not decline at the same

rate under an ideal programme for developing countries (Fig. 2). This raises the question of which index to use in defining the objectives of a programme and consequently for assessment. It may not be proper to consider anyone of them as the best index. Fig. 2 shows that prevalence of

FIG 2 EXPECTED TIME TREND IN THE FOUR EPIDEMIOLOGICAL INDICES AS A RESULT OF AN IDEAL PROGRAMME FOR DEVELOPING COUNTRIES



infection is the least sensitive index for measuring changes in the tuberculosis problem. This is understandable because the incidence of infection is only a small fraction of the prevalence of infection (e.g., one-ninth for children of age 0-14 years; NTI, 1974). Even a complete absence of incidence of infection (i.e., 100% reduction) can bring down the prevalence rate only by a small extent (say 11% in age group 0-14 years and much less for all ages combined). Viewed in this context, the index suggested by the WHO Expert Committee, being the least sensitive index, is aptly more stringent to determine whether the stage of control viz., ceasing to be a major public health problem, has been reached. Some workers recommend this index for surveillance or assessment in the earlier periods under a programme also, without suggesting the expected values of this index after different intervals as a standard for comparison. The criterion suggested by WHO was not intended to be an index of change and its use for that purpose may not be justified. This criterion was intended to assess whether the goal of control has been reached and could be applied without reservation only after a period of about 30 to 40 years after full implementation of the programme when control of the disease could be expected.

On the other hand, prevalence of disease and incidence of infection show the fastest decline and any assessment in the early periods on the basis of these two indices alone may lead to over-optimism because the rate of decline noted in the first 5 or 10 years is followed by a much slower rate thereafter. Incidence of disease which

Utility of Epidemetric Models

By introducing into such models, parameters which represent the potentials of a particular type of programme, the values of the epidemiological indices at different points of time could be predicted. This could help in (1) selecting the proper index or indices for defining the objectives of the programme in quantifiable terms (i.e., in terms of the selected index), taking also the time element and the natural trend into consideration, (2) in planning in the first instance viz., choosing among alternate programmes one that could be considered most suitable on the basis of the predicted trends and (3) in assessing the programme by matching the actual achievements against either the predicted natural values of the chosen index or the predicted expectations from the programme.

Choice of the Index

One such model (Nair, 1975) has shown that all the four epidemiological indices viz., preval-

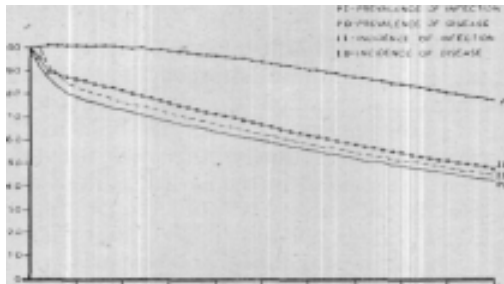
declines more steadily than the other indices is probably the most suitable index from technical point of view. Waaler, *et al* (1974) had mainly considered this index. This index is readily available in developed countries. However, for practical reasons, it is difficult to get figures for incidences of disease in developing countries and the real choice has to be made between prevalence of infection and prevalence of disease, for surveillance and/or assessment. Some limitations of the former have been discussed earlier and studies have been suggested to overcome at least some of these limitations. Costly surveys covering large populations are necessary to get figures for prevalence of disease. This difficulty could be overcome to a large extent if the correction factor, to be applied to prevalence rates obtained from sputum examination of chest symptomatics, worked out by Gothi, *et al* (1976) is found to be more widely applicable.

Assessment using an Epidemetric model—Two Methods

Method A

Whichever index is chosen, the model referred to above enables fixing up of the intermediate and long-term objectives (or expectations) in relation to time, taking also the natural trend in the index into account. For example, Fig. 3,

3 3 EXPECTED TIME TREND IN THE FOUR EPIDEMIOLOGICAL INDICES - THE DISTRICT TUBERCULOSIS PROGRAMME REACHES ITS POTENTIAL



shows that the District Tuberculosis Programme, if it is fully implemented and efficiently maintained, is expected to reduce prevalence of disease to 73% in 10 years, 68% in 15 years and 63% in 20 years. The actual value of the index at the time of assessment could then be obtained from available information or from surveys conducted for this purpose. Matching of this value against expectations from the model gives a measure of the extent of achievement of the objective (interim or long-term). However, the model may not be quite reliable for periods of more than 15 years because it does not reflect the effect of socio-

economic changes in the community. The fixing up of the expectations upto the end of 15 years after the full implementation of the programmes, therefore, more desirable. If assessment has to be carried out earlier than 15 years, it may be attempted after 10 years of full working of the programme. For this, the expected values of the chosen index are provided by the model. On the basis of the reduction thus expected, the number of persons to be examined to detect whether the observed reductions are of the same magnitude has to be postponed to a later date.

Method B

Any planned tuberculosis programme can be defined in terms of some expected programme parameters such as proportion of cases found, efficacy of drug regimen, treatment regularity, coverage for BCG vaccination, etc. (For further details refer to Nair, 1975). The actual average values of these parameters for any working programme can then be compared with the expected values of the parameters to *assess the efficiency* of the working programme from year to year or as often as practicable. But this will not provide information on how far these short-falls in efficiency will influence the expected reductions in disease over a period of time. It is of interest to know by how much the reduction in the problem from time to time as a result of the actual working programme will fall short of the reductions expected from the planned programme. This information could be obtained by feeding into the epidemetric model the expected values of the programme parameters to obtain the expected time trend and compare with the time trend obtained by feeding the actual average values of the parameters for the working programme. This latter will be the time trend which will result: if the programme continues to work with the present efficiency. This comparison will then provide a basis for *assessing the effectiveness* of the working programme (Method B). This is a simpler method of assessment of effectiveness as compared to Method A, if the latter involves epidemiological surveys at different points of time, which are expensive. Further, Method B can be used at any time when assessment of efficiency is carried out.

If the efficiency of the programme is low, it is not worthwhile to carry out any assessment of effectiveness using Method A, even after 15 years as suggested earlier. In other words, the proper time for assessing the effectiveness of a programme using Method A will be at least 10 years after it functions at a high level of efficiency. Till then, only assessment of efficiency and assessment of effectiveness using Method B, need be carried out.

Summary

The present definition of the objective of the National Tuberculosis Programme is too vague. A proper definition of the objectives (both long-term and intermediate) which should state clearly the index to be used for measurement of the problem and the expected values of this index at specific points of time is needed.

Another serious problem in assessment is to find out how much of the observed problem reduction is due to the impact of the programme and how much due to (or in spite of) the natural trend (downward or upward). Repeated surveys cannot provide this information and keeping of control groups is not feasible.

Epidemiologic models help in choosing the index for measuring the problem and fixing intermediate and long-term objectives in terms of this index. They also help to take the natural trend into account, while assessing the programme.

Prevalence of infection is the least sensitive index. Prevalence of disease and incidence of infection may lead to over-optimism. Incidence of disease is most suitable but difficult to get in developing countries. Hence, prevalence of infection or disease has to be chosen. Difficulties of the former are interference by BCG vaccination and non-specific sensitivity. The use of BCG induration to estimate prevalence of infection has some advantages and it is worthwhile to investigate further this possibility. Surveys for prevalence of disease are expensive but a simpler method suggested by Gothi, *et al* (1976) may overcome this difficulty.

Using epidemiologic models, two methods of *assessment of effectiveness* are suggested. One involves prevalence surveys and need not be attempted unless programme efficiency has been quite high for at least 10 years. The other can be carried out easily along with *assessment of efficiency*.

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IMMUNOLOGICAL SIGNIFICANCE OF NEGATIVE MANTOUX TEST IN TUBERCULOUS PATIENTS

M.S. AGNIHOTRI, S.K. PANDE and H. VERMA
(From King George's Medical College, Lucknow)

Resistance to infection by micro-organism is based on non-specific and specific immunity. Non-specific immunity makes one innately susceptible or resistant to certain infections. Some of these factors are low pH of skin, lysozyme-bactericidal enzyme, mucous secretion in lung and phagocytosis. Specific immunity against micro-organism is acquired and operates by cell mediated reaction and humoral antibody synthesis. Specific immunity operates in co-operation with non-specific immunity and increases its effectiveness.

Both cellular and humoral systems are essential for protection of man. The incidence of diseases is higher in both genetic and acquired humoral and cellular deficiencies. For example, immune suppression by X-ray, corticosteroid and cytotoxic drugs, in lymphoproliferative disorders like lymphocytic leukemia and myeloma, malnutrition and certain viral infection like measles.

Immune deficiency is clinically recognisable. In C.M.I, deficient infant immune responses are absent just after birth. They can deal with common bacterial infection. Infection by Herpes Zoster indicates deficient C.M.I. These children get over-whelmed by vaccinia and measles virus and B.C.G. if given by mistake. Humoral immune deficiency is recognisable at the age of 4 months, when the protection by mother IgG disappears. Presence of Candida infection indicates humoral deficiency. These children are prone to repeated infection by pyogenic organisms whereas measles and small pox are readily brought under control.

It is well known that malnutrition, corticosteroid therapy, measles and Hodgkin's disease predispose to tuberculosis. All these conditions lead to deficient immune response.

The patients with deficient C.M.I, are hyporeactors or non-reactors to skin test by antigens like tuberculin, Candida, trichophyton and mumps.

The immune status of patients of tuberculosis was assessed by X-ray chest, blood count and skin test by antigen like E. Coli, M. catarhalis strepto aureus, A. influenzae, strep, viridans and Candida albicans and D.N.C.B. sensitization. Sensitization dose of 2,000 ug of D.N.C.B. in .1 ml of acetone was used; a control dose of 50 (j.g was also used in .1 ml acetone to see whether

patient is sensitised before or not. Challenge dose of 50 μ .g was used after 14 days, reaction was evaluated for three days in terms of erythema, induration, vesiculation and ulceration.

Table I shows the result of D.N.C.B. stimulation in hyporeactor and reactor to tuberculin. Patients of tuberculosis having reaction less than 10 mm are classified as hyporeactors. Reactors includes those with induration more than 10 mm. Out of 10 hyporeactors only 20% could be sensitized by D.N.C.B. whereas 80% of reactors could be sensitized. No significant difference was found in the lymphocyte count.

Table II shows results of intradermal test by bacterial and fungal antigen. 50 % of hyporeactors reacted to antigen of H. influenzae, N. catarhalis, Candida albicans. Reactions to antigen of E. Coli and strep, viridans were 40% and 10% respectively. Amongst the reactors to tuberculin 60%, 80% and 70% reacted to H. influenzae, N. catarhalis and E. Coli respectively. Reaction to strep, viridans and Candida was 30% and 70% respectively.

Table III shows correlation of D.N.C.B. sensitization and reaction to bacterial and fungal antigen in hyporeactors and reactors of tuberculin. 6 patients in hyporeactor group reacted to less than two bacterial and fungal antigens, 4 patients showed reaction to between 3 to 5 antigens, whereas 8 patients in reactor group showed reaction to 3 to 5 antigens, 16% of hyporeactors having reaction to less than 2 bacterial and fungal antigens could be sensitized by D.N.C.B., whereas amongst reactors to tuberculin, 75% patients reacting to 3 to 5 antigens could be sensitized by D.N.C.B.

D.N.C.B. is a simple chemical which produces active sensitization in 100% normal man indicating adequate cell mediated immunity. In the present study only 20% of hyporeactor tuberculous patients demonstrated sensitization to D.N.C.B. Thus 80% patients of this group had depressed cell mediated response.

Hyporeactor tuberculous patients reacted in only 40 % of intradermal tests done by antigens of common bacteria and fungi, whereas 62 % tests done by same antigen showed reaction in reactor tuberculous patients. This finding demonstrates that tuberculous patients who are hyporeactors

Table 1

Result of D.N.C.B. sensitization in hyporeactors and reactors in tuberculin

Tuberculin reaction	No. of cases	Stimulation by D.N.C.B.	Lymphocyte count
Hyporeactors	10	20%	Not significant
Reactors	10	80%	

Table II

Results of intradermal tests by bacterial and fungal antigens

Tuberculin reaction	H. Influenzae	N. Catarrh.	E. Coli	Strep. viridans	Candida albicans
Hyporeactors	50%	50%	40%	10%	50%
Reactors	60%	80%	70%	30%	70%

Table III

Correlation of D.N. C.B. sensitization and reaction of bacterial and fungal antigens

	No. of antigens	
	0—2...	3—5
Hyporeactors	6	4
D.N.C.B. sensitization	1 (16%)	1
Reactors	2	8
D.N.C.B. sensitization	2	6 (75%)

to tuberculin fail to react with other antigens more often than reactors to tuberculin.

60 % of hyporeactor tuberculous patients reacted to less than two bacterial and fungal antigens. Out of these only 16% could be sensitized to D.N.C.B. whereas amongst reactor tuberculous patients 75 % reacted to 3 to 5 antigens and 75 % of these patients could be sensitized by D.N.C.B. According to this observation tuber-

culous patients can be classified into two distinct groups.

- (a) Hyporeactive to tuberculin and other antigens, and can not be sensitized by D.N.C.B., indicating immune deficiency.
- (b) Reactive to tuberculin and other antigens and can be sensitized by D.N.C.B. indicating proper immune process.

According to this criteria 50% of Mantoux negative tuberculous patients have immune deficiency. This finding possibly explains individual to individual variation in response to same chemotherapy as host factor plays an important role in determining the ultimate outcome of chemotherapy.

In our undernourished population with immune deficiency, Mantoux negative test should not only mean non-infected, but this group includes those infected but still tuberculin negative due to depressed C.M.I. These Mantoux negative individuals are at a higher risk to develop disease because of low host resistance.

Immunity to Infection

Non-Specific Immunity (Innate)

- (1) Low pH of skin
- (2) Lysozyme-Bactericidal enzyme
- (3) Phagocytosis

Specific Immunity (Acquired)

- (1) Cell mediated reaction
- (2) Humoral antibody synthesis

Specific immunity operates in cooperation with non-specific immunity and increases its effectiveness.

Are Cellular and humoral systems essential for protection of man ?

- (1) Incidence of diseases in genetic humoral and cellular deficiencies.
- (2) Incidence of disease in acquired humoral and cellular deficiencies.
 - (i) Immune suppression
 - X-Rays
 - Cyto toxic drugs
 - Corticosteroids
 - (ii) Lymphoproliferative disorder
 - Lymphatic leukaemia
 - Myeloma

- (iii) Malnutrition
- (iv) Viral infections
 - Measles.

Clinical evidence of Immune deficiency

(A) Cell Mediated Immune deficiency

- (1) Recognisable just after birth
- (2) Common bacterial infection dealt with
- (3) Infection by Herpes Zoster virus and Thrush
- (4) Overwhelmed by vaccinia and measles and B.C.G.

(B) Humoral Immune Deficiency

- (1) Recognisable at age of 4 months
- (2) Presence of thrush (*Candida albicans*)
- (3) Prone to repeated infection by pyogenic bacteria
- (4) Measles and small pox—readily brought into control.

Immune deficiency predisposes to tuberculosis

- (1) Malnutrition
- (2) Corticosteroid
- (3) Measles
- (4) Hodgkins.

Patients with deficient C.M.I, are hypo or unreactive to skin test by antigen like tuberculin, *Candida*, *trichophyton* and mumps.

Negative Mantoux test in patients of tuberculosis may be an indication of deficient C.M.I. in those patient.

Assessment of Immune Status

- C.M.I. (1) X-ray chest
 (2) Blood count
 (3) Skin test by *E. Coli*, *Neisseria catarrhalis*, *staphylococcus aureus*, *haemophilus influenzae*, *Strep. viridans*, *Candida albicans*.
 (4) D.N.C.B. sensitization.

RETREATMENT OF DRUG-SENSITIVE RELAPSES OF PULMONARY TUBERCULOSIS FOLLOWING CHEMOTHERAPY WITH STANDARD DRUGS

T. SANTHA DEVI

(From Tuberculosis Chemotherapy Centre, Madras)

It is the usual practice to prescribe initial chemotherapy for a period of 1 year to patients with newly diagnosed pulmonary tuberculosis. At the Tuberculosis Chemotherapy Centre, Madras, those patients who become bacteriologically quiescent, i.e., all cultures negative at 10, 11 and 12 months of chemotherapy, are usually followed up for a period of 4 years with routine clinical, bacteriological and radiographic examination.

Table 1 summarises the results of 4 year follow-up of patients with pulmonary tuberculosis who were admitted to 3 controlled clinical trials at our Centre and had attained bacteriologically quiescent disease at 1 year. Of these 12-17% had a bacteriological relapse during the follow-up period. A striking feature of the relapses is that 80 % of them occurred with organisms sensitive to the drugs with which they were treated initially. We believe that even under routine treatment conditions, most relapses occur with drug sensitive cultures. One logical question suggests itself—can these patients be treated with standard drugs again? To elucidate this problem we undertook a study in our Centre by retreating such patients with the drugs on which they had attained quiescence originally.

Table 1

Bacteriological relapse in pulmonary tuberculosis

Bacteriological relapse over 4 years	12%-17%
Sensitive to Streptomycin and INH	80%

Patients were considered suitable for the retreatment study if the following conditions were satisfied.

(1) Their disease was bacteriologically quiescent at 1 year following chemotherapy with standard drugs. (They had been admitted to three controlled clinical trials and had been treated with either a once weekly or twice weekly regimen containing streptomycin and isoniazid).

(2) Their disease had bacteriologically relapsed during the follow-up phase with (a) at least 2 sputa positive by culture (one of them

having a growth of at least 20 colonies), (b) one positive smear, and (c) all cultures sensitive to streptomycin and isoniazid.

There were in all 49 relapses and 5 of these could not be admitted to the study for various reasons. The remaining 44 patients are the subject of this report. Thirtyone of them were males and 13 females. Their mean age was 35 years and mean weight was 41 kg. The radiographic assessments were done by an independent assessor (Dr. K.V. Krishnaswamy). He had classified 64 % of patients as having moderate or extensive disease radiologically and 86% of patients as having cavitated disease on postero-anterior chest radiograph on admission to retreatment study (Table 2). It may be recalled that all patients were smear and culture positive at the time of starting retreatment. In 80 % of patients, the first sputum specimen collected was positive by smear. Thus, most of the patients had extensive, cavitated disease and were heavily positive bacteriologically.

Table 2

Condition on admission to retreatment study

Moderate or extensive disease	64%
Cavitation present	86%
Smear positive (1st specimen)	80%
Total patients	44

All patients were prescribed a fully supervised ambulatory chemotherapy for a total period of 12 months. They received a regimen of streptomycin and isoniazid daily for 4 weeks followed by twice a week for 48 weeks (Table 3). The dose of streptomycin was 1 g throughout and that of isoniazid was 400 mg irrespective of the body-weight in the daily phase. During the twice weekly phase the dose of INH was 400, 600 or 750 mg depending on body-weight, i.e., about 15 mg/kg body-weight. This corresponds to 750 mg of INH for a patient weighing 45 kg or more. Pyridoxine 6 mg was given with every dose of isoniazid to prevent peripheral neuropathy.

Table 3
Retreatment Regimen

Strep.	INH	Rhythm	Duration
1g	400 mg	Daily	4 weeks
1g	400, 600, or 750 mg	Twice a week	48 weeks

All patients attended the Centre daily for the first 4 weeks and thereafter twice weekly for their chemotherapy. They also attended once a month for a check up when they were seen by a doctor and the following investigations were undertaken. Three sputum specimens were examined every month by smear and culture and any positive culture produced was tested for sensitivity to streptomycin and isoniazid. Postero-anterior chest radiographs were taken at 1, 6 and 12 months.

By the end of 1 year, 71 % of the patients had received 80% or more of chemotherapy. While interpreting these findings one must take cognizance of the fact that these patients in the retreatment study had already had an year of treatment earlier and were on a prolonged follow-up. Hence regularity of 80% or more in 71 % of the patients can be taken to be a remarkable achievement.

Of the 44 patients in the study, 6 patients could not be assessed at 1 year and they will be discussed separately. The findings of the remaining 38 patients are shown in Table 4. Of these,

Table 4
Status at 1 year

	No.	%
Bact. quiescent*	34	92
Bact. doubtful	1	
Treatment changed	2	8
Tuberculous death	1	
Total	38	

*All cultures negative at 10, 11 and 12 months.

34 patients had all cultures negative at 10, 11 and 12 months. They were classified as having bacteriologically quiescent disease. One patient had been persistently sputum negative from the second month onwards, except for an isolated positive culture of 2 colonies at 12 months; his disease was classified as bacteriologically doubtful. This patient continued on the same drugs in the second year, but once a week and remained persistently bacteriologically negative from the 13th month onwards. He is also considered to have had a favourable response. Thus, 35 (92%) patients had a favourable bacteriological response at one year.

Two patients had their treatment changed for an unfavourable bacteriological response. One patient had become sputum negative by 3 months, but relapsed at 7 months with cultures resistant to both streptomycin and isoniazid. He also had a clinical deterioration. He had missed 43 % of the prescribed chemotherapy in the daily phase and 25% in the twice-weekly phase. The second patient was persistently sputum positive even though he was very regular in his drug intake. The organisms had developed resistance to INH at 3 months and his treatment was changed at 5 months. This patient had a low degree of pretreatment streptomycin resistance which could not be detected by the standard method but could be detected by the proportion sensitivity test. The last patient had a clinical deterioration by the end of the first month, and although he was continued on the daily treatment he died 8 days later. Thus, 3 (8 %) of 38 patients had an unfavorable response.

Considering the 6 patients whose response at 1 year could not be assessed, 5 of them became non-cooperative and took their discharge against medical advice, and the sixth had his treatment changed on account of streptomycin toxicity. All of them, however, had shown clear-cut evidence of bacteriological response while on treatment. Indeed, all except one were culture negative at the time of discharge.

Considering drug toxicity, as already mentioned, one patient had his treatment changed on account of streptomycin toxicity. Five others had their dosage of streptomycin reduced from 1 g to 0.75 g on account of giddiness and completed their course of treatment on this dose.

It may be recalled that the dose of streptomycin used was 1 g throughout the year in this study. From studies on primary chemotherapy at this Centre, a dosage of 0.75 g of streptomycin is now known to be therapeutically as effective as 1 g and has the advantage that adverse reac-

tions with the lower dose are less frequent than in the 1 g dose. It is, therefore, likely that had a dosage of 0.75 g of streptomycin been used in the retreatment study reported here, the regimen would have been just as effective, but with very little streptomycin toxicity.

Summarising, patients who relapse with organisms sensitive to standard drugs, streptomycin and isoniazid can be effectively treated with the same drugs. 80 % of the patients who have relapses do so with organisms sensitive to both drugs. Therefore, in routine practice, these drugs can be prescribed to all patients without any sensitivity tests being performed. If these patients are followed up routinely, failure of chemotherapy due to pretreatment drug resistance or due to any other cause will become evident on

sputum microscopy necessitating change of treatment. These standard drugs are readily available, relatively inexpensive and as this study has clearly shown, they are very effective. As the Hon'ble Minister for Health Sri Prabhu Narayan Singh remarked, the previous day, such drugs should be the choice for treatment of tuberculosis in a country like India. Recourse to costly and more toxic second line drugs as a routine will appear to be unjustified. Their use may be limited to patients who fail to respond to retreatment with standard drugs.

I thank the Indian Council of Medical Research for permitting me to present this paper, and my colleagues at the Tuberculosis Chemotherapy Centre for their valuable help in the preparation of this report.

TUBERCULOSIS IN CHILDREN IN A SLUM COMMUNITY

G.D. GOTH, BENJAMIN ISAAC, A.K. CHAKRABORTY, R. RAJALAKSHMI AND SUKANT SINGH
(From National TB Institute, Bangalore)

Introduction

Information on prevalence and incidence of tuberculous infection for all age groups and that on morbidity for the age group 5 years and above for the general population of India is available from various surveys. The magnitude of tuberculous disease in the age group 0-4 years is, however, not known. The paediatricians, however, on the basis of clinical observations and impressions, believe that the "incidence" of tuberculosis is very high among children. This may be true among the sick children visiting the paediatric clinics but may not be so for children in the entire community. A pilot survey was, therefore, planned to find out a suitable methodology to get the required information. The population of a slum area where tuberculosis morbidity is expected to be high was selected. The material from this study has been analysed to obtain some information on:

- (a) Prevalence of
- (i) All forms of tuberculosis in the age group 0-4 years;
 - (ii) Respiratory* tuberculosis in the 5-14 years age group;
 - (iii) The proportion of respiratory tuberculosis among total respiratory disease in the 0-14 age group.

Methods

The entire population of a slum area under comprehensive medical care of Church of South India (C.S.I.) Hospital, Bangalore was registered on individual cards by house-to-house visit. All were advised to attend the Area Health Centre located in the same slum.

Initial Investigation

All those who attended for examination were interrogated by a Medical Officer for the presence of any sickness. Children aged 0-9 year were in addition assessed for nutritional status by clinical

* Respiratory Tuberculosis for this paper consists of primary disease, pleurisy, miliary tuberculosis of lungs & pulmonary tuberculosis, sputum positive as well as negative.

examination and their weight and height were measured; their shoulders were examined for the presence of BCG scar and they were given tuberculin test with 1 TU RT 23 with Tween 80.

X-ray Examination

All persons were then directed for chest photofluorography to the mobile X-ray unit located at the Area Health Centre.

Reading of X-ray and Tuberculin Test

Tuberculin reactions were read 72-96 hours after the test. X-rays were processed at the National Tuberculosis Institute, Bangalore (NTI) and interpreted by two independent readers, as normal or abnormal.

Sputum Examination

Two specimens of sputa were collected from

- (i) all those whose chest X-rays were judged to have abnormal shadow
- (ii) all those who gave history of cough, pain in chest, fever of more than one week's duration and haemoptysis ("chest Symptoms") and
- (iii) children aged 0-4 years, with any kind of sickness and/or malnutrition and/or tuberculin +ve (5? 10 mm).

Two laryngeal swabs (LS), were collected from children below 10 years of age, if they failed to produce sputum.

The sputa were examined by direct smear for AFB. These and the LS specimens were also cultured.

Further Investigations

Children aged 0-4 year judged to be malnourished, tuberculin positive, having any kind of sickness and/or with X-ray abnormal shadows and persons aged 5 years or more with chest symptoms and/or radiological abnormality in the chest were subjected to following further investigations :

A—Soon after the initial investigation

- (a) Detailed clinical investigation by Medi-

Medical Officers at the Area Health Centre, (b) Laboratory examination viz., blood for total and differential WBC count, RBC count, haemoglobin estimation, erythrocytic sedimentation rate, urine and stool.

B—For sputum negative persons, six to eight weeks after initial investigation

(a) Follow-up X-ray, (b) Two additional specimens of sputa/laryngeal swab, (c) another clinical examination by the Medical Officer of Area Health Centre with the full knowledge of the X-ray, bacteriological and laboratory investigation results, (d) in case, the Medical Officer was unable to diagnose the condition even with the full knowledge of above investigations, such persons were referred to a Consultant Panel comprising a Thoracic Surgeon, a Physician, a Radiologist, a Paediatrician and a TB Specialist for final opinion, along with the results of the investigation. Investigations like large chest X-ray, bronchoscopy, bronchography, tissue or lymph node biopsy, ECG etc., were utilised to establish the diagnosis.

The facilities for investigations of skeletal and central nervous system tuberculosis were also arranged free of charge in the CSI Hospital. None, however, needed these. All persons when in need were offered appropriate treatment.

Material

In this paper the data pertaining to 1,537 children (0-14 years) are presented, from among 3,313 persons registered (Table 1).

The coverages (Table not presented) for initial sickness questioning, tuberculin testing, clinical and X-ray examinations were about 92%. The sputum laryngeal swab examination coverage in 0-4 year age group was only 35.2% but this was very high (96.7%) in 5-14 years age groups. Of the 1,413 children X-rayed, questioning for sickness could not be done for only five.

In all, for 106 children the records of investigations were submitted to the Consultant Panel for their opinion. Of these, further investigations were ordered for 67, but 59 (88%) could be persuaded to undergo them.

Results

Symptoms

Of the 1,408 X-rayed children questioned for presence of sickness, 668 (47.4%) had some kind of sickness, of varying duration (Table 2). The proportion of sick children was significantly more in 0-4 year age group as compared to those in 5-9 and 10-14 years age group. Of the total sick children majority were of the age group 0-4 years (46.3%).

Table 1

Registered population by age and sex

Age group	M	F	Total
0—4	329	296	625
5—9	257	269	526
10—14	217	169	386
0—14	803	734	1537
15+	908	868	1776
Total	1711	1602	3313

Table 2

Sickness by age

Age Group	Persons	Sick	
		Number	Percent
0—4	571	309	54.1
5—9	502	220	43.8
10—14	335	139	41.5
0—14	1408*	668	47.4

(*Note : Remaining are absentees)

Table 3

Prevalence of sickness and malnutrition by age*

Age group	No. of children	Pertaining to resp. system	Type of Sickness				
			Mal-nutrition	Pertaining to GI system	Fever alone	Pertaining to ENT	Others
0—4	571	166 (29.1)	146 (25.6)	37 (6.5)	20 (3.5)	16 (2.8)	17 (3*0)
5—9	502	130 (25.9)	77 (15.3)	18 (3.6)	17 (3.4)	6 (1.2)	17 (3.4)
10—14	335	102 (30.4)		27 (8.1)	7 (2.1)	2 (0.6)	16 (4.8)
0—14	1408	398 (28.3)	—	82 (5.8)	44 (3.1)	24 (1.7)	50 (3.6)

* Malnutrition and each "sickness" occurring alone or along with others

In Table 3 are set forth various kinds of sicknesses obtained on questioning and nutritional status, by age. Sickness pertaining to respiratory, gastro-intestinal and otorninolaryngeal systems has been presented. The protein calorie malnutrition presented in this Table is based only on

rapid nutritional assessment by the Medical Officers. The figures in different cells of each line are not mutually exclusive. In other words, a

child having sickness pertaining to more than one system will recur in more than one cell.

Table 4
Prevalence of respiratory radiological abnormalities by age

Age group	Number X-rayed	Number with chest abnormalities	Percentage
0—4	573	28	4.9
5—9	502	27	5.4
10—14	338	9	2.7
0—14	1413	64*	4.5

* Three persons having cardiac abnormalities and diagnosed as ASD and Fallot's tetralogy not included.

The sickness pertaining to respiratory system was the commonest among children of all ages followed by malnutrition. The information about malnutrition for higher age group 10-14 was not collected. The proportion of persons with respiratory symptoms among children in three age groups considered were the same (not significantly different). The malnutrition was more in the 0-4 year age group as compared to that in 5-9 year age group (the difference being significant).

Tuberculous Infection Rate

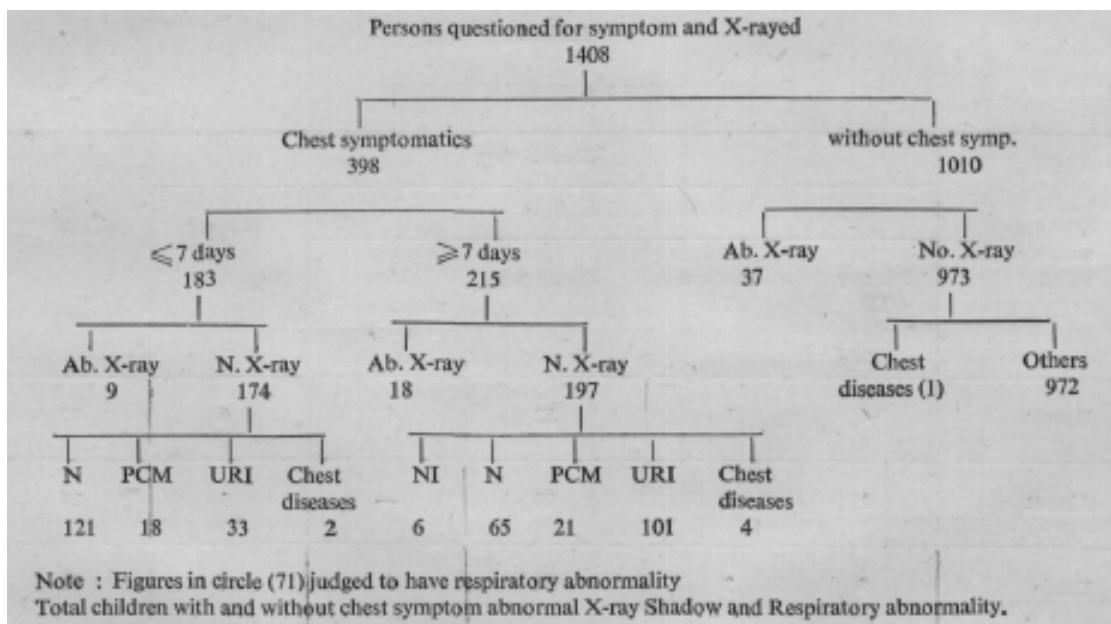
Out of 562 children in 0-9 year age group without BCG lesion, 31 (5.5%) were tuberculin reactors at 10 mm level, 1.8% in 0-4 year and

11.3% in 5-9 years (Table not presented). These rates were not different from the rates of tuberculin reactors in the above groups observed elsewhere.²

Chest symptoms, Radiological Abnormality in Chest and Overall Respiratory Abnormality

Chest Symptoms

Among 398 children with chest symptoms, the duration of symptoms among 183, was 7 day or less and in 215 it was more than 7 days or less and in 215 it was more than 7 days (Fig.). Of the 183, chest X-rays of 9 were judged to have abnormal shadows and 2 without abnormal shadows were diagnosed to have respiratory disease.



Of the 215 with chest symptoms of more than 7 days, 18 with abnormal shadows and 4 without abnormal shadows were judged to have respiratory disease.

In the entire group of children with chest symptoms, 134 (33%) were diagnosed to have upper respiratory infection (U.R.I.).

Of the remaining 1,010 children without history of chest symptoms, 38 were classified to have respiratory abnormality, 37 with radiological evidence and one without.

Radiological Abnormality in Chest

Of total children X-rayed, chest photofluorograms of 64 (4.5%) were classified to have abnormal shadows excluding 3 with cardiac abnormalities. In 0-4 and 5-9 year age groups percentage of persons with abnormal shadows were similar (4.9% and 5.4% respectively) whereas in age group 10-14 years, it was 2.7% the latter being significantly different from 0-9 year age group (Table 5).

Respiratory Abnormality

Children who had clinical and/or radiological evidence of respiratory disease have been diagnosed to have "Respiratory Abnormality" irrespective of the presence or absence of symptoms. Of the 1,408 children 71 were found to have respiratory abnormalities (Table 5), 7 without any radiological evidence (acute bronchitis—4, eosinophilia—2, bronchial asthma—1). Of the

remaining 64 children with respiratory abnormality in chest X-rays, 41 had either chest symptom or fever or PCM and 23 did not give any history of sickness. Among children with radiological abnormality 52 (82.5%) were judged to have non-specific pneumonitis, 5 primary tuberculosis, 3 inactive respiratory tuberculosis and 4 other conditions (non-tuberculous scar—2 and bronchiectasis—2).

In table 6 age wise break-down of the children with overall respiratory abnormality is presented. Out of 71 children with respiratory abnormality 60 were below the age of 10 years, only 5 of these were diagnosed to have primary tuberculosis, remaining had either non-tuberculosis disease or inactive tuberculous shadows (3). In the age group 10-14 years none were diagnosed to have respiratory tuberculosis and only a few had other respiratory diseases.

Prevalence of Tuberculous Morbidity

None of the children was found to be excreting *Mycobacterium tuberculosis* or had tuberculosis of other systems. The 5 children diagnosed to be having primary tuberculosis had symptoms, strong tuberculin reactions and shadows in their chest, which persisted even after 6 weeks. If all these five among 1,413 children X-rayed are considered as suffering from active tuberculous, the prevalence of active abacillary respiratory tuberculosis will be 0.35%. Only one out of every 12 children with abnormal shadows pertaining to respiratory system had tuberculous conditions.

Table 5

Respiratory system abnormality by symptoms

Symptoms and or PCM	Chest X-rays					Total
	With abnormal shadows				Normal	
	Primary TB	Inactive TB	Pneumonia	Other diseases of lungs		
Present	4	1	32	4	6	47
Absent	1	2	20	—	1	24
Total	5	3	52	4	7	71

Table 6

Respiratory system abnormality by X-ray and age

Age group	Radiological abnormality of respiratory system				Normal* chest X-ray	Total
	Primary TB	Inactive TB	Pneumonia	Other diseases of lung (non-tuberculous)		
0—4	3	2	23	—	4	32
5—9	2	1	21	3	1	28
10—14	0	0	8	1	2	11
0—14	5	3	52	4	7	71

Not included in Table 5. See text

Tuberculosis of other systems in 0-4 year age group

Despite special efforts to find out tuberculosis of other systems like that of bones and joints, miliary and meningeal and lymph glandular, none was found to have any one of these conditions.

Discussion

In this study, undertaken to find out a suitable methodology of measuring tuberculosis morbidity in paediatric age group in the community, it was also possible to identify some of the problems likely to be encountered.

From the analysis of the material of this study, it is seen that sputum specimens from 97 % of the eligible population in age group 5-14 years could be collected; in the age group 0-4 years, the coverage for sputum collection was only 35%. The coverage in this age group could not be improved even with the repeated intensive efforts made specially to study the methodological aspects. The low coverage in this age group could possibly be attributed to the rather generous criteria of eligibility for sputum examination, as compared to that in 5-14 years age group. The eligibility was made wider in 0-4 age group so that no case of tuberculosis might be missed because of the limitations of X-raying them.

From further analysis of the data it was seen that if the criteria for sputum collection for age 0-4 years had also been the same as that for 5-14 years, then coverage for sputum examination would have been 92 %.

As regards radiological examination of children it was seen that despite repeated attempts, skiagrams of 6% of children aged 0-14 years were technically inadequate and could not be interpreted.

For detailed clinical investigation as well as further follow up, considerable inputs were required. About 12% of children requiring detailed investigations in the hospital did not co-operate, even though they were offered free services including inpatient care and transport to and from hospital. Thus, the problems encountered were:

- (i) non co-operation by parents to get their children investigated
- (ii) difficulties of X-raying
- (iii) interpretation of X-rays (sometimes) and
- (iv) collection of sputum samples.

These problems have been quantified to some extent.

The analysis of the material showed that in the paediatric age group, there was no case of bacteriologically confirmed tuberculosis. There were 5 children with primary tuberculosis. If all of them could be considered as suffering from active tuberculosis the prevalence rate could be considered to be 3.5 per 1000. As compared to this, the prevalence of active abacillary tuberculosis in 15 years and above age group has been repeatedly found to be 16 per 1000. The rate of 0.35% in the age group 0-14 is not much different from 0.3% in 5-14 year age group reported by Gothi et al 1971 from rural areas of Bangalore district where no detailed clinical investigations were done.

None was found to have tuberculosis of any other system including tuberculous lymphadenitis, which is frequently diagnosed in the general practice in age group 0-4 years, even though the study was specially designed to identify these conditions in the above age group. Based on these findings and low tuberculous infection rate, it can be concluded that tuberculosis in the paediatric age group in this community is not a serious public health problem.

The most common sickness in the paediatric age group observed in this study referred to respiratory system (28 %); following this the other common condition observed was malnutrition (21 %). The prevalence of respiratory symptoms as well as malnutrition was almost same in 0-4 year age group, but for older children the former predominated.

The prevalence of sickness referring to respiratory system among children in the three age groups considered was quite high but the radiological evidence of disease was seen only in 4.5% of the total group. Of those with chest symptoms, only 27 had abnormal shadows in the chest X-rays, and in addition 6 children were judged to have other respiratory abnormality but radiologically normal. Large number of children with sickness referring to respiratory symptoms were diagnosed to be suffering from either upper respiratory infection including mild

tracheo-bronchial catarrh. It was surprising to note that active primary tuberculous lesions were seen only among 5 out of 71 children diagnosed to have any respiratory abnormality. In general practice, where due care is not exercised, many children with such conditions, specially if tuberculin reactors, would be labelled as suffering from active tuberculosis and put on anti-tuberculous treatment. On such evidence, impressions are formed that tuberculosis is a very common disease of paediatric age group, which in fact is far from the true situation.

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EXTENT AND PATTERN OF TUBERCULOUS DISEASE AMONGST CHILDREN

S.P. PAMRA, S.S. GOYAL and G.P. MATHUR

(From New Delhi Tuberculosis Centre)

The extent of tuberculous disease in the paediatric age group (0 to 14) is notoriously difficult to gauge. Diagnostic criteria such as radiological examination of the chest can often be imprecise and bacteriological confirmation is usually impossible. Tuberculin reaction, at best, can only indicate infection and is of little help in confirming diagnosis. Thus, the diagnosis, at least to start with, is usually presumptive rather than proved. Lastly in community surveys, children below 5 years are always excluded. For these reasons, estimates of tuberculous morbidity in the younger age groups are difficult to come by and are not unoften inaccurate.

Most misleading are probably the statistics based on number of children diagnosed as suffering from some tuberculous manifestation amongst those reporting at TB clinics or hospitals. It is well known that only very limited epidemiological conclusions can be drawn from hospital registrations and this is even more true of paediatric age groups. The main reason, for this is the fact that unlike adults the most prevalent form of tuberculosis among children is primary disease and since the symptoms of this are neither specific nor pressing enough, a large number of children either do not attend any health facility or attend general hospitals rather than TB institutions. Since availability of these facilities may vary from place to place and from time to time, little reliance can be placed on statistics obtained from TB institutions.

This will be clear from Table 1 which shows the pattern of tuberculous disease among children reporting at the New Delhi TB Centre during two periods—1940-53 and 1973. Superficially, it would appear from this table that the total number of cases reporting every year has practically halved over the period. The fact, however, is that a number of other health facilities including TB clinics have come up in the city during the period and many cases have naturally been diverted to these newer facilities. Similarly, cases of tuberculosis of organs other than the lungs now go to other speciality clinics.

The pattern of tuberculous disease also appears to have undergone a considerable change in so far as there is a greater preponderance of primary disease than before. All these conclusions however are invalid for reasons stated earlier.

From data given in Table 1, one might get an impression that although primary disease is the most common manifestation of TB in the younger age groups, pulmonary tuberculosis (post-primary disease) is not infrequent. This conclusion however is belied from mass radiography surveys carried out in a locality in the city of Delhi which forms the main reservoir for patients attending the New Delhi TB Centre. The survey carried out in 1962 covered 7,500 children in age group 5 to 14 years residing in a poor to lower middle class neighbourhood in the old city of

Table 1

Pattern of tuberculous disease among children (0—14 y) reporting with symptoms at the New Delhi Tuberculosis Centre

	1940-53		1973	
	No.	%	No.	%
Pulmonary TB (Late Post-primary)	647	20.3%	32	27.1%
Primary Disease	1,011	31.7%	57	48.3%
Pleurisy with Effusion	133	4.2%	2	1.7%
TB of other organs	1,397	43.8%	27	22.9%
Total TB Cases	3,188	100.0%	118	100.0%

Delhi. Children below the age of 5 years were, as mentioned earlier, not covered. It was found that there were 10 cases (0.1%) of pulmonary tuberculosis in this group, 4 of which were bacillary and 50 cases (0.7 %) of primary disease. It is clear that in this age group primary disease is far more preponderant than the adult type of tuberculosis and that the difference in the prevalence of the two is far more than would appear to be the case if one were to go by symptomatic attendance at the clinic (table 1). What gets reported to the TB clinics is probably only the tip of the iceberg and this is corroborated by the fact that of the 10 cases of pulmonary tuberculosis found in the general population survey, only one was known and of the 50 cases of primary disease, only 4 (8 %) were known. Data regarding the incidence of primary disease in the age groups 5 to 14 years are also available from a series of longitudinal surveys carried out over a period of 10 years from 1962 to 1972 in Delhi. It would be seen from Table 2 that this incidence despite minor ups and downs has stayed at more or less the same level namely 1.4 per 1000 per year.

Another group in which the problem of tuberculous morbidity is of special interest is that of child contacts. Data regarding prevalence of disease among household contacts of tuberculosis patients are available for two periods 1959-1961 and 1975. The prevalence of pulmonary tuberculosis (Table 3) has stayed unchanged at 0.3% but that of primary disease appears to have fallen from 5.1 % in 1959-61 to 2.1% in 1975. The epidemiological significance

of this fall is not clear specially because there has been no such fall in the incidence of primary disease among children in the general population.

Household contacts who were healthy at the initial examination in the 1959-61 study were kept under observation for a further period of 3 years. The annual incidence of pulmonary tuberculosis was 0.3 per 1000 and the non-pulmonary disease 7.1 per 1000 in the age group 0 to 14 years. Primary disease occurred more often in the 0 to 4 age group than in the 5 to 14 age group. A comparison with table 2 would show that child contacts continue to have a much higher risk of contracting primary disease than children in the general population, the rate in the latter being 1.4% per year. A point worth noting is that the further incidence of primary disease in the age group 0-4 appears to be related to the infectivity status of the Index Case. Thus, where the Index Case achieved sputum conversion within 6 months of start of treatment, the incidence of primary disease over a 3-year period was 5.1 per thousand as against 22.4% among contacts of patients who continued to be sputum positive beyond 6 months. Thus, successful treatment directly seems to affect the incidence of primary disease in this age group.

To sum up, one can say that :

- (i) Prevalence of tuberculous disease in the 0-4 age group is extremely difficult to assess since epidemiological surveys omit this group and hospital statistics can be very misleading.

Table 2

Incidence of fresh primary disease in age group 5—14 years as found from longitudinal surveys in Delhi (1962—72)

	Number re-examined	Fresh cases of primary disease	
		No.	Rate per 1000 per year
1962—64	6,459	14	0.9
1964—67	7,211	26	1.4
1967—69	7,424	20	1.1
1969—72	7,247	37	1.7
Average 1962—1972	—	—	1.4

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Table 3

Prevalence of TB among child contacts of pulmonary TB patients

	1959—61			1975		
	0—4	5—14	0—14	0—4	5—14	0—14
Number examined	1,216	1,855	3,071	962	1,542	2,504
Pulmonary TB (Late post-primary disease)	3 0.2%	7 0.4%	10 0.3%	0.0%	9 0.6%	9 0.3%
Primary disease	75 6.2%	83 4.5%	158 5.1%	24 2.5%	46 3.0%	70 2.8%

Table 4

3 year Incidence of fresh TB among child contacts of pulmonary TB patients (1959—61)

	0—4	5—14	0—14
Person-years at risk	2,044	2,908	4,952
Pulmonary TB (Late post-primary disease)	1 0.5%	3 1.0%	4 0.8%
Primary Disease	19 9.3%	16 5.5%	35 7.1%

(ii) Contacts in the same age group have a fairly high prevalence of TB which is predominantly primary disease. Further incidence continues to be high if the index case continues to be positive beyond 6 months.

(iii) Contacts in the age group 5-14 years too have a higher initial prevalence rate and subsequent incidence rate than in the general population. The bulk of this is, again, primary disease although late post-primary disease is not infrequent.

CONCURRENT COMPARISON OF RESULTS OF DOMICILIARY CHEMOTHERAPY OF PULMONARY TUBERCULOSIS UNDER TRIAL AND ROUTINE CONDITIONS IN AN URBAN CLINIC

BHARAT BHTJSHAN SURPAL (*From
New Delhi Tuberculosis Centre*)

I. Introduction and Review of Literature

Modern chemotherapy has revolutionized the management of pulmonary tuberculosis. Although the anti-tuberculous drugs are capable of giving, at least theoretically, almost a hundred percent sputum conversion under controlled clinical trial conditions (Tuberculosis Chemotherapy Centre, Madras, 1959; Singapore Tuberculosis Services/Brompton Hospital/BMRC Investigation, 1974), in routine service programmes, even when the same drug regimens are prescribed, the shortfall may be from twenty to thirty percent (Parthasarthy & Frimodt-Moller 1964; Kent *et al*, 1970; Bailey *et al*, 1974; Krishnaswamy, 1975). Why this shortfall? Why this whittling down of results even when the same drug regimen is prescribed? The comparatively poorer results are, no doubt, partly, due to the fact that the patients included in controlled clinical trials are carefully screened before induction, and those not satisfying a certain set of conditions excluded, a procedure which cannot be followed in routine clinical practice, where all patients are to be treated. Conditions such as age above or below a certain limit, extra-pulmonary tuberculosis, co-existing diabetes, pregnancy, chronic bronchitis, etc. usually complicate the management of patients in general, and make for comparatively poorer results. The fact that patients attending clinics in a routine domiciliary service include a fair proportion of such patients with a poor prognosis obviously dilutes the final results. However, the differences in the results between the two sets of patients (those treated under Trial conditions and those treated in a Routine service) cannot be explained away entirely by this factor.

Another possible reason for the poorer results obtained in routine practice could be the difference in procedures that are adopted in dealing with patients. For example, patients included in clinical trials do not have to wait for long to see the physician, a personal rapport gets established between the patient on one hand and the attending physician and the para-medical staff on the other hand. As a result of these advantages, it is possible that irregularity and drug default, so often observed in routine domiciliary treatment, may become comparatively infrequent.

Because of the small number of patients involved in controlled clinical trials it is possible to ensure that the procedures laid down in the protocol are rigidly complied with. In routine domiciliary treatment service, these near-ideal conditions do not exist. Due to large number of patients attending clinics with limited resources, even the best of clinics have to make compromises at many stages. The waiting time for a patient may vary anywhere from an hour to three hours on each visit for a mere two to five minutes' medical interview with the doctor (Nair & Mathur, 1973). Moreover, a patient may be confronted by a different doctor on each visit, and under such circumstances the doctor seldom gets to know his patient personally. It is rightly remarked that the clinic doctor sees the patient briefly and away from his environment, like a fish out of water (Dunlop & Alstead, 1966). Medical as well as para-medical care is administered in a highly impersonal manner.

It is possible, indeed, to make a long list of facilities and priorities available to trial patients which are denied to patients attending in the usual routine. No wonder, irregularity and drug default are the biggest problems facing our domiciliary treatment service (Pamra *et al*, 1973; Nagpaul, 1975).

Aim of the study

A few studies have compared the results obtained under controlled clinical trials with those obtained under routine service conditions. But these were either retrospective studies or the regimens used in the two groups were not identical (Kent *et al*, 1970; Baily *et al*, 1974).

The aim of the present study was to assess and quantify, as far as possible, the influence of certain factors on the results obtained among patients treated under Trial conditions and those treated under Routine conditions using the same drug regimen through the domiciliary treatment service of the New Delhi Tuberculosis Centre.

Organisation and Conduct of the Study

1. *Source of cases* : The study was carried out on newly diagnosed sputum positive pulmonary tuberculosis patients registered at the New

Delhi Tuberculosis Centre (hereinafter referred to as the Centre) between 1st May, 1973 and 30th September, 1974 and residing in the Centre's Domiciliary Treatment Service area. The Centre, it might be mentioned, operates this service in an urban population of about 8,00,000 spread over an area with a maximum distance of approximately ten kms. between the Centre and its farthest point.

The procedure for dealing with new patients in the routine is as follows :

After diagnosis is established, drug regimen decided, socio-economic interrogation and other formalities like contact examination completed, the patients attend for drug collection usually every 4 weeks, sometimes earlier, if there is any problem such as worsening of symptoms, haemoptysis or drug toxicity. In routine practice the total time spent by a patient after his arrival in the Centre till the collection of drugs is anything from half an hour to about two hours. In case he is sent for investigations like bacteriological and radiological examinations, this total period may be extended by another hour or so. Since the doctors rotate between the diagnostic and treatment sub-sections, patients may be attended to by different doctors at different visits. If a patient fails to attend within three days of the due date for drug collection, a health visitor is supposed to visit the patient's home. Three visits are paid during the next two to three weeks if default continues. The Chief Public Health Nurse or the Field Medical Officer finally visits the home if the health visitor's visits are ineffectual. If the patient does not attend even after this visit, he is finally listed as a non-cooperator, and no further attempt at retrieval is made.

2. Criteria for eligibility : All new patients reporting from the domiciliary treatment service area of the Centre having radiographic evidence of pulmonary tuberculosis and sputum smear positive for A.F.B. were considered eligible for inclusion in the study provided they satisfied the following criteria :

- (a) Age 15 years or more but not over 45 years.
- (b) No or less than two weeks previous chemotherapy before reporting at the Centre.
- (c) Willing to accept tablets and/or injections.
- (d) Willing and able to attend the Centre regularly to collect drugs.

- (e) Judged as likely to be co-operative on interrogation by the doctor and the area health visitor.
- (f) Likely to remain in the area for at least one year.

The presence of any of the following conditions made the patients ineligible for inclusion in the study :

- (a) General condition too bad for domiciliary treatment
- (b) Body weight less than 32 kg.
- (c) Pleural effusion obscuring more than one third of the lung field.
- (d) Known to be pregnant at start of treatment.
- (e) Extra-pulmonary tuberculosis, diabetes or any other condition/complication likely to lead to difficulty in the management at home.
- (f) Government servants and other similar categories of personnel entitled to special treatment facilities such as hospitalization, second-line drugs etc.

3. Allocation of Groups : After having established their eligibility for inclusion in the study, the patients were randomly allocated by opening the next in a series of sealed envelopes to one of the following two categories :

- (a) The Trial Group
- (b) The Routine Group

4. Pre-treatment investigation : Before the start of treatment, each patient was subjected to a clinical examination, weight, hemoglobin and total RBC count, total and differential WBC count and routine urine examination. Two pre-treatment sputum specimens from each patient were sent for culture and drug sensitivity, testing. A 70 mm postero-anterior radiograph of the chest was also taken.

5. Treatment Procedures:

(a) *Chemotherapeutic Regimen :* All patients included in the study, irrespective of the group, were prescribed the same drug regimen which comprised: INH 300 mg and thiacetazone 150 mg. once daily for 52 weeks; in addition, streptomycin one gram daily by intramuscular injection was prescribed during the first four

weeks of treatment. Drugs were supplied free of charge to all patients.

The above treatment regimen could be changed under the following circumstances:

- (i) Major toxicity or persistent intolerance;
- (ii) Clear-cut radiological deterioration provided it was accompanied by positive sputum;
- (iii) Non-conversion of sputum upto 24 weeks.

(b) *Hospitalization*: During the course of the study, no patient was admitted to any hospital or sanatorium.

(c) *Duration of Chemotherapy*: The total duration of chemotherapy as mentioned above was 52 weeks. Since the study related only to the first year of treatment, no definite guide-lines were laid for the chemotherapeutic regimen to be used after the expiry of this period.

(d) *Observations during treatment*

- (i) Departures from the prescribed chemotherapy, delays and defaults in drug collection and any evidence of drug toxicity were recorded separately for each four-week period of treatment.
- (ii) Sputum was examined by direct smear microscopy and culture every four weeks for 52 weeks. Sensitivity tests for streptomycin, INH and thiacetazone were carried out on pre-treatment positive cultures and those relating to 12, 24, 40 and 52 weeks, if positive.
- (iii) A 70 mm postero-anterior radiograph was taken at 12, 24, 40 and 52 weeks' period after the start of treatment. All radiographs were assessed by an independent observer who was not connected with the conduct of the study and was not aware of the group to which any particular patient had been assigned.

6. General Management

(a) *Both groups* : Patients were issued four weeks' drugs supply at a time. For patients attending late for drug collection the next supply of drugs was correspondingly reduced. For example, if a patient was supposed to attend on the 23rd of the month but attended on the 27th, the next supply of medicines was for 24 days only. In this way, every effort was made to get the

bacteriological and radiological examinations at the stipulated periods such as 12, 24, 40 and 52 weeks.

(b) *Trial group* : Patients in this group were given special facilities and concessions throughout the first year. At every visit, they were attended to by the same physician (the author) and were given all the priorities and facilities usually reserved for patients in controlled clinical trials. A special health visitor was deputed to take out the treatment card immediately after the arrival of the patient and the assigned physician attended to him as promptly as possible, reducing the waiting period to practically nil. Patients belonging to this group were attended to even if they reported after the normal working hours of the Centre. The attending physician and the special health visitor established and maintained a personal rapport with these patients in order to ensure regular and successful treatment. If a patient was late for drug collection even by a day the special health visitor immediately tried to contact him at his residence to persuade him to attend the Centre for drug collection. If needed, these visits were repeated several times. The special health visitor also made a surprise visit once in four weeks for pill counting etc. Besides the special health visitor, the area health visitor also visited the patients in case of drug default. In a way, each patient belonging to the Trial group had the services of two health visitors for checking of drug default.

(c) *Routine group* : Patients in this group were treated according to the usual routine of the Centre. They were not extended any extra or special facility. Since the attending physicians in the treatment room were not supposed to give any special consideration to these patients, the latter had to take their turn with the other patients attending the clinic. Drug distribution, health visiting etc. were handled in the usual manner. Except for the special home visiting required for the purposes of periodic assessment, no other special attention was paid to them. However, in case any problem arose or any clarification was required, the Routine group patients were referred to the author.

Material

Four hundred and sixty bacteriologically proved cases of pulmonary tuberculosis, residing in the domiciliary treatment service area of the Centre, were considered for inclusion in the present study. However, only 166 patients were actually included in the analysis and the reasons for the ineligibility of the remaining 294 patients are shown in Table 1. The major reason for exclusion (102 or 34.7 %) was that the patients

Table 1

Reasons for not including 294 patients in the study*

	Number	Percent
Age below 15 years or above 45 years	39	13.3
Previous anti-TB treatment > 15 days	50	17.0
Poor general condition and/or weight below 32 kg.	67	22.8
Tuberculosis elsewhere in the body	3	1.0
Pleurisy obscuring more than 1/3rd of lung field	5	1.7
Non-tubercular complications	19	6.5
Residential qualification not fulfilled	102	34.7
Not likely to conform to protocol (Govt. Servants etc.)	30	10.2
Initially Drug Resistant	21	7.1
	294	100.0

Patients ineligible on more than one ground have been counted in each category.

did not satisfy the necessary residential qualification i.e. they were unlikely to stay in the domiciliary service area for the duration of the study. Sixty seven patients (22.8%) were excluded because their poor general condition did not permit inclusion in the study. Another 21 (7.1 %) patients were not included in the analysis since their initial culture turned out to be resistant to one or more anti-TB drugs. A significant observation is that only about 36% of the patients attending a clinic satisfy the conditions usually laid down for intake in a controlled clinical trial.

One hundred and sixty six patients were allocated at random to either of the two groups; 78 to the Trial group and 88 to the Routine group. The distribution of these patients according to

sex, age, extent of initial disease and cavitation is shown in Table 2. It will be seen that inspite of random allocation, there was some difference in respect of sex and initial extent of disease among the two groups. The crude results, therefore, had to be 'standardised'.

Drug toxicity

Six patients had to be excluded on account of drug toxicity, four from the Trial group and two from the Routine group.

Deaths

Three patients died due to tuberculosis in the Routine group and another patient died due to train accident. The latter has been excluded from

Table 2

Distribution of patients by age, sex, extent of initial disease and cavitation

	Trial Group		Routine Group	
	No.	%	No.	%
Sex				
Male	56	71.8	70	79.5
Female	22	28.2	18	20.5
Age				
15—24 years	32	41.0	52	59.1
25—34 years	25	32.0	24	27.3
35—45 years	21	27.0	12	13.6
Extent of Disease				
1 zone of	16	20.5	7	8.0
2 zones	28	35.9	32	36.4
3 zones and more	34	43.6	49	55.7
Cavitation				
Not present	17	21.8	20	22.7
Single cavity	419	52.6	39	44.3
Multiple cavities (Unilateral)	11	11.5	10	11.4
Multiple cavities (Bilateral)		14.1	19	21.6
Total	78	100.0	88	100.0

analysis. No patient in the Trial group died during 52 weeks' treatment.

Results

(a) *Premature stopping of treatment*

Table 3 shows that premature stopping of treatment was far more frequent in the Routine group than in the Trial group, rising gradually from 12 weeks period onwards. The most common causes were migration and non-cooperation. It is significant that 38.6% patients in the Routine group stopped treatment prematurely as against 12.8% in the Trial group.

(b) *Regularity of treatment*

Regularity of drug collection (which has been taken to be synonymous with self-administration of drugs) is a very important index for comparing the two groups. Urine examination, surprise or routine, to determine covert irregularity was not feasible and was not done. Regularity for the

purposes of this study has been defined as 'drugs actually collected as a percentage of the amount that should have been consumed in any period' i.e.

Drugs collected during the entire period x 100

Drugs which should have been consumed during this period

For example, if a patient collected 81 days' drugs in a period of 90 days, he was labelled as '90% regular'.

Table 4 shows the regularity of drug collection in the two groups during successive quarters. Three different standards of regularity (over 80%, over 90% and over 95%) were adopted for this tabulation. Whatever the standard adopted it is obvious that patients in the Routine group were far more irregular in drug collection than those in the Trial group, especially after the first 12 weeks' period. If 80% regularity be considered as the minimum acceptable, the

Table 3
Patients completing successive periods of treatment in the two groups

		Patients at start	Patients completing			
			12 weeks	24 weeks	40 weeks	52 weeks
Trial Group	No.	78	74	71	69	68
	%/°	100.0	94.9	91.0	88.5	87.2
Routine Group	No.	88	80	70	64	54
	%/a	100.0	90.9	79.5	72.7	61.4

Table 4
Regularity of drug collection in the two groups during successive quarters

		Trial Group				Routine Group			
		Total patients	Regularity			Total patients	Regularity		
			>95%	>90%	>80%		>95%	>90%	>80%
0—12 weeks	No.	74	49	58	69	80	48	60	69
	%/°	100.0	66.2	78.4	93.2	100.0	60.0	75.0	86.2
13—24 weeks	No.	71	43	51	59	70	27	43	55
	%/°	100.0	60.6	71.8	83.1	100.0	38.6	61.4	78.6
25—40 weeks	No.	69	34	50	60	64	20	27	37
	%/°	100.0	49.3	72.5	87.0	100.0	31.2	42.2	57.8
41—52 weeks	No.	68	28	39	55	54	17	25	29
	%/a	100.0	41.2	57.4	80.9	100.0	31.5	46.3	53.7

proportion of patients in the Trial group reaching this standard was 93.2%, 83.1%, 87.0% and 80.9% in the four successive quarters compared to 86.2%, 78.6%, 57.8% and 53.7% in the Routine group.

If we consider the cumulative regularity at various periods of treatment (calculated according to the formula described above) it is again observed that patients in the Trial group were far more regular in drug collection than those in the Routine group (Table 5). Over the entire 52 weeks' period, the proportion of patients reaching the 95%, 90% and 80% standard of regularity was respectively 45.6%, 72.0% and 92.6% among the Trial group patients and 29.6%, 46.3% and 70.4% among the Routine group patients.

(c) *Bacteriological results*

Sputum was considered to be converted when

two sputum/laryngeal swab cultures, taken at four weekly intervals, were negative.

For a small number of patients results of bacteriological examination were not available at one stage or the other. These have been excluded from Table 6 which shows bacteriological results at successive stages. The rate of sputum conversion, as can be seen from this Table, was more rapid among patients belonging to the Trial group as compared to those in the Routine group. The comparable figures for the Trial group and the Routine group at 12, 24, 40 and 52 weeks periods are 85.7%, 85.9%, 86.6%, and 93.4% and 65.3%, 69.7%, 75.0% and 80.0% respectively. It would be seen that not only was conversion more rapid in the Trial group but the overall conversion rate too was significantly higher. These differences are statistically significant at all stages ($P < 0.05$).

It may be recalled here that the two groups of

Table 5

Cumulative regularity of drug collection in the two groups at various stages

		Trial Group				Trial Group			
		Total patients	Regularity			Total patients	Regularity		
			>95%	>90%	>80%		>95%	>90%	>80%
0—12 weeks	No.	74	49	58	69	80	48	60	69
	V/a	100.0	66.2	78.4	93.2	100.0	60.0	75.0	86.2
0—24 weeks	No.	71	42	50	65	70	33	48	56
	V/a	100.0	59.2	70.4	91.5	100.0	47.1	68.6	80.0
0—40 weeks	No.	69	39	47	62	64	19	29	42
	V/a	100.0	56.5	68.1	89.9	100.0	29.7	45.3	65.5
0—52 weeks	No.	68	31	49	63	54	16	25	38
	V/a	100.0	45.6	72.0	92.6	100.0	29.6	46.3	70.4

Table 6

Bacteriological assessment at successive stages

		Trial Group				Routine Group			
		Bacteriological results available	Sputum negative	Sputum positive	Dead Tbc	Bacteriological results available	Sputum negative	Sputum positive	Dead Tbc
12 weeks	No.	70	60	10	—	72	47	22	3
	%	100.0	85.7	14.3	—	100.0	65.3	30.6	4.2
24 weeks	No.	64	55	9	—	66	46	16	4
	%	100.0	85.9	14.1	-----	100.0	69.7	24.2	6.1
40 weeks	No.	67	58	9	—	60	45	11	4
	%	100.0	86.6	13.4	-----	100.0	75.0	18.3	6.7
52 weeks	No.	61	57	4	—	50	40	6	4
	%	100.0	93.4	6.6	—	100.0	80.0	12.0	8.0

patients showed some difference in the initial extent of disease (Table 2). Even after allowing for these differences by the statistical procedure of standardization, one finds the results in the Trial group to be considerably better than those in the Routine group (84.8%, 85.1%, 86.1%, and 93.8 % sputum conversion rates at the end of successive quarters in the former compared to 66.1%, 70.2%, 75.3% and 80.8% in the latter). (Standardization was based only on patients with two or more zones involved since the number of patients with involvement of one zone was too small in one of the groups).

(d) *Radiological changes*

The radiological clearing achieved in the two groups at successive stages is shown in Table 7. The number of patients attaining complete clearing at 52 weeks period was 37.9% in the

Trial group compared with 34.8 % in the Routine group. A close study would show (Table 7) that at the 40 and 52 weeks periods there were significant qualitative differences in improvement recorded in the two groups of patients. The differences persist inspite of standardization for pre-treatment differences (Table 8).

(e) *Target Point*

The overall achievement of chemotherapy in the two groups was assessed in terms of a composite index, viz. the Target Point, incorporating both the bacteriological and the radiological improvement. A patient was said to have reached this point if in the plain skiagrams lesions were stationary, no cavity was seen and the sputum/laryngeal swab cultures were negative for at least six months. Out of 58 patients in the Trial group for whom 52 weeks' results are

Table 7

Radiological Assessment * at successive stages

	Trial group							Routine group						
	Total patients	+3	+2	+1	0	Worse	Dead	Total patients	+3	+2	+1	0	Worse	Dead
12 weeks	No.	—	18	40	13	—	—	70	—	11	45	12	—	2
	%	—	25.4	56.3	18.3	—	—	100.0	—	15.7	64.3	17.1	—	2.9
24 weeks	No.	6	38	21	—	2	—	63	1	43	15	2	—	2
	%	9.0	56.7	31.3	—	3.0	—	100.0	1.6	68.2	23.8	3.2	—	3.2
40 weeks	No.	19	36	8	1	1	—	58	9	39	8	—	—	2
	%	29.2	55.4	12.3	1.5	1.5	—	100.0	15.5	67.2	13.8	—	—	3.4
52 weeks	No.	22	29	4	1	2	—	46	16	25	2	—	1	2
	%	37.9	50.0	6.9	1.7	3.4	—	100.0	34.8	54.3	4.3	—	2.2	4.3

* Radiological Assessment code given at bottom of Table 8

Table 8

Radiological assessment at successive stages : Standardised rates (%)

	Trial Group						Trial Group					
	+ 3	+ 2	+ 1	0	Worse	Dead	+ 3	+ 2	+ 1	0	Worse	Dead
12 weeks	—	27.2	56.2	16.6	—	—	—	14.9	64.6	17.5	—	3.0
24 weeks	7.1	62.1	28.8	2.0	—	—	5.2	66.5	22.0	3.1	—	3.2
40 weeks	32.3	52.0	6.7	2.4	6.6	—	15.4	68.6	12.4	—	—	4.6
52 weeks	33.3	54.2	6.2	2.0	4.3	—	31.3	57.3	4.5	—	4.5	3.3

* Radiological Assessment Code:

+ 3 Almost complete clearing

+2 Over 50% clearing

+1 20% to 50% clearing

0 No change (+20% to—20%)

Worse Worse (—20% or more)

available, 31 (53.5%) reached this point within 52 weeks period as against 15 (32.6%) out of 46 in the Routine group. This difference, again, is statistically significant ($P < 0.05$).

Discussion

While assessing the working of any routine domiciliary treatment organisation, it is usual to compare its achievements with those obtained in the controlled clinical trials. In routine domiciliary treatment service in some clinics, the overall results obtained from the home-based treatment programmes are comparatively poor compared to those obtained in controlled clinical trials. An attempt has been made in the present study to show that such direct comparisons may to some extent be misleading.

The final outcome of the result of anti-tubercular chemotherapy depends upon the following three sets of conditions :

- (i) The nature or composition of the drug-regimen prescribed.

- (ii) The presence or absence of factors likely to effect the management adversely and

- (iii) the organisational set up of the clinic or institution managing the patient.

It is a common observation that different results are obtained if the drug regimens prescribed are different (Tuberculosis Chemotherapy Centre, Madras 1960; Fox, 1971; Pamra & Mathur, 1973). Even when the same regimen is used the final results may not be maximal because of the presence of adverse factors such as initially extensive disease, poor general condition, drug resistance and advanced age. According to Pamra *et al* (1973), 90 % success in domiciliary chemotherapy with the particular regimens used can be achieved if no initial adverse factors are present, factors that in general, make a patient ineligible for inclusion in a controlled clinical trial. The patients in a controlled clinical trial are a selected lot. Only about 36% of the patients attending a routine clinic service would have qualified for inclusion in a controlled clinical trial (Table 1).

A majority of patients would have to be excluded for reasons which, in general, are designated as of adverse or poor prognostic significance, and this may partly explain the 'shortfall' between the ideal and the actual results obtained. In routine domiciliary service, all patients are to be treated; there is no choice.

In the present study the first two sets of conditions responsible for the 'shortfall' were largely excluded so that any further shortfall noted could be legitimately ascribed to the differences in dealing with these patients at the organisational level.

It has been commonly observed that under domiciliary treatment service the behaviour of a patient is not constant and anything from 10% to 50% of the total patients may abandon treatment prematurely against medical advice. Gothi (1955) reported that the proportion of patients making 9 out of 12 monthly collections in a year varied from 52 % when the treatment centre was nearby to 7% when it was far off. Parthasarathy (1969) found that the percentage of patients collecting drugs at 3, 6, 9 and 12 months periods was 52, 75, 67 and 65 respectively. In a co-operative investigation conducted by the Indian Council of Medical Research at six different clinics, it was observed that the range of patients stopping treatment prematurely varied from 15.4% to 64.7% (Pamra & Mathur, 1973). This variation is a reflection of the existing state of facilities available at different clinics. The reasons may be migration, non-cooperation or patient becoming symptom-free, or others enumerated earlier.

In the present study, inspite of the best facilities extended, 12.8 % of the patients from the Trial group left treatment prematurely. This percentage includes not only some patients who had some compelling difficulties about staying in Delhi or otherwise continuing treatment as advised, but also a hard core of, say, 5 to 10 per cent who would be non-cooperative under any circumstances and are probably so in other walks of life as well. However, the considerable difference (38.6 % as against 12.8 %) between the Routine and the Trial group must be attributed to the better facilities that were made available to the patients in the latter group—facilities which make some patients, who might have been non-cooperative under routine conditions, continue with the treatment.

Minor irregularity in the self-administration of drugs under domiciliary treatment service conditions is unavoidable compared to supervised administration in the clinics or the hospitals. It was observed in the present study that patients

were far more irregular in the Routine group compared to those in the Trial group (Table 4). The percentage of patients showing less than 80 % regularity at 52 weeks period in the Routine and the Trial group was 29.6% and 7.4% respectively, showing a significant difference of about 22%. If irregularity in treatment goes beyond a certain limit, say, more than 20%, it considerably contributes to the failure of treatment (Pamra *et al.*, 1973). The difference between the two groups with regard to premature stoppage of treatment and irregularity, as already emphasised, can be directly attributed to the availability of greater facilities to the patients in the Trial group.

The final outcome of the regularity is observed in the clinical response, sputum conversion rates and radiological clearing. Whatever be the criterion or the yardstick applied, whether it is premature stopping of treatment or irregularity or bacteriological conversion or radiological clearing or attainment of the 'target point', the results among the patients belonging to the Trial group were far better and more satisfactory than those in the Routine group. (Tables 6, 7 & 8). It would be instructive, too, to compare the overall, cumulative effect of all these factors. Out of 78 patients in the Trial group, 68 completed 12 months' treatment and (making allowance for some who could not be examined at the end of this period), sputum conversion was obtained in 64 (82%). The comparable figure for the Routine group is 43 (49%) conversions out of 88 patients. There is thus a difference of 33% in the overall achievement between the two groups. This difference could be attributed to one main factor—a personal rapport between the clinic staff and the patients in the Trial group. The above data cannot help but point at the organisational lacunae responsible for the 'shortfall' between what is achieved and what should be achieved.

One of the main reasons for irregular and inadequate treatment is quick symptomatic relief. However this need not always be so if patients are repeatedly motivated about continuing to take drugs as advised inspite of symptomatic relief. Had irregularity in this study been only due to symptomatic relief one would have expected higher irregularity in the Trial group patient with better and quicker results, and, therefore, symptomatic relief.

The management of a patient involves many factors of which the intrinsic efficacy of drugs is but one though the most important one. However, it is for the medical and para-medical personnel in domiciliary service to operate an efficient and effective 'pullback system' in case of

drug default, irregularity and premature stoppage of treatment, if maximal results are to be obtained.

It has been increasingly recognised how valuable it is to have one physician primarily responsible for the tuberculous patient throughout his illness (Dunlop & Alstead, 1966). It can be comforting to the patient that he will remain under the care of one particular doctor and can seek any help whenever necessary. An effort should be made to have a reasonable doctor-patient ratio, so that a personal rapport between the two may be able to keep the latter a 'captive audience'.

We have been rightly laying emphasis on effective and judicious drug regimens; also needed is an equally efficient management to prevent drug default and premature stoppage of treatment. The latter two account for drug resistance and treatment failure, and even if a patient gets well, it is believed that the chances of reactivation in the long run are greater compared to those who had adequate treatment from the onset (Snider *et al*, 1975; Pamra *et al*, 1976).

These findings are encouraging as well as disheartening: encouraging in the sense that under certain improved conditions near-maximal results can be achieved; disheartening, because the results are not being achieved leaving a gap of about 33 % between the two groups because of the organisational deficiencies of our clinics. The problems that we face to-day cannot be solved by advanced scientific and technical skills alone; we require management skills as well to solve them.

Summary and Conclusions

The paper presents the results of a concurrent comparison of patients treated under trial conditions and under routine service conditions. In all, 166 patients were allocated to the two groups by randomization. Patients in both the groups were prescribed the same drug regimen. Those belonging to the Trial group had the same facilities as are offered in controlled clinical trials. The same doctor attended to this group, on priority basis, clinic working timings were flexible for these patients and the services of two health visitors for taking prompt defaulter action were available. Patients belonging to the Routine group were attended to in the usual routine of the Centre and no special facility was given.

Significant differences were observed in the results between the two groups with regard to (i) premature stopping of treatment, (ii) irregularity

in drug collection, (iii) bacteriological conversion, (iv) radiological clearing and (v) attainment of 'Target Point'. Whatever be the yardstick applied, it was observed that the results among the patients belonging to the Trial group were far better and more satisfactory than those in the Routine group. There was a difference of 33 % in the overall achievement between the two groups.

Among the important factors which could explain this difference was the existence of a personal rapport between the clinic staff and the patients in the Trial group, which was absent in the Routine group. The data point to the organisational lacunae responsible for the 'shortfall' between what is achieved under controlled trial conditions and what could be achieved under routine service conditions.

It is concluded that an adequate, efficient and flexible clinic service with all the necessary staff and equipment is a pre-requisite for the proper functioning of the domiciliary treatment service. The problems that we face to-day cannot be solved by advanced scientific and technical skills alone; we also require management skills to solve them.

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Summaries of Papers Presented at the Thirty-first National Conference on Tuberculosis and Chest Diseases

CASE-FINDING & FOLLOW-UP THROUGH P.H.C.

M.L. MEHROTRA *et al.*

The paper deals with the programme of case-finding and follow-up of patients under treatment carried out by the Training & Demonstration Centre, Agra in collaboration with the PHCs in the rural areas of Agra District. The programme is slightly different from the one envisaged in the national tuberculosis programme. Agra has 18 P.H.Cs. The key staff from each PHC comprising a medical officer, a microscopist and a dispenser were brought to the Training & Demonstration Centre for training for one to two weeks. Thereafter, a medical officer, a health visitor and a laboratory technician of the Centre visited the PHC on a fixed day once a week for helping the PHC staff in case-finding, starting treatment and follow-up. The X-ray unit of the Centre visited the PHC once a month. A BCG technician was posted at the PHC for tuberculin testing of symptomatics and BCG vaccination of Primary School children within a radius of 5 km. from the P.H.C. When more P.H.C.s were included in the programme the visit of the Centre staff was reduced from once a week to once a month and the visit of the mobile X-ray unit was discontinued. The other features of the programme were involvement of Nyaya Panchayat, town area committees and voluntary social workers of the area. An active door to door search for symptomatics, collection and examination of sputum along with tuberculin testing and BCG wherever indicated were also arranged. The main deterrents are stigma, lack of confidence in the programme leading to failure to accept responsibility and challenge, inadequate supervision, communication gap between various authorities responsible for the programme and the low priority that seems to be given to tuberculosis programme.

NATIONAL TB CONTROL PROGRAMME — ROLE OF TB HOSPITALS

A. CHAKRAPANI RAO

Andhra Pradesh has 1,830 beds for treatment of tuberculosis in 6 regional tuberculosis hospitals. 10% of the beds are reserved for emergencies, 10% for resistant or re-treatment cases, 5% for non-tuberculous chest conditions and the remaining 75 % for admissions from routine waiting list maintained in 21 district tuberculosis centres. Only 25% of the patients that are admitted in the hospital complete their treatment from the DTC after discharge from the hospital. Diagnostic and treatment activities in the PHIs are practically negligible. The author suggests that a large part of the funds spent on hospitals could profitably be diverted to the TB centres since 1/3rd of the total expenditure of a hospital is infructuous as it is on patients who do not complete the treatment after discharge.

ROLE OF PERIPHERAL CENTRES IN THE URBAN TUBERCULOSIS CONTROL PROGRAMME IN THE CITY OF MADRAS

K.V. KRISHNASWAMI and R. PARTHASARTHY

The Madras city urban tuberculosis control programme had been evolved with a view to provide diagnostic and treatment facilities to patients near their homes in all parts of the city. The city is divided into 16 zones each with an average population of 2.5 lakhs. The Tuberculosis Training and Demonstration Centre supervises and provides these facilities through 35 peripheral centres; 22 run by the Government, 5 by the Corporation and 8 by voluntary organisations. The staff of the various peripheral institutions is also helped by the doctors from the Training & Demonstration Centre. Easy accessibility, easy retrieval of defaulters and adequate diagnostic facilities favour the case-finding programme. Some of the deterrents are the heavy case-load which has to be dealt within limited working hours leading to rush of patients and little time for motivation, and some administrative impediments. Patients switch over from one clinic to another leading to wastage of resources and duplication of work. Different procedural standards followed in institutions with different managements also hamper efficient working of the programme. The authors advocate a

Unified control, full coordination and standardization of procedures, proper and fuller utilization of available resources, adequate and uninterrupted drug supply, regular supervision and periodic assessment with a view to remove these difficulties.

DETERMINATION OF THE APPROPRIATE INDEX AND TIME FOR ASSESSING THE EFFECTIVENESS OF A TUBERCULOSIS CONTROL PROGRAMME

S.S. NAIR

(Full paper is published elsewhere in this issue)

PARTICIPATION IN NATIONAL TUBERCULOSIS PROGRAMME THROUGH THE C.R. MOBILE HOSPITAL CAMPS IN HARYANA & THE WORKING OF PHIs IN THIS CONNECTION

M.S. PARMAR

Under the mobile hospital scheme, Rohtak Medical College runs a mobile camp hospital in remote and backward areas of Haryana. Two camps are held in each district between October and April of the following year. All specialties in the Medical College are represented in these camps which, in their active phase, last for 3 to 4 days, the total duration of the camp being about 10 days. Diagnostic, curative and BCG vaccination facilities are provided in all camps. Experience of 11 camps is presented. About 400 symptomatics were examined in each camp. About 150 specimens of sputum were examined and of these about 12% were found positive for A.F.B. On an average 45 patients suffering from active tuberculosis were detected in each camp. These patients were given one month's drugs on the spot and advised to attend the nearest PHI subsequently for further supply of drugs under the DTP. These camps, to a certain extent, compensate for the poor working of the P.H.Is.

EFFECT OF MASS SPUTUM SURVEY, HEALTH EDUCATION & BCG VACCINATION CAMPS (ANTI-TB SHIBIRS)

H.P. RAMESH

Twenty-five shibirs have been held in the district of Chikmagalur, the main objective being detection of open cases of tuberculosis, providing for their treatment through involvement of the PHI staff, popularization of BCG vaccination and above all to create awareness of the problem in the community and to involve voluntary organisations like the Rotary and Lions Clubs, school and college staff, village panchayats, municipalities, philanthropists etc. in the national control programme. The average duration of a camp is one and a half days and at practically no expense. 89 sputum positive cases were detected in the 25 camps. The camps are not proposed as a substitute for the national tuberculosis programme but as a supportive activity of the DTC.

THE TAI's TRIAL ON SHORT-TERM CHEMOTHERAPY

Research Committee, T.A.I.

(Full paper is published elsewhere in this issue)

A CONTROLLED CLINICAL TRIAL OF SEMI-SUPERVISED SHORT COURSE CHEMOTHERAPY IN PULMONARY TUBERCULOSIS—TWO YEARS FOLLOW UP

TB CENTRE, AGRA

421 previously untreated sputum positive patients were randomly allocated to one of the three treatment groups. Study group I was given Streptomycin, INH, Pyrazinamide & Ethambutol daily for 4 weeks in hospital, followed by Pyrazinamide, INH and Ethambutol (Domiciliary) for 20 weeks, again all the four drugs for two weeks in hospital followed by Placebo (Domiciliary) for 52 weeks. In study group II drugs were same except that the first domiciliary phase was for 32 weeks

Instead of 20 weeks and placebo phase of 40 weeks. The third group (controls) were given Streptomycin, INH and Thiacetazone for 4 weeks in hospital followed by INH and Thiacetazone for 76 weeks (domiciliary). Only 225 patients (51,92 and 82 respectively) were available for analysis of one year's results. Toxic reactions were seen in 12, 3 and 12 patients respectively. 3, 5 and 6 patients died respectively in the three groups. Defaulters numbered 10, 36 and 27 respectively. There were 12 relapses in Group I and only 2 in group II among regular patients.

IS ONE YEAR'S TREATMENT ENOUGH?

S.P. PAMRA, *et al.*

There is disagreement amongst various workers about the optimum duration of treatment; some believe one year's treatment is enough while others treat patients for even more than 2 years. A controlled study to answer the following questions is being carried out at the New Delhi TB Centre:

1. Does continuation of chemotherapy influence relapse rate if sputum is converted after one year's treatment?
2. Does continuation of chemotherapy help to attain quiescence if not attained with one year's treatment?

All newly diagnosed sputum positive patients who are converted at the end of one year's treatment with two drugs are randomly allocated to three groups. In one group only placebo is given for another year; in the second group INH alone is given and the third group is treated according to the usual practice with two drugs till 'target point' is reached and thereafter INH is given to complete two years' treatment. Patients who are not converted at the end of one year's treatment are continued on whatever treatment is indicated. The interim results based on 137 patients who had completed one year of follow-up (i.e. one year after the initial year of treatment) tend to show that if sputum is converted with 12 months' regular treatment with two-drug regimens in previously untreated patients, nothing seems to be gained by further continuation of one or two drugs more. Worsening during the second year, irrespective of the group to which the patients belonged, depended on presence of open cavities and more extensive residual lesion. The number of cases who were not converted at the end of one year and are being followed further is too small at present to allow any valid conclusions about such cases.

RETREATMENT OF PATIENTS WHO RELAPSE AFTER STANDARD CHEMOTHERAPY

TB CHEMOTHERAPY CENTRE, MADRAS

(Full paper is published elsewhere in this issue)

INCIDENCE OF TB INFECTION AND DISEASE IN CHILDREN

S. MAYURNATH

(Paper not received)

TUBERCULOSIS IN PEDIATRIC AGE GROUP

G.D. GOTHI

(Full paper is published elsewhere in this issue)

PREVALENCE AND PATTERN OF PRIMARY TUBERCULOSIS IN CHILDREN

NEW DELHI TB CENTRE

(Full paper is published elsewhere in this issue)

TECHNIQUE OF ROUTINE RADIOGRAPHY OF CHEST IN CHILDREN AND RADIOLOGICAL DIAGNOSIS OF CHILDHOOD TUBERCULOSIS

N.L. BORDIA

A large number of children are referred to specialists for advice and/or treatment of tuberculosis, where diagnosis is wrongly made on the basis of a faulty skiagram of the chest. The author demonstrated with the help of well-planned and well made slides the technique of taking proper skiagrams of children and the effects of low KVP high exposure time, reduction in the distance between the tube and the cassette, phase of respiration etc. which often lead to a wrong diagnosis. It was vividly brought out that radiology alone should never be relied upon to make a firm diagnosis of tuberculosis in children and in a case with a suspicious skiagram, fluoroscopy of the child is very effective in removing the doubts.

PATTERN OF TUBERCULOSIS IN CHILDREN ATTENDING OUT-PATIENTS DEPARTMENT OF TUBERCULOSIS CONTROL AND TRAINING CENTRE, NAGPUR

K.W. BARLINGAY and C.R.N. MENON

An analysis of the records of children attending Tuberculosis Control and Training Centre, Nagpur from 1962 to 1972 has shown that the infection rates seem to have come down during the later half of the period as compared to the former (24.1 % to 15.8 %), though there is no decline in the prevalence of active disease.

A CLINICO-RADIOLOGICAL STUDY OF SPINAL TUBERCULOSIS

P.K. DABRAL *et. al.*

52 cases of tuberculosis of the spine admitted in the M.L.B. Medical College, Jhansi from 1973-75 have been studied. Majority of the patients were males and none was below one year in age. Majority of the patients were young adults. Almost all had localised backache and stiffness. 14% had a palpable cold abscess and the same percentage had a discharging sinus. Diminution of disc space was seen as the earliest radiological sign. Majority of the patients responded satisfactorily to anti-TB drugs and immobilization. Decompression was necessary only in two cases. Some cases needed arthrodesis later on for instability of the spine. If fusion and decompression are done at the same sitting, it reduces the period of recumbency and hospitalisation.

A FIVE YEAR CLINICAL STUDY OF TUBERCULAR MENINGITIS IN ADULTS

N.L. PATNEY *et. al.*

377 patients of tuberculous meningitis have been studied over a period of four years. Majority of the patients were females. Maximum cases were in the third decade of life. Overall mortality was 27% with 34% in males and 23% in females. General and/or neurological complications were present in 1/3 of the cases and in these the mortality rate was much higher. Associated tuberculous lesions, pregnancy, emaciation, etc. did not influence mortality rate as against pulmonary oedema, uraemia, dehydration, peripheral vascular collapse etc., which raised the mortality rate significantly. Similarly, marked leucocytosis raised urea content of blood and CSF protein above 400 mg% lead to higher mortality.

VALUE OF PERITONEAL BIOPSY IN SUSPECTED CASES OF ABDOMINAL TUBERCULOSIS

O.P. MITAL *et. al.*

The paper deals with the technique of peritoneal needle biopsy and its value as a diagnosis aid in 80 suspected cases of abdominal tuberculosis. Three types of needles, viz. Vim Silverman, Abrams and Cope needles were used. 16 patients had ascites. Patients who had no ascites were given pneumo-peritoneum before biopsy could be taken. Associated pulmonary tuberculosis was present in 61 cases. Mantoux test was positive in 91%. Smear and culture examination of ascites fluid was negative in all cases. Adequate tissue was obtained in 12 out of 16 cases with ascites and 34 out

of 64 cases without ascites. Specific diagnosis of tuberculosis could be established in 7 out of 12 tissue positive cases with ascites. In cases without ascites 12 cases had histopathological evidence of tuberculosis. In all, the diagnosis of peritoneal tuberculosis could be made in 19 out of 80 cases. No serious complications or fatality was observed.

EXCISIONAL SURGERY IN POTT'S SPINE WITH NEUROLOGICAL DEFICIT

SATYA NAND

The paper is based on 50 cases of tuberculosis of the spine with varying degrees of neurological deficits treated in the G.V.S.M. Medical College, Kanpur. All these patients had had treatment, viz. chemotherapy and immobilization with POP earlier. Majority of the patients were females. Lower dorsal and upper lumbar spine was involved most frequently. In more than 50 % of the cases only two adjacent vertebrae were affected. For surgical treatment the vertebral column was approached through the anterior route. The debris was excised *in toto* and grafts from excised ribs with or without support of cancellous graft were performed. Thickened meninges were incised for decompression. The author finds this technique more rewarding than the others and recommends that it is risky to delay surgery since radiology is a poor indicator of the extent of the lesions.

CHANGING PATTERN OF PULMONARY TUBERCULOSIS—A 25 YEAR STUDY IN AGRA

N.L. PATNEY *et. al.*

(Paper not received)

*** STUDY ON CHANGES IN THE PATTERN AND BEHAVIOUR OF PULMONARY TUBERCULOSIS DURING 1966-1975**

HARIHAR DAS *et. al.*

Age, sex, sputum status and extent and severity of disease of the 1,554 new patients of pulmonary tuberculosis in 1975 have been compared with 1,169 patients of 1966. There is no significant age and sex difference. Nearly 70 % of the patients were males. The duration of symptoms prior to attending the clinic appears to be less in 1975 than in 1976. 22.9% of the 1975 patients were found sputum positive as against 15 % in 1966. This difference may however have been due partly to better technique and partly because of an unknown number having been contributed by the PHIs. The percentage of cases with capitation and advanced disease was significantly less in 1975 as compared to 1966.

IMMUNOLOGICAL SIGNIFICANCE OF NEGATIVE MANTOUX TEST IN TUBERCULAR PATIENTS

M.S. AGNIHOTRI

(Full paper is published elsewhere in this issue)

PLEURO-PULMONARY CALCIFICATION

H.B. DINGLEY

Out of 45,817 patients' skiagrams reviewed during the period 1972-74, 30 skiagrams showed pleural and/or pulmonary calcification. Majority of them were males and more than 40 years in age. 20 patients gave previous history of pulmonary tuberculosis or pleural effusions. Although all the patients had symptoms suggestive of active tuberculosis, the sputum was positive only in three cases. 10 others had radiological evidence of active pulmonary disease. Tuberculin test was positive in 27.

SERUM TRANSAMINASES IN PULMONARY TUBERCULOSIS

B.M. GOYAL, *et. al.*

SGOT and SGPT values were studied in 55 patients of pulmonary tuberculosis. All were sputum positive. Patients with complications were excluded. 25 healthy individuals were included

in this study as controls. The values of SCOT and SGPT in cases of pulmonary tuberculosis did not differ significantly from those in the controls. Extent and duration of tuberculosis and age and sex of the patients did not influence this activity. However, relatively higher levels were noted in patients with non-productive cough as compared to those having productive cough irrespective of the duration of the disease.

SPUTUM CONVERSION AND QUANTITATIVE BACTERIAL COUNT OF A.F.B. IN SPUTUM AFTER TREATMENT IN PULMONARY TUBERCULOSIS

O.A. SARMA

Overnight sputum was examined by direct smear every week upto 8 weeks after commencement of chemotherapy. After 8 weeks the sputum was examined once a month. Out of 40 cases treated with first line drugs the rise and fall phenomenon was seen in two cases and in 31 out of the other 38 sputum was converted within four weeks. Six of these cases were cavitory. Out of the 56 cases treated with second line drugs the rise and fall phenomenon was seen in 8 cases. The sputum was converted in 43 out of the remaining 48 in a period of six weeks.

OBSERVATIONS ON DAILY EOSINOPHIL COUNT IN ONE HUNDRED CASES OF TROPICAL EOSINOPHILIA

H.K. SINGH

Circulating eosinophils, though a small proportion of total body pool, provide a sensitive and reliable index for the study of eosinophilia in man. 100 hospitalised patients of tropical pulmonary eosinophilia were subjected to daily estimation of absolute eosinophil count (AEC) for 30-35 days during which period deworming, if necessary, and specific treatment was given. 69 patients were males and remaining 31 females. The study showed slow rise and fall of AEC levels. Two weeks' treatment with specific drugs is minimum for obtaining clinical cure in most patients. Simultaneous administration of cortico-steroids gives better results.

PATTERN OF RESISTANCE OF TUBERCLE BACILLI TO SECOND LINE ANTI-TUBERCULAR DRUGS

C. SRINIVASA RAO.

Sensitivity to second line drugs of bacilli excreted by 69 sputum positive patients who had earlier been treated with first line drugs for varying periods was carried out. Resistance to Ethambutol, Cycloserin and Pyrazinamide was noticed in some patients who had never been treated with these drugs previously. Of all the second line drugs, resistance developed least to Ethambutol.

ROLE OF SURGERY IN THE MANAGEMENT OF PULMONARY TUBERCULOSIS

P.B. DAS and J.G. DAVID

The study is based on management of pulmonary tuberculous patients in the Wanless Chest Hospital, Miraj over a period of ten years (1963-72). Only 805 patients out of a total of nearly 1,000 needed surgical treatment. During this period there was a decline in patients needing surgical treatment. Pulmonary resection is now the procedure of choice. Bronchopleural fistula with empyema was the most important complication and was seen in nearly 3 % cases. Mortality rate was 2.8 % and almost all of them had bronchopleural fistula. Though mild to moderate respirator insufficiency developed in some patients, none was seriously incapacitated. The majority of surviving patients have remained well with quiescent disease,

COLLAPSE Vs RESECTIVE SURGERY -- A REVIEW OF PATIENTS

H.B. DINGLEY

Failure of bacteriological conversion/or cavity closure after 9 months-12 months adequate treatment with specific drugs/antibiotics is an indication for surgical intervention vis-a-vis administration of reserve drugs surgical intervention is of two types:

1. Resective/or excision of the diseased area
2. Collapse of the diseased area.

Radical procedure is resective, but collapse procedure is preferable in pathology of the upper lobe, with contralateral disease, which may be apparently quiescent or healed. In a total of 12,806 patients discharged between the period of 1959-75, surgical treatment was done in 1,039 or 8.1 %. Resective surgery was done in 392 or 37.7%, whereas in the rest 647 or 62.3 % collapse surgery was done. The results of bacteriological conversion particularly in relation to sensitivity studies and the type of surgery was reviewed. The total mortality, immediate and delayed, was 106 or 10.1% and of complications e.g. bronchopleural fistula and empyema 14 or 3.5%.

PLACE OF THORACOPLASTY IN THE PRESENT DAY MANAGEMENT OF PULMONARY TUBERCULOSIS—AN ANALYSIS BASED ON 700 CASES WITH 1 TO 14 YEARS' FOLLOW UP

A.L. ANAND

The study is based on about 700 cases subjected to thoracoplasty between 1960 and 1974. Cases in whom thoracoplasty was carried out for empyema or as a corrective procedure for plombage are excluded. Patients have been followed up from 1-14 years. About 92% are well. 4% still have active disease with or without positive sputum. Thoracoplasty being performed now is less extensive and therefore deformities and physical handicaps are noticed less often. Since the number of older TB patients is increasing and resection is hazardous in such cases, thoracoplasty has a definite place if chemotherapy fails.

VALUE OF MENGHINI NEEDLE IN LUNG BIOPSY

O.P. MITAL, *et al.*

Biopsy of the lung was carried out in 110 cases. 80 cases had localised lesions and 30 diffuse lesions. Adequate tissue for histopathology was obtained in 76 out of 80 cases with localised lesions and 22 out of 30 with diffuse lesions. Specific diagnosis was possible in 73 out of 76 where biopsy was successful. The diagnosis was malignancy in 46, tuberculosis in 17 and pneumonitis in 10 in localised cases. In cases with diffuse pathology, 12 had interstitial fibrosis, 2 alveolar cell carcinoma and 3 bronchiectasis. Complications appeared in 35 cases (pneumothorax 6, haemoptysis 14, subcutaneous emphysema and local bleeding 7). The complications in all cases were mild and self-healing.

ASSOCIATION OF MYCOSES WITH SYMPTOMATIC BRONCHO-PULMONARY DISORDERS AMONG TEXTILE MILL WORKERS

S.K. SHOME, *et al.*

Mycological investigation on the incidence of mycoses in patients of broncho-pulmonary disorders among 6,000 cotton textile workers was conducted. A total of 621 (10.5 %) workers suggestive of broncho-pulmonary disorders were screened for mycoses by direct examination, culture and animal inoculation of the sputum. 24.2% specimens were positive for fungal elements by direct examination. 15.7% were positive by culture. None of the specimens was positive by animal inoculation. There were 57 cases of Candidiasis, 7 of Nocardiosis and 6 of Cryptococcosis. There was suggestion of the involvement of opportunistic fungi in 28 cases. In 25 cases mycotic involvement appeared to be primary whereas in the remaining 45 chronic bronchitis, pneumonia, tuberculosis etc. were present simultaneously as pre-disposing conditions. A sample survey of the air in all the section and rooms of the mill for the presence of fungal spores showed presence of 15 different strains. Results show complete absence of any known human pathogenic fungi among those isolates.

A STUDY IN SPOROTRICHOSIS

S.C. CHAKRAVARTY *et. al.*

Two thousand and one persons were skin tested with Sporotrichum antigen. These included 1,282 patients with broncho-pulmonary disease and 175 with skin diseases. The remaining were gardeners, farmers and non-farmer villagers. 498 (25 %) were positive for the antigen. None of the 92 persons clinically investigated were positive for Sporotrichosis. All the 48 persons tested serologically were found to be negative. Sporotrichum antigen was prepared by the authors in their own laboratory and compared favourably with the antigen obtained from USA. The results of an experimental study were also reported wherein it was found that the Sporotrichum skin test became positive in rats after intravenous and intra-testicular injections but not after intracutaneous and subcutaneous injections.

IMMUNE REACTION IN PULMONARY ASPERGILLOSIS

K.L. SOBTI and R.S. HOON

Immunoglobulins IgA, IgM and IgE were estimated in 15 cases of Allergic broncho-pulmonary aspergillosis, 3 cases of Aspergilloma, 1 case of Invasive Aspergillosis and 4 cases of Cystic fibrosis complicated by pulmonary Aspergillosis. There were 10 controls. IgA was raised in 8 cases, the mean being 1930 (± 432). No alteration of immunoglobulins was noticed in Invasive aspergillosis. In cystic fibrosis cases complicated with pulmonary aspergillosis there were no changes in immunoglobulins. The estimation of IgE forms an important tool in the diagnosis of allergic broncho-pulmonary aspergillosis. The IgG is related to the activity and severity of the disease. No alteration in immunoglobulins was noticed in the controls.

A STUDY OF MYCOTIC FLORA OF RESPIRATORY TRACT IN PULMONARY TUBERCULOSIS

A.N. ANSARI, *et. al.*

(Paper not received)

HISTOPLASMIN SENSITIVITY AMONG CHEST DISEASE PATIENTS ATTENDING TB DEMONSTRATION & TRAINING CENTRE, AGRA

S.K. SHOME *et al.* (Paper not received) HISTOPLASMIN

SURVEY IN A HOSPITAL POPULATION

O.P. MITAL, *et. al.*

1954 patients were tested with histoplasmin between February and December, 1974 from two chest hospitals in Kanpur. The test could be read in 1,846 patients. Nearly 30% of these patients came from rural areas. 0.1 ml of H-42 histoplasmin antigen in 1 in 100 dilution was administered intradermally on the volar surface of the right forearm. Induration of 5 mm or more in transverse diameter after 48 hours was taken as positive. Attempts were made to isolate fungus from all the 14 positive reactors, but the sputum culture was negative in all of them. Of the positive reactors, 10 were males and 4 females, almost evenly distributed in all age groups except 0 to 10 year group in which there was no positive reactor. There was no difference in the rural and urban patients. One hundred and eighteen of the 1,846 persons tested had pulmonary calcifications. Of these, 5 only gave a positive reaction to histoplasmin and the reaction in this group ranged from 0 to 14 mm (mean 2.1 mm). On the other hand the tuberculin reaction amongst these ranged from 7 to 24 mm (mean reaction 16.6) which suggests that pulmonary calcification amongst these patients was mainly due to tuberculosis.

ROLE OF FUNGAL INFECTION-CANDIDA ALBICANS IN OCCUPATIONAL PULMONARY DUST DISEASES

RAVI SHANKER and R.K.S. DOGRA

Animal experiments conducted by the authors with *Candida Albicans* together with industrial mine dusts have revealed that fungal infection enhances the fibrogenic potential of mine dust and resembles in many ways the synergistic action of coal mine dust and tuberculous infection in the development of pulmonary massive fibrosis in coal mines.

OBSERVATIONS ON THE EFFECTS OF ATMOSPHERIC POLLUTION ON HUMAN HEALTH IN GENERAL

P.R. KRISHNAMURTHI

Pollution from motor vehicles is increasing in large cities. Poor engine performance of old cars, leakage of gas from crank case, evaporation from the fuel tank and carburetor result in the emission of carbon monoxide in the atmosphere which has an impact on central nervous system and blood chemistry. Coal and domestic fuel also contribute significantly to the air pollution. Solid wastes which include garbage refuse, excreta of men and animals pollute the atmosphere if allowed to decay due to non-removal. Air pollution leads to increased mortality among patients suffering from cardio-respiratory diseases especially the very old and the very young. Antecedent influenza epidemic may remove high proportion of susceptible patients bringing less dramatic results in the subsequent year. Chronic bronchitis, emphysema and cor pulmonale are aggravated by air pollution. Cigarette smoking also acts like air pollution in addition to being carcinogenic. Remedial measures in controlling automobile air pollution by providing wide roads, compulsory periodical engine overhaul, improving the standard of internal combustion piston engine, fitting with diesel engines and using electric cars for shorter trips was suggested. The community has also to be made conscious of keeping the environment as pollution free as possible.

DIFFICULTIES IN UNDERSTANDING THE EFFECTS OF ATMOSPHERIC POLLUTION ON HEALTH

B.B. CHATTERJEE

One of the main difficulties in proper study of the problem is the necessity for epidemiological approach which requires large number of persons kept under observation for long periods. Most of the studies have been on the basis of measure of carbon monoxide and SO₂ concentrations or concentration of suspended particulate matter or degrees of blackening filter paper through which air has been drawn. Furthermore, the degree of harmful exposure may vary from period to period. SO₂ concentrations above 0.07 ppm is associated with discernible morbid effects on the respiratory system. Regarding particulate material, the size and distribution of the particles also influences penetration into the lung and deposition at various levels. Certain particles of specific chemical nature like asbestos or beryllium also bring about specific disorders of the lung. In addition to the degree of air pollution in a place where a person lives, it is also important to know about the place of birth and other places where the person has lived before and the air pollution in those areas. Many more studies are necessary before a clearer understanding of the nature, extent and effects of atmospheric pollution can be obtained.

AN APPRAISAL OF DIFFERENT PROCEDURES OF HOME VISITING FOR REDUCING DRUG DEFAULT—AN INTERIM REPORT

GOVIND PRASAD *et. al.*

A controlled study is in progress at the New Delhi TB Centre to determine the contribution of home visiting in preventing and retrieving drug default amongst patients on domiciliary chemotherapy. In one group of randomized patients there is no home visiting after initial and repeated motivation at the Centre when the patients attend for drug collection. In another group, the health worker visits the patients' home one to three days *before* the due date of drug collection in addition to repeated motivation as in the first group. In the third group, the patients are visited according to current practice //they do not attend for drug collection on due date. Interim results have shown

that home visiting definitely helps to reduce default and increases the regularity of drug collection. Age and sex of the patients or of the most important and responsible member of the family do not seem to make any significant difference in the regularity in the three groups; but there is a suggestion that irregularity is perhaps more pronounced among the educated and economically better-off families. Whether the policy of "preventive" visiting (visit before drug collection is due) pays better dividends than home visiting for retrieval *if* default occurs remains to be seen.

CAUSES OF DRUG DEFAULT IN PULMONARY TUBERCULOSIS PATIENTS

K.D. GAUTAM *et al.*

497 defaulters attending TB Centre, Agra during June and July 1976 were interrogated to find out the cause of default. Default was defined as failure on the part of the patient to collect drugs within 7 days of the due date. In 93 % of the cases the default was due to socio-economic and personal factors concerning the patient e.g. death, sickness, marriage, etc. in the family, forgetfulness, lack of faith or failure to benefit from the treatment etc. In 3 % default was due to organisational factors like too much time taken for disposal in the clinic, fear of family planning, rude behaviour of the staff, in 1 % due to drug intolerance and in the remaining 3 % due to factors unconnected with disease or the patients such as riots, fire, theft, etc.

SOCIOLOGICAL STUDY TO ASSESS THE REASONS FOR DEFAULT OF PATIENTS UNDER DOMICILIARY TREATMENT IN AN URBAN SITUATION

K.V. KRISHNASWAMI and N. SETHURAMAN

A study was undertaken to assess the reasons for drug default in 320 patients attending the chest Institute, Madras. A large number migrated or were lost to follow up for other reasons and the analysis is based on 164 patients only. A patient has been considered as a defaulter if he did not attend within 3 days of the due date for drug collection. Drug default does not seem to vary with age, sputum status and treatment regimen of the patients. The main reasons of default were temporary absence from the city mostly because of business and family obligations such as deaths, marriages elsewhere; inability to find time for attending the clinic because of vocational commitments. Among the other reasons for default were unacceptability of the regimen prescribed (specially involving injections), intolerance to drugs and inability to find money for transport when the patients' residence was at a long distance from the clinic. Forgetfulness and improper understanding of the due date and time for drug collection did not account for many cases of default.

CAUSES OF DRUG DEFAULT IN PATIENTS TREATED AT KASTURBA TB CLINIC

MOHD. An and B.K. KHANNA

(Paper not received)

PROBLEMS OF DRUG DEFAULT, THEIR REASONS AND MANAGEMENT

A.G. PATEL

Out of 847 patients analysed the most frequent causes of drug default were economic difficulties, belief that the disease was cured, migration, transport difficulties etc. Failure to improve or deterioration were responsible for default only in about 8.6 %. Culture and sensitivity tests were done regularly for all the patients. It was found that 28 patients collected their drugs fairly regularly but probably did not consume the drug adequately and regularly as judged from sensitivity test. The author emphasises the importance of dealing with the patients sympathetically and with understanding and the quality of diagnostic and other services in reducing drug default.

PROBLEM OF DRUG DEFAULT IN A RURAL HEALTH CENTRE

T. RAMA RAO *et al.*

One hundred drug defaulters collecting drugs from a rural health centre, 15 km from Tirupati are analysed. Most of the defaulters were from the hinterland served by the health centre. 72 %

were males. The main reasons for default were socio-economic difficulties, ignorance; false sense of complacency because of relief of symptoms. 10% of the patients defaulted because they felt worse after treatment. Default was due to intolerance of drugs only in 1 %. Some of the defaults were due to improper motivation, irregular supply of drugs and unhelpful attitude of the staff of the health centre.

DRUG DEFAULT AMONGST RAILWAY POPULATION IN A LARGE RAILWAY COLONY

R.N. CHAKRABARTY *et al.*

Nearly 4,000 patients attending the Kharagpur railway chest clinic from 1971 to 1975 have been analysed. Nearly 8 % were defaulters and majority were among the family members rather than the employee of the railway. Most of the defaulters were more than 40 years in age and lived outside the railway colony. Most of them belonged to the low and middle income group. The default rate was much more among new cases than amongst relapse cases. Default is seen more often in the latter stages of treatment and contributed substantially to the disease becoming chronic and incurable. The main causes of default were found to be ignorance, illiteracy, poverty, lack of health consciousness, long distances from the clinic and in a few cases, irregular supply of drugs by the clinic.

STUDY OF DRUG DEFAULT IN A CITY—ITS CAUSES AND MANAGEMENT

A.K. KOLEH *et al.*

Out of 1,163 patients treated for more than one year by the TB Centre, Calcutta from 1974 to 1976, 207 were defaulters. A patient was considered a defaulter if he was late by more than 3 days in drug collection. The main causes for drug default were migration, non-cooperation, relief of symptoms etc. Failure to benefit from treatment was responsible for default in 14 cases and intolerance in 9 out of 207 defaulters. Majority of the defaulters were males and amongst the younger age groups.

T.A.I. GOLD MEDAL

While congratulating Sri B.M. Cariappa on the occasion of the presentation of TAI Gold Medal by Dr. M. Channa Reddy, Governor of Uttar Pradesh, at the inaugural session of the 31st National Conference on Tuberculosis and Chest Diseases held at Lucknow in November 1976, Dr. R. Viswanathan said: I have the rare honour and pleasure to present to you a man who has been the life and soul of the Tuberculosis Association of India, serving it for over three decades with unstinted devotion and admirable distinction. Born in the beautiful hill State of Coorg with a martial tradition, producing some of the most distinguished Generals of the Indian Army, he had his early education in Tiruchirapalli with a brilliant academic career which was cut short by his passionate desire to serve the country by joining the national movement. After serving as a teacher and later as editor of a number of journals he joined the Tuberculosis Association in 1944 as Secretary. For the very valuable services rendered by him within the short campus of 4 years, he was awarded the Kaiser-i-Hind Medal in 1948. With a W.H.O. Fellowship in 1952 and Colombo Plan Fellowship in 1961, he was able to visit several countries and gain further knowledge and experience in the field of tuberculosis control. He has had the rare distinction of attending almost all International Tuberculosis Conferences. He has attended all the biennial Conferences of the Eastern Region of the Union in various places outside India, the latest one having been held in Seoul (Korea) where he was again elected as its Vice-President. He was closely associated with the formation of the Eastern Region branch of the International Union Against Tuberculosis of which he was the Secretary-General from 1957 to 1964, and more recently as Vice-President. In recognition of his meritorious work in the field of tuberculosis, he was awarded the Commonwealth Award of Honour by the Chest and Heart Association of the United Kingdom.

Many people in the world strive hard to reach the pedestal of authority. Once they sit in the pedestal, they lose their powers of locomotion and interest in the activities of the organisation whose pedestal they have climbed. There are, however, some "whom a thirst ardent unquenchable, fires not without aim to go round in an eddy of purposeless dust, effort unmeaning and vain". If there is one in the tuberculosis field who has climbed to the pedestal of Secretary-General of the Tuberculosis Association of India, fired with the unquenchable thirst of carrying the organisation from strength to strength, it is no less a person than Sri B.M. Cariappa to whom I request you to bestow the most coveted honour of the TAI Gold Medal.

NEWS & NOTES

ANNUAL MEETINGS

The 38th. Annual General Meeting of the Association will be held on Thursday, the 21st April, 1977 in the Conference Hall of the Association, 3, Red Cross Road, New Delhi. This will be followed by a meeting of the Central Committee of the Association on the same day.

A meeting of the Technical Committee of the Association will be held on the 20th April, 1977. The Conference of Secretaries of State TB Associations will be held in the afternoon on 21st April, 1977.

KHUSHI RAM SHIELD

The Association has decided to award the RAI SAHEB KHUSHI RAM SHIELD for 1976 to the Tamil Nadu TB Association. The Association has also decided to award a Certificate of Merit for good performances to the Associations of Bengal, Kerala, Karnataka and Madhya Pradesh.

SEAL SALE AWARDS

The Association has decided that the TB Seal Shield for highest collections in the 26th Campaign be awarded 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 has been won by the Goa TB Association. Certificates of Merit for improved collections will be awarded to Delhi, Pondicherry and Tripura TB Associations.

NATIONAL CONFERENCE

The Thirtysecond National Conference on Tuberculosis and Chest Diseases will be held in Trivandrum (Kerala), sometime in November/December, 1977. The exact dates will be announced in due course: Subjects selected by the Programme Committee for discussion at the Conference include (1) National TB Control Programme—including the role of TB Associations and other voluntary organisations in the working of the programme, (2) B.C.G. Vaccination—its present position, efficacy and operational aspects, (3) Epidemiology of TB in India, (4) Chemotherapy, including short-term regimens, (5) Hypersensitivity diseases of the Lung, (6) Direct smear microscopy for case-finding and Follow-up, (7) Training Programmes, (8) Urban TB Control Programme, (9) Immunology of Tuberculosis and (10) Tuberculosis in Industry.

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.

CHANCHAL SINGH MEMORIAL AWARD—1977.

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, 1977.

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 1977 competition is 'Causative Factors in 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-110 001, not later than 31st August, 1977 and should be forwarded through the Dean or Principal of the College/University.

HEALTH VISITORS' COURSE

The 1977-78 TB Health Visitors' Course will commence in July, 1977 at the New Delhi TB Centre, New Delhi TB Centre, New Delhi. The course will be of nine months' duration, which includes 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 of admission to this course should reach the Secretary-General, TB Association of India, 3, Red Cross Road, New Delhi by 30th April, 77.

EASTERN REGION CONFERENCE

The Eleventh Conference of the Eastern Region of the International Union Against

Tuberculosis will be held in Colombo in 1979 under the joint auspices of the Sri Lanka National Association for the Prevention of Tuberculosis and the Eastern Region of the International Union Against Tuberculosis.

IUAT CONFERENCE

The 24th World Conference on Tuberculosis and its allied meetings under the auspices of the I.U.A.T. will be held in Brussels in 1978. This conference will be known as "World Conference" of the Union. Prof. Gyselen of Belgium is the President of this Conference.

SEMINAR/CONFERENCE

The Tuberculosis Association of Pondicherry and the Pondicherry State Medical Officers Association conducted a Seminar-cum-Refresher Course in Tuberculosis on the 9th January, 1977. Professor V. Rangaswamy, Medical Superintendent, Tuberculosis Sanatorium, Tambaram spoke on the subject "How to treat a Tuberculosis case successfully with limited facilities." The Seminar was attended by the Medical Officers attached to the General Hospital and peripheral institutions, Nurses and other para-medical personnel. Shri B.T. Kulkarni, Lt.-Governor of Pondicherry, presided over the function.

The XVth Maharashtra State Tuberculosis & Chest Diseases Conference was held in Bombay on 11th, 12th and 13th March, 1977. The first two days of the Conference were devoted for Scientific sessions. On the third day an Anti-TB Shibir was held for the benefit of rural medical practitioners. A Souvenir was also brought out on the occasion.

DR. B.C. ROY NATIONAL AWARD

In recognition of the best talent in encouraging the development of specialities in different branches of medicine (ENT) Dr. T. Manickam of Bangalore Medical College has been awarded the Dr. B.C. Roy National Award for 1976. It may be mentioned that

Dr. Manickam is the Honorary Secretary of the Karnataka State TB Association.

The other winners of the Awards are the following :

In recognition of the merit of eminent Medical Teacher :

1. Dr. A.C. Das of K.G. Medical College, Lucknow.
2. Dr. Inderjit Dewan of Postgraduate Institute of Medical Education & Research, Chandigarh.
3. Dr. S. Ramachander Rao of Gandhi Medical College, Hyderabad.
4. Dr. G.S. Sainani of B.J. Medical College, Poona.

In recognition of the best services in the field of Socio-medical Relief :

1. Dr. P.R. Trivedi of Ellis Bridge, Ahmedabad.
2. Dr. J.M. Pahwa of Gandhi Eye Hospital, Aligarh.

Dr. B.C. Roy Oration

1. Lieut-General R.S. Hoon of Director General of Armed Forces Medical Services, New Delhi.

NATIONAL ACADEMY OF MEDICAL SCIENCES

The Membership Examination of the National Board conducted by the National Academy of Medical Sciences will be held in August 1977. Only medical graduates are eligible to apply. For details write to the Controller of Exams, National Board of Examinations, National Academy of Medical Sciences, C-II/16, Ansari Nagar, New Delhi-110016.