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REHABILITATION OF THE TUBERCULOUS

It is encouraging to note that the question of rehabilitating the handicapped is receiving increased attention by the public and the Governments in this country. However, when one speaks of the rehabilitation of the handicapped, one usually refers to those disabled by accidents or by military operations and also those who were victims of disabling diseases such as polio-myelitis. They do not normally think of those handicapped by diseases which do not leave obvious physical disabilities, and these include those who are victims of tuberculosis or those disabled mentally.

The need for the rehabilitation of the tuberculous, has been recognised for many decades especially by those engaged in the treatment of tuberculosis and in fact a good deal of work has been done in the West in this line. The establishment of the Papworth Village settlement and the Preston Hall rehabilitation centre in England and the Altro Workshops in New York and the Spero Works in London are the outstanding examples of the attempts at such rehabilitation. Of these, the pride of place goes to the Papworth Village Settlement. The success of that venture, as well as the publicity given to it in the medical and the lay press, have led many to think that the rehabilitation of the tuberculous meant establishment of village settlements of the Papworth type and there was a time when those interested in tuberculosis work in India clamoured for the establishment of such village settlements, sometimes even in preference to hospitals and sanatoria. Though in a few places, such colonies or settlements for tuberculous ex-patients were attempted, yet up till now large scale concerted efforts have not been made in India to rehabilitate the handicapped tuberculous, the main reason probably being the overwhelming pressure for treatment of the seriously sick and infectious.

In the past, the need for village settlement was real. Patients were then treated for long periods in sanatoria or hospitals, keeping them away from normal life for years. This necessitated considerable readjustment in their mode of life and work after discharge from the institution. The relapse rate of the treated patients was also rather high and therefore many had to be provided with work in "Sheltered Occupation" under strict medical supervision. Even in spite of the success of Papworth and Preston Hall, the idea of village settlement has not progressed in the West, as was anticipated. This was partly due to the expenses involved in establishing such settlements which are not likely to be remunerative especially if they depended entirely on the ability of the patients to make them self-supporting or paying.

With the changing ideas of the methods for tuberculosis control that are taking place all over the world, ideas on the rehabilitation of the tuberculous are also changing. The success that can be achieved in treating patients in their homes by the new antibacterial drugs, and that without interference with their normal life and work, is one of the main reasons for this change. There is, therefore, need for a good deal of rethinking on the subject. There seems to be very little place in India at present for the village type of rehabilitation on Papworth lines. Because of the expansion of domiciliary treatment and the good results achieved by it even while the patients continue their normal avocations, the proportion of patients who need rehabilitation and work under sheltered conditions is getting less and less.

The groups that need most help are the chronically ill who are still excreting Tubercle Bacilli in spite of prolonged treatment. Most of these may be economically too poor to afford reasonable comforts of life without some assistance. Some of those who had lung resection may have their vital capacity reduced to such a degree as to necessitate a change of work that is suitable to their capacity.

While one should take advantage of the experience gained in the West, the time has come for India to evolve a pattern that will be less costly than village settlements and that will meet the conditions in India. There is still need for rehabilitation of the tuberculous, but the form it has to take may have to be different from what has been done in the West. One possible line in which rehabilitation can be arranged is by having training given for cottage industries for the handicapped tuberculous as well as to some of their family members.

Whatever form it may take, there should be an organisation to undertake this type of service. This service should include not only physical

rehabilitation but also a mental readjustment. The workers engaged in this should be dedicated persons and in addition they should have special training and aptitude for social service.

Though Governments have a responsibility to rehabilitate the handicapped, it should be seriously considered whether they are the best to undertake such a service. Surely there are non-official bodies with selfless workers who will be glad to undertake such work provided they are given the necessary inducement and encouragement. The Government should give them liberal grants with freedom to use the money as the organisation thinks best. There should be safeguards against misuse and mis-appropriation of funds. When such organisations are available the Government should give them reasonable latitude without insisting on rigid rules and regulations which are normally followed by the Government. Without trust and willingness to take risks, no social service programme can make real progress.

It is natural for the public to look up to the Tuberculosis Associations in the country to take special responsibility in this regard. But it has to be realised also that all Tuberculosis Associations in the country are not at the moment in a position to undertake such a task. The Tuberculosis Associations can however act as catalytic agents, stimulating the public and other social organisations such as Rotary Clubs, Lion Clubs, and religious bodies engaged in humanitarian work to undertake this task.

The Tuberculosis Association of India should also start a centre, which could serve as a model for others to copy. It may be mentioned that this Association has already made a start. They have now a building for a work centre in association with the New Delhi T.B. Centre. This will also take part in training. The Government of India has given grants for the buildings and it is hoped, further help would be forthcoming from the Government to allow it to start functioning on proper lines.

SCOPE AND LIMITATIONS FOR POST-GRADUATE EDUCATION IN TUBERCULOSIS IN INDIA*

K. N. DE

(Chest Physician and Superintendent, Islamia Hospital, Calcutta)

Facilities for post-graduate medical education in a country is an index of its progressiveness so far as it concerns itself with the health of its people. In the 17 States in India there are 84 Medical Colleges today and in only 14 of these States there are arrangements for post-graduate education in different branches of medicine. The State of Maharashtra in the west heads the list with 18 colleges for post-graduate medical education with Bengal following it with 12 such institutions in the east but in each of these two States there is only one college for advanced teaching in Tuberculosis.

In the 84 Medical Colleges there are altogether 7,171 seats for the undergraduates; in 15 of these colleges there are only 132 seats for the Diploma Course in Tuberculosis and in 3 of these 15 colleges there are 14 seats for the doctorate degree in the same subject.

Of all the State Tuberculosis Associations three have arrangements for holding short term refresher courses in TB regularly. The Bengal TB Association has been organising such short courses since 1933.

The imbalance between higher medical studies and advanced technological education is manifest when we look at the progress made in the latter branch of science during the last 15 years through the establishment of national institutions in important centres in India. Based on this assumption it is observed that like the All India Institute for Medical Sciences in New Delhi there is an urgent necessity for establishing similar centres in Calcutta, Bombay and Madras to serve the eastern, western and southern zones respectively.

The Central and the State Governments have to speed up this scheme in their five-year plans. Like the University Grants Commission a statutory body has to be constituted by the Central Health Directorate and this body should be given the responsibility to implement the scheme. In India the big pharmaceutical concerns have to collaborate and make combined efforts to raise adequate funds. In economically underdeveloped coun-

tries the WHO and the UNO should come to extend their helping hands.

As research is linked up with post-graduate medical education the establishment of Laboratories for advanced types of work is indispensable. A good Library in each of these centres will be an asset. A library is a 'knowledge bank' and one can draw an unlimited amount from it.

In order to attract the right type of teachers it will be reasonable to expect that the Government will keep the teachers happy and the teachers on their part should be occupied with teaching only and no other duties; The example of the teachers in Army Medical Service can be cited with advantage. These centres should have enough freedom for work with limited control from the Government.

The teachers in the undergraduate classes should keep a watchful eye on the aptitude of their students for the different branches of medicine. This will enable the picking up of suitable type of candidates for advanced studies when they finish their internship after graduation. As a further safeguard these students should work for a year or two under research professors before they are admitted to the post-graduate degree course. This rule may have to be made flexible in certain cases of exceptional merit. In India talents will not be wanting if proper facilities are thrown open.

Guest Chairs should be created for inviting well experienced foreign teachers if rapid advance is to be made in making these centres full of reputation, and worthy of international recognition. The standard of teaching should be uniform in all these centres. The palpable disproportion now prevailing in India between the teachers and the taught will gradually disappear. In course of time there will be no need for going abroad for higher studies in medicine and unnecessary wastage of foreign exchange will be prevented.

For the health and welfare of a nation there is an urgent necessity for building up post-graduate centres for chest diseases.

* Paper read at the VIIIth International Congress on Diseases of the Chest, New Delhi, February, 1963.

TUBERCULOUS DISEASE OF THE BREAST

P. N. GHEI, M.S.

(Surgical Registrar, All-India Institute of Medical Sciences, New Delhi)

Tuberculosis in our country is still ubiquitous as it was a generation ago in the western countries. It is surprising, therefore that tuberculous infection of the breast is a very uncommon lesion. It is also possible that this low incidence abroad may be due to the emergence of better and clearer picture of various granulomatous processes, including sarcoid and fungus diseases. These diseases, sometime produce pictures indistinguishable even microscopically from tuberculosis.

Tuberculous infection of the breast was first described in 1829 by Sir Astley Cooper. Gauthier in 1895 compiled 79 cases. Scudder (1898) reported 83 compiled cases. Deaver (1914) reported 77 cases, out of which 5 cases he had observed himself and rest 72 he compiled from the literature between 1904-1914. Cheever, Shipley and Spencer in 1921 reported an incidence of 1.5 per cent of tuberculous infection of the breast in their cases of breast diseases. Shipley and Spencer in 1926 were able to report 205 cases. 'Barker in 1926 also reported 15 cases. Morgan in 1931 collected a series of 439 cases from the literature. In the Mayo Clinic between the years 1904 to 1915, six cases of tuberculous infection of the breast were reported representing 0.51 per cent of all diseases under treatment. McKeown and Wilkinson reported five cases of this disease in 1952 treated in the breast clinic at the Post Graduate Medical School of London. In the Presbyterian Hospital in New York between the years 1938 to 1955, four cases of tuberculous infection of the breast were seen out of 6,500 lesions of the breast (Haagensen 1957).

Case Report

A female patient Mrs S, B. aged 30 years was admitted into A.I.I.M.S. Hospital complaining of gradually increasing painful swelling of left axilla of 4 years duration and painful lump in the breast of 4 months duration. The lump in the breast developed soon after her delivery and since then had been gradually increasing. No history of fever and cough, nor anorexia and loss weight. She had 4

normal deliveries over a period of nine years and nursed all her children successfully. Patient was in lactation amenorrhoea. There was no family history of tuberculosis.

On examination, the patient was anaemic but fairly of good general health. Her oro-dental hygiene was poor. Both breasts showed generalised engorgement and milk discharge through the nipples, typical of lactation. The nipple showed no retraction. There was also no deviation of breast axis. The skin of the breast was normal in that there was no dimpling of peau d'orange. On palpation a lump was felt with the flat of the hand as well as by the fingers occupying the lower inner quadrant of the left breast. The feel was firm and the lump could be moved from side to side. The size of the lump was 7 cm. x 3.5 cm. On contraction of the pectoralis major muscle, the lump was not found adherent to it. The skin could also be moved freely over the lump. On pressing the nipple, milk could be pressed out. The transillumination test was negative. Palpation of left axilla revealed a nodular swelling of firm feel near the axillary tail, made of lymph glands. The size was 10 cm. x 5 cm. Rest of the groups of lymph nodes were not palpable.

Her general examination was essentially negative.

Laboratory examination showed—Hb. 10 Gm; W.B.C. 9,500 cu. mm. of blood; differential percentage was Polymorph 60, lymphocyte 37, and eosinophil 3. The total blood protein was 6.8 Gm. and A/G ratio was normal, E.S.R. 85 mm. fall first hour (Westergren), blood urea 25 mg. per cent, sputum—negative for A.F.B., Urine N.A.D., X-ray 'chest showed no active intrathoracic lesion.

The patient was operated on under general anaesthesia. Excision of the left breast lump was done by sub-mammary incision. The lump in left axilla was separately excised, which consisted of 3 enlarged lymph glands. On cutting, the axillary lump of lymph glands showed caseation typical of tuberculosis. Patient was put on antituberculous therapy

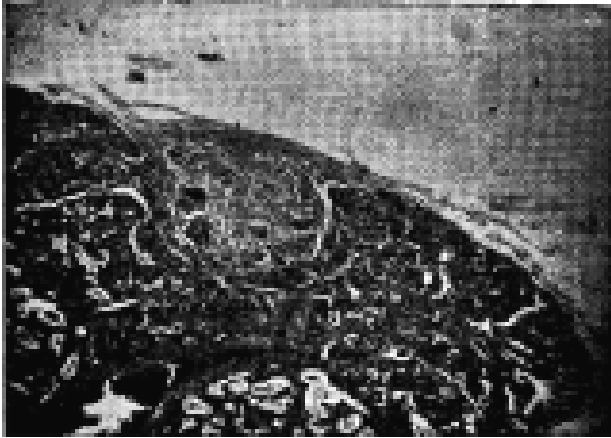


FIG. 1. Section of the breast showing proliferated mammary tissue (Postpartum adenosis) and a well circumscribed granuloma in the centre.

H & E X 45

FIG. 2. Higher magnification of Fig. 1 showing details of granuloma and neighbouring mammary tissue. A granuloma is typical of tuberculosis.

H & E x 140

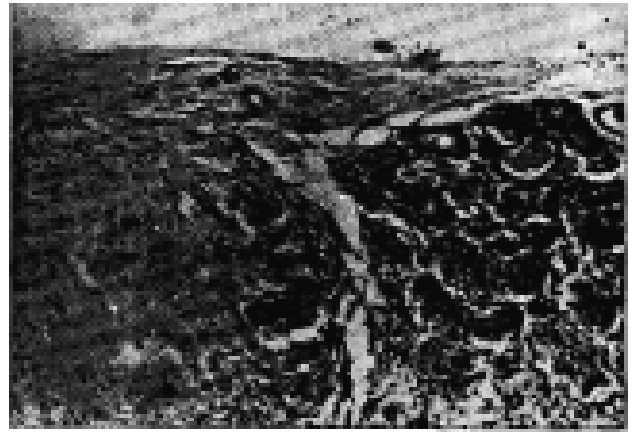
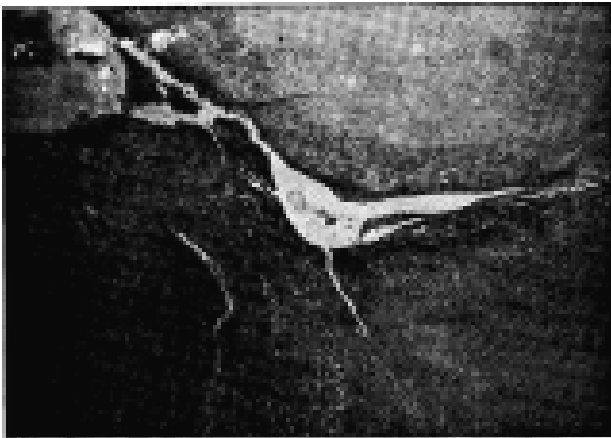


FIG. 3. Section from axillary lymph node showing large caseating tubercles.

H & E x 45



(Streptomycin 1 Gm. I.M. daily, I.N.H. 50 mg. T.D.S., P.A.S. 3 Gm. Q.I.D.) from the day of operation. The post operative course was uneventful. The wound healed soundly, stitches being removed on the 8th post operative day.

A histopathology examination of the left breast lump and left axillary lump showed evidence of tuberculous granulomatous lesions of the breast and tuberculous lymphadenitis and caseating tubercles (Fig. No. 1). Breast sections also showed in addition evidence of proliferating mammary tissue (Postpartum adenosis). There were tubercular follicles with central caseation. There was also typical giant cells with preponderance of lymphocytes in the periphery (Fig. No. 2 & 3).

Follow Up

The patient was on anti-tubercular treatment throughout, having been given a total of 100 injection Streptomycin along with I.N.H. and P.A.S. over a period of 4 months. The patient put on 10 lbs. of weight in 4 months, follow up. The E.S.R. came down to 14 mm. fall 1st hour (Westergren) and the patient was completely symptomless.

Discussion

The diagnosis of tuberculous infection of the breast in this case has been based on the demonstration of typical granulomatous lesion in the breast and also demonstration macroscopically of caseation and tuberculous lymphadenitis in the corresponding axillary lymph nodes. This case, therefore can be labelled as a case of tuberculous disease of the breast. Moreover, the breast lesion in this case can be fairly considered an early one with very good prognosis.

It is pertinent to enquire the mode of infection of tuberculous disease of the breast. The infection can reach the breast by lymphatic or direct spread from rib, costo-chondral junction, pleura or mediastinal or cervical or axillary lymph glands, or even from shoulder joint. The spread of infection to the breast from the axillary lymph nodes is presumably by retrograde spread along the lymphatics. It is likely that the spread to the breast in this case may well have occurred in a retrograde manner via the lymphatics from the corresponding axillary lymph glands. Spread by blood stream has been a matter of much discussion.

Such a route would account for the primary types of tuberculous mastitis and also the rare involvement of breast by miliary tuberculosis. McKeown and Wilkinson (1952) have divided cases of tuberculous infection of the breast into primary and secondary types. The diagnosis of primary tuberculous mastitis should only be entertained when A.F.B. could be demonstrated in the breast lesion. Raw (1924) in 10,000 autopsies in a sanatorium found tuberculous mastitis in only 7 cases. Nagashima (1925) performed 34 autopsies in cases of miliary tuberculosis but in none of these cases was able to demonstrate tuberculous lesion in the breast. In the case under review the lesion in the left breast was associated with left axillary lymph gland tuberculosis. Clinically the breast lesion was difficult to differentiate from fat necrosis, plasma cell mastitis and carcinoma, though, our preoperative diagnosis of tuberculous infection of the breast was based on lump of the breast which was painful from onset. The diagnosis is easier when the breast lesion breaks down and forms sinuses. These features were absent in our case and, hence, we have labelled it as early case of tuberculous infection of the breast. Operative interference was undertaken for the diagnosis as well as for treatment. Treatment by simple excision of the breast lump and excision of axillary swelling accompanied by anti tubercular drug therapy gave an excellent result. By simple excision of the breast lump, breast function is preserved.

The case is also of interest because of two reasons. Contrary to the majority of reports in the literature, this secondary tuberculous mastitis has occurred without the presence of sinuses and demonstrable tuberculous infection anywhere else in the body except left axilla. Secondly the tuberculous lesion of the breast is associated with postpartum adenosis of the breast.

Carcinoma and tuberculosis of the breast may occasionally occur together and the old concept that two diseases are antipathetic to each other is not correct. Sometime carcinoma and tuberculosis may occur in different breast of the same patient and very rarely tuberculosis and carcinoma may both occur not only in breast but also in the axillary lymph nodes. Excisional biopsy should always be performed for correct diagnosis and to avoid needless mastectomy.

Summary

The incidence of tuberculous disease of the breast and review of literature on it is briefly discussed.

A case report of a 30 year old female suffering from tuberculosis of breast associated with tuberculous axillary lymph adenitis of corres-

ponding axilla is discussed. Postpartum adenosis has also been seen in the same breast.

A simple excision of the breast lesion and excision of the axillary lymph gland swelling combined with antitubercular drug therapy gave excellent result.

The possibility of occurrence of tuberculosis and carcinoma together has been mentioned.

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PREGNANCY AND PULMONARY TUBERCULOSIS

O. P. MITAL* AND B. M. S. SRIVASTAVA

Pulmonary tuberculosis is frequently encountered during pregnancy. According to F. J. Browne¹ and J. C. Me Ceure Browne, pulmonary tuberculosis is the most frequent cause of death among women of child bearing age and account for one in six in the age group of 16 to 44 years.

Ever since the days of Hippocrates, the prevailing opinion was that pregnancy exerted a favourable influence on the course of Phthisis, the view even being voiced that pregnancy was 'the best cure for consumption'.

Tyler Smith² in 1858 subscribes to modification of the same credo when he states 'the progress of phthisis is often remarkably stayed by gestation but after labour the disease generally goes on at an accelerated pace and it is not uncommon for women in consumption to die within a few days of parturition'.

By the end of nineteenth century however most British obstetricians seem to have taken the view that not only the patient did not improve, but she was positively harmed by pregnancy. Playfair³ in 1898, therefore enunciated that marriage was inadvisable, pregnancy was forbidden and suckling prohibited. Marshall⁴ in 1931 found that, both in the early dormant cases and in the late cases, pregnancy did not affect the fatal outcome, in fact, if any thing, the pregnant women did rather better.

Young⁵ studied 46 patients with pulmonary tuberculosis in 1936. There was an appreciable depreciation in the clinical condition in puerperium in 58.6 per cent. In 8 cases (17.4 per cent) death occurred within three months. So young's dictum is 'if a virgin, no marriage; if married, no pregnancy; if pregnant, no confinement and if mother, no suckling'.

Kersley⁶ and Me Ginty⁷ (1938) concluded that after delivery the rapid descent of diaphragm causes re-expansion of lung, and would drag open the partially healed cavity during the last months of pregnancy. Dragging leads to exacerbation of pulmonary tuberculosis.

Thus gradually developed the notion that pregnancy exercises an unfavourable influence, on tuberculosis. Therapeutic abortions, therefore became in the course of years more and more common for all cases of manifest pul-

monary tuberculosis. Cohen⁸ 1943 however concluded that in women known to have suffered from pulmonary tuberculosis, pregnancy and parturition, in themselves seldom have deleterious effects on the pulmonary process; hence therapeutic abortion is not a procedure to be resorted to, even in active pulmonary tuberculosis.

Flamagan⁹ and Hansler, (1959) reported 22 patients with pregnancy and tuberculosis in comparison with a matched group of non-pregnant patients, treated with chemotherapy and hospitalised for 6 months. They did not observe any difference between the two groups regarding, sputum conversion, cavity closure and radiological stability.

M. Jesiotr¹⁰ (1960) opines that with the modern anti-microbial treatment and with moderate lung excisions, there is little possibility of exacerbation of the disease, even after delivery. The lesion responds equally well in pregnant and non-pregnant group, to treatment.

B. R. Mehta¹¹ (1961) studied 53 patients of pulmonary tuberculosis with pregnancy and 53 non-pregnant patients with active disease. He recorded sputum conversion and radiographic improvement and stability of lesion in all cases. All the above evidence indicates the variety of views held by various workers at different times over the last two centuries. The pendulum swung from the one extreme, 'that pregnancy exerts a beneficial effect on phthisis'—to the other extreme, 'that pregnancy exercises a deleterious influence upon the disease, indicating interruption of pregnancies', and now occupies the intermediate position.

Material and Method

The cases for this study are taken out of those who are taking treatment at home as well as in the tuberculosis hospital of G.S.V.M. Medical College, Kanpur, during the period January 1959 to December 1962. These were divided into two groups:

- (A) Cases of pregnancy associated with pulmonary tuberculosis.
- (B) Control group of non-pregnant women who were treated for pulmonary tuberculosis during that period.

* Reader and Head of the Dept. of Tuberculosis, G.S.V.M. Medical College, Kanpur.

Cases of group A are further divided into three sub-groups as below:

- (a) Patients who conceive during the period of antituberculous treatment.
- (b) Patients who manifested pulmonary tuberculosis during the course of their pregnancy.
- (c) Patients who presented with pulmonary tuberculosis, soon after the termination of pregnancy.

The following observations were recorded in these two groups, prior to beginning of treatment and at monthly intervals for the first six months, and at three months interval for the next two years. (1) presenting symptoms. (2) E.S.R. (3) sputum for A.F.B. by smear and cone, method (4) sputum for culture and sensitivity tests to streptomycin, P.A.S. and isoniazid (5) skiagram chest (6) total duration of treatment.

Composition and comparability of groups

Both the groups have been compared according to age and sex, type of disease, extent of disease—unilateral or bilateral. The presence of tubercle bacilli on culture of pulmonary secretions at the beginning of treatment and the form of treatment as shown in Table I.

TABLE I

*Comparative Age and number of cases in group A and B**

Age groups	Group A				Control (group B)
	a	b	c	Total	
15 to 20 Years	5	20	2	27	20
21 to 25 Years	2	10	5	17	17
26 to 35 Years	2	2	2	6	13
Total	9	32	9	50	50

* The cases of group B-came to us with relapses and usually with pregnancies.

It is observed that the most common presenting symptoms in sub-group a, i.e., who were under treatment for pulmonary tuberculo-

TABLE II

Presenting symptom in group A and B

Complaints	No. of cases			Group B
	Group A			
	a	b	c	
1. Cough with expectoration	2	32	9	45
2. Pyrexia	9	30	18	30
3. Haemoptysis	2	...	...	10
4. Loss of weight	...	...	15	40
5. Weakness and loss of appetite	9	32	9	30

sis and conceived during that period, were, pyrexia, weakness and loss of appetite. Haemoptysis was noted in two patients only. (The symptoms were present while they were on the treatment of their disease).

In sub-group 'b' the usual presenting symptoms were cough with expectoration, pyrexia, loss of appetite and weakness. The loss of weight is not appreciated during this period.

In group 'c' the commonest presenting symptom was pyrexia after delivery which did not respond to any other treatment.

Among the control group usual features of pulmonary tuberculosis were noted, while haemoptysis was present in 10 cases (20 per cent).

TABLE III

E.S.R. (Wintrobe's with corrections)

E S R	Group A			Total	Control group
	a	b	c		
1. Less than 20 m.m.	1	...	...	1	5
2. Between 20 to 50 m.m.	4	20	1	25	20
3. Between 50 to 80 m.m.	3	8	7	18	23
4. Above 80 m.m.	1	4	1	6	2

TABLE IV
Sputum status (smear and Cone, examination for A.F.B.)

Sputum	No. of cases in Group A				In Group B h*
	a	b	c	Total	
Positive	3	32	7	42	50
Negative*	6	...	2	8	...

* In negative cases:

1. Six cases who showed radiologically quiescent lesion, because of the treatment which they were receiving under our care and belong to sub-group 'a'.

2. Two cases who radiologically and bacteriologically were negative during pregnancy but were referred to us within four weeks of the delivery with milinary tuberculosis.

TABLE V
Sensitivity Test

Sm Isoniazid P.A.S.

	S.	R.	S.	R.	S.	R.
Group (A) a	9	..	9	..	9	..
b	29	3	26	6	30	2
c	7	..	6	1	7	..
Control Group B	46	4	45	5	50	..

TABLE VI

Classification of lesion	Group A			Control Group B
	a	b	c	
Minimal	...	9	2	10
Moderately Adv.	3	10	2	25
Far Advanced	6	13	5	15

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TABLE VII

Cavitary Cases	A			B
	a	b	c	
Unilateral	3	10	2	15
Bilateral	6	13	...	25

Follow-up: Clinical improvement

Clinical Condition	Group A	Group B
Improved	49	48*
Satisfactory	...	...
Worse	1	...

* WE lost contact of two cases.

Sputum conversion	Group A	Group B
< 3 months ...	7	15
3 to 6 months ...	28	25
> 6 months	4	10
Total ...	39	50
Average total duration of Treatment ...	15 months	18 months

Nine cases of group A became worse after delivery. X-ray check up in 11 the cases were done every month for the first six months and then every three months for the period till they were cured.

Discussion

The incidence of pulmonary tuberculosis has reduced from 0.8 per cent to 0.6 per cent according to Siegel *et al*¹² (1962) vide their study in Chicago Board of Health Antenatal Clinics and mortality considerably diminished. The socio-economic, psycho-social and socio-medical conditions in our country are far too different from those in the Western countries. Some

Radiological response

	3 months		6 months		9 months		12 months		15 months		18 months		21 months	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
		1												
Improvement														
Good	17	23	7	22	15	22	15	20	IS	8	15		...	...
Moderate	13	IS	18	28	26	28	35	30	35	42	5	10	5	...
Slight	20	12	18											
Worse			7		9									
Complete clear											30	40	45	48

patients will not take any specific treatment lest they harm the foetus. A large majority will not be given any treatment for few weeks after confinement. During this time they are given good diet and kept segregated. Even the known tuberculous patients under treatment are not allowed to move out of the house; and of course services are not so well developed as to reach all the patients at their home.

As there is no perfect method of physical examination for detecting the early pulmonary tuberculosis lesion, we are justified to say that if routine radiological examination is not done, it should certainly be carried out in any case in which there are suspicious symptoms. Early tuberculosis in pregnancy is liable to be overlooked, symptoms such as poor health and loss of appetite being regarded as due to pregnant state.

From our observation it is clear that pregnancy as an event in the course of tuberculosis, scarcely influences the progress of the pulmonary condition, regardless of the degree of the active disease. In our series 50 pregnant tuberculous women are compared with 50 non-pregnant tuberculous women. Clinically 90 per cent of cases of pregnant group showed clearance of their lesion, and non-pregnant group showed 96 per cent improvement. Hence both the group behave in the same way with anti-tubercular drugs and surgery.

By the above findings, there is no reason to apprehend any dramatic adverse change as a result of pregnancy and labour with sufficient control by the use of modern anti-tubercular

therapy, provided they are sensitive to drugs. Therefore induction of abortion is hardly justifiable. In other words, follow-up cases in non-pregnant and pregnant women have shown the disease runs parallel courses in two groups, and it may therefore be said that it would be illogical to abolish the physiological condition (pregnancy). Probably more women would be saved if greater care was given to the treatment of tuberculosis, treatment of the associated anaemia provision of a high calorie, and high protein diet.

Summary

Pregnancy in tuberculosis poses a frightening spectra for physicians, obstetricians as well as to the patients. The problem is not rare. The pendulum had swung in maximum to both the sides but now opinion has reached to a position of moderate optimism.

Fifty cases of pregnancy with pulmonary tuberculosis were studied thoroughly and their results are compared with non-pregnant tubercular cases.

It has been observed that under the tent of modern anti-tubercular drugs and surgery the pregnancy does not have a deleterious effect upon pulmonary tuberculosis whether active, quiescent or inactive. The clinical, bacteriological and radiological course of pulmonary tuberculosis during pregnancy and after delivery is not different, from that in non-pregnant women and lesions respond to treatment provided the sensitivity to such anti-microbial drugs as are used, does exist.

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TUBERCULOSIS AND PREGNANCY

H. B. DINGLEV

(Medical Superintendent, T.B. Hospital, Mehrauli, New Delhi)

Pregnancy is not a pathological but a physiological entity, which may complicate Tuberculosis; as such there are no etiological factors, no pathogenesis, no pathology, nor any signs and symptoms to be discussed. As such we are only left with its management and prognosis if it is associated with some other diseased process.

One school of thought is, that Pregnancy has got a worsening effect in the Tuberculous patients. A patient who is already burdened with the load of defence against tuberculosis, if she becomes pregnant, she has to carry a double load of Pregnancy and Tuberculosis; as a result of which she might break down. Further it was thought that during pregnancy, there is increased production of certain proteolytic ferments which might dissolve the connective tissue capsule around a healed focus and this together with low blood calcium level cause breakdown or reactivation of the diseased process. It was thought that Tuberculous pregnant women may have first baby with safety, second probably and third none.

The modern view is that Pregnancy as such has got no effect on Tuberculosis.

Froesner¹ observed same mortality in both Tubercular and non-tubercular pregnant women. He thinks that terminating pregnancy may be even more harmful.

Prognosis will depend upon age, general condition of the patient, type, severity and extent of the disease, socio-economic condition of the patient, treatment and result of treatment. Any associated local disease of the uterus or its appendages if present, may also play an important part.

The various pathological changes met within the uterus of the pregnant females are:

1. Tuberculous endometritis or
2. Deciduitis of Deciduabasilis
3. Placentitis, with tubercles in between Villi, where bacilli may be seen in the internal blood spaces.

During the period of between July, 53 to December, 1962, 1043 female cases were admitted at the T.B. Hospital, Mehrauli which included 40 pregnant women. Of these 40, 36 or 90 per cent were between the ages of

21-30 years and the rest 4 or 10 per cent were between the ages of 31-40 years.

Stages of Pregnancy

Seven or 17.5 per cent were in the 1st trimester, 23 or 57.5 per cent were in the 2nd trimester and 10 or 25 per cent were in the 3rd trimester.

State of Disease

Of these 5 or 12.5 per cent were in the 1st stage, 9 or 22.5 per cent were in the 2nd stage and 26 or 65 per cent were in the 3rd stage.

18 or 45 per cent were having mild or no constitutional symptoms, 5 or 12.5 per cent were having moderate constitutional reaction, 17 or 42.5 per cent were having more constitutional symptoms.

Bacteriological Status

Of these 40 cases, 22 or 55 per cent were having Bacilli in the sputum, 18 or 45 per cent sputum was negative for A-F.B.

Treatment: Of the 40 cases only 38 could be followed up, as two left the Hospital during the first month, as such these two have been excluded.

Of the 38, 14 cases were given streptomycin and I.N.H., 13 were given Streptomycin, I.N.H. and P.A.S., and 11 cases were given only P.A.S. and I.N.H.

In one Thoracoplasty operation was done. This case was in the 2nd trimester of Pregnancy. Another case was admitted with Pyo-Pneumothorax following Artificial Pneumothorax started before admission to hospital. This patient after delivery had Right Pneumonectomy followed by space reducing Thoracoplasty.

Management of Labour and Puerperium

During Antenatal period, all the 38 patients had a preliminary check up and all had normal labour.

The New Born were isolated and not allowed to be breast fed by the mother.

Of the 22 cases whose sputum was positive, 18 or 81.8 per cent were discharged with negative sputum.

Preventive Management

An open case of Tuberculosis should not marry till her lesion has healed completely. A

case which progresses to recovery may get married two years after all the signs and symptoms have disappeared and may become pregnant; but she should have a careful regimen of regulated rest with well balanced high caloric diet rich in proteins and fats and remain under periodic check up.

Actual Management

A. *Antenatal Management:* During the Antenatal period the case is examined by a Pthysiologist during the antepartem course and is checked every two weeks on an average during the first seven months of gestation and every week thereafter. Three sputum or L.S. Cultures or gastric analysis are done during gestation and immediately after delivery.

Chest roentgenogrames are taken every 2-3 months and one week after delivery and 3 months after delivery.

B. *Patients with Active Tuberculosis* are preferably hospitalized. The treatment is the same as like the non-pregnant patients with the exception that major surgical procedures are not performed in the last two months of gestation. Antimicrobial therapy is continued and operation is delayed until 6 weeks or longer after delivery.

Management of Labour and Delivery

It is better to avoid the use of Narcotic Drugs, which depress cough reflex and voluntary expectoration. Wherever possible, local anaesthesia is recommended for delivery of the Tuberculous patient.

Type of Delivery

Normal spontaneous delivery should be allowed, if labour is progressing satisfactorily, and if second stage is not long or tiring.

Forceps may be used to shorten the second stage particularly if the patient is

- (a) Toxaemic
- (b) Having Haemoptysis
- (c) Poor general condition.

Early ligation of the Cord is always recommended.

Management of Puerperium

During puerperium it is always advisable to have slower ambulation with longer periods of rest.

Breast Feeding is not permissible and segregation of the infant is insisted, if the mother is an open case.

B.C.G. vaccination should be given to the baby within few days of delivery (usually after **Ind. J. Tub., Vol. X, No. 4**

the 7-10th day and preferably within the 1st and 2nd month).

Discussion

I. What effect, if any, the antimicrobials have on the Foetus of the new born infant?

It is often heard that Streptomycin should not be used in the 1st trimester of pregnancy i.e., in the time of development of foetus because for fear of injury or anomalies of the foetus.

According to Schaffer². 'No injury or untoward effects were noted at birth or after several years in all the infants who were available for follow up observation'.

II. Whether Diagnosis of Active Pulmonary Tuberculosis in the first Trimester of Pregnancy is an indication for Therapeutic Abortion:

Both clinical and statistical review has shown that abortion does not improve the end results in tuberculous patients.

Schaffer *et al*² have stated that in the New York Lying-in-Hospital not a single therapeutic abortion was done in the last 6 years.

III. When should surgery be performed in Pregnant Patients with Active Tuberculosis?

Earlier the treatment is instituted better the results.

Chamberlan³ has stated that timing is as important to the successful surgical result as it is in a military operation.

Neither Streptomycin nor any other drug can be expected to replace sound judgement in selecting the right operation for a specific patient to be done at a proper time under good anaesthesia by a competent surgeon.

Any procedure done to cure tuberculosis in the non-pregnant patient should be performed in the pregnant women.

All Thoracic operations done during Pregnancy could be done amongst the patient during the first and second trimester.

Operation in the last two months of Pregnancy is not done due to danger of premature delivery.

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RESISTANCE OF TUBERCLE BACILLI TO DRUGS

S. P. GUPTA

(Department of Pathology and Bacteriology, Medical College, Lucknow)

It is well known that the tubercle bacilli soon develop resistance to drugs used in the treatment of tuberculosis, that the information regarding resistance is useful in the treatment, and that regular determination of resistance should be included in all campaigns against tuberculosis. Since 1957 resistance determinations have been carried on, on a small scale in the Department of Pathology and Bacteriology, King George's Medical College, Lucknow and the results obtained during the last 6 years have been analysed in this note.

Determinations of resistance can be performed as a direct test with inoculations of the homogenised material or as an indirect test after isolation of the strain. Direct test is better for it saves work, gives results in about 3 weeks, affords a reliable estimate of the percentage of resistant tubercle bacilli in the given specimen. Indirect tests were put up only when the growth in the control tubes without drugs showed less than 50 colonies.

As the aim of these tests is to compare the resistance of tubercle bacilli isolated from the patients with that of a standard strain it is necessary to know the dose of the drug at which standard strain ceases to grow. In this connection Dr Jensen's (1954) suggestion regarding the strength of the drugs to be incorporated in the mediums were adopted and the standard strains used were either E 5 or H 37 Rv.

Methods

For determining the sensitivity to different concentration of drugs mycobacteria were cultured in media containing drugs and in control tubes without any drug. Both direct and indirect method were used according to the technique suggested by Dr Jensen (1954).

1. *Direct Method.* The material was homogenised with 4 per cent caustic soda, directly cultured into two drug free control tubes, and one tube of drug media for each concentration. The drug concentration used were as follows:

Streptomycin: 1, 2, 4, 16, 64, mic. gm. per ml.
P.A.S.: 0.1, 0.2, 0.4, 1.6, 6.4 mic. gm. per ml.
I.N.H.: 0.02, 0.04, 0.08, 0.32 and 1.28 mic. gm. per ml.

Sensitive strain like H37 Rv. or E5 when inoculated into these media shows growth in 1st and 2nd tubes and not in the third. This ensures that the quantity of the drug is just sufficient to stop the growth and is not in excess.

2. *Indirect method:* This was undertaken only when the clinical material was microscopically negative or if the control tube set for direct method yielded 25-50 colonies. A bacterial suspension was prepared with a pestil and mortar in normal saline. It was diluted so that capital type letters could just be read through a 16 mm. tube. It now contained about 1 mgm. semi-dried bacilli per ml. The suspension was finally diluted 1:100 and the tubes were inoculated with one drop of this dilution. The water of condensation (if present) was poured out before inoculation. The concentrations of drug used were the same as for direct method.

Results were read after 4 weeks of incubation at 37° C. If growth was not confluent the exact number of colonies were recorded. When a particular strain was seen to grow on media in the third tube onwards, the strain was considered to be resistant. If there was no growth in the third tube and onwards, it was considered to be sensitive.

The results obtained with sensitivity test in the last 6 years were analysed and are given in total number, in Table I and in percentages in Table II.

The nature of treatment received by the patients before their sputa were collected has been analysed in some cases and is shown in Table III along with the drug resistance in relation to previous exposure to drug.

TABLE I

Analysis of results showing total number of cases

	Total number of cases						Total for six years
	1957	1958	1959	1960	1961	1962	
1 Total number of cases	84	199	106	205	111	242	947
2 Positive smear	42	79	38	76	52	84	372
3 Negative smear	42	120	68	129	59	158	576
4 Positive culture	41	69	39	79	49	79	356
5 Negative culture	43	130	67	126	62	163	591
6 Smear negative culture negative	35	114	62	120	56	146	533
7 Smear positive culture negative	8	16	5	6	6	17	58
8 Smear negative culture positive	7	6	6	9	3	12	43
9 Smear positive culture positive	34	63	33	70	46	67	313
10 Resistant to PAS only ...	1	...	1	2	...	...	4
11 Resistant to INH only	10	10	6	10	2	8	46
12 Resistant to Streptomycin	1	4	1	6	4	11	27
13 Resistant to PAS and INH	2	10	4	8	2	...	26
14 Resistant to INH and Streptomycin	7	18	5	11	20	31	92
15 Resistant to Streptomycin and PAS	...	...	1	...	2	...	3
16 Resistant to all three	15	17	19	38	14	26	129
17 Sensitive to all three ...	5	10	2	4	5	3	29
18 Total resistant to Streptomycin	23	39	26	55	40	68	251
19 Total resistant to PAS	18	27	25	48	18	26	162
20 Total resistant to INH	34	55	34	67	38	65	293

TABLE II

Analysis of results in percentage

	Percentage of cases						
	1957	1958	1959	1960	1961	1962	Total
1 Total number of cases	84	199	106	205	41	242	947
2 Positive smear	50.0	40	36.0	37.0	47.0	35.0	39.2
3 Negative smear	50.0	60	64.0	63.0	53.0	65.0	60.8
4 Positive culture	49.0	34.5	37.0	38.0	44.0	32.0	37.5
5 Negative culture	51.0	65.5	63.0	62.0	56.0	68.0	62.5
6 Smear negative culture negative	41.6	57.3	58.5	58.5	50.4	60.2	56.3
7 Smear positive culture negative	9.5	8.0	4.7	2.9	5.4	7.0	6.1
8 Smear negative culture positive	8.4	3.0	5.6	4.4	2.7	4.9	4.5
9 Smear positive culture positive	40.5	31.7	31.2	34.2	41.5	27.9	33.1
10 Resistant to PAS only	2.4	...	2.6	2.5	...	...	1.1
11 Resistant to INH only	24.4	14.5	15.4	12.6	4.1	10.0	12.9
12 Resistant to Streptomycin only	2.5	5.8	2.6	7.6	8.2	13.8	7.6
13 Resistant to PAS and INH	4.9	14.5	10.2	10.1	4.1	...	7.3
14 Resistance to INH and Streptomycin	17.0	26.1	12.8	14.0	40.8	39.7	25.8
15 Resistance to Streptomycin and PAS	...	...	2.6	...	4.0	...	0.8
16 Resistance to all three	36.6	24.6	48.6	48.2	28.5	32.8	36.3
17 Sensitive to all three	122	14.5	5.2	5.0	10.2	3.7	8.2
18 Total resistant to Streptomycin	56.0	56.0	66.0	70.0	71.0	74.1	70.0
19 Total resistant to PAS	44.0	39.0	64.0	60.0	37.0	31.4	45.0
20 Total resistant to INH	83.0	79.0	87.0	85.0	78.0	73.0	82.0

TABLE III

Showing previous exposure to drug and nature of drug Resistance

Nature of previous exposure to drug	Total number	No. showing resistance to one or more drugs	Percentage	No. resistant to		
				Streptomycin	P.A.S.	I.N.H.
Treatment with all three drugs	66	54	81.8	31	32	48
Treated with Streptomycin and I.N.H.	21	17	80.9	12	8	16
Treated with Streptomycin and P.A.S.	7	7	100	4	2	7
Streptomycin alone ...	2	1	50	1		1
No. history of treatment	6	6	100	6	6	6

Discussion

Positive culture were obtained in about 40 per cent of cases and 356 cultures were available for the tests. It was observed that in about 6 per cent of cases smears were positive but the cultures were negative. This has been observed by many other workers and the low viability is attributed to the effect of chemotherapy. Attempts have been made to increase the number of positive cultures by adding certain amino acids, nucleic acids, and other substances to the culture media and encouraging results have been reported by Dr Coletsos *et al.*, (1960) and Darzins and Pukite (1961).

Of the 356 strains in our series only 29 (8.2 per cent) were sensitive to all the three drugs. This is markedly different from Ganguly and Bardhan's (1960) findings where out of 490 Strains 378 (or 77 per cent) were sensitive to all the three drugs. This appears to be due to different type of cases and to the fact that their minimum strength for Streptomycin and P.A.S. is 10mic. gm. and for I.N.H. 0.5 mic. gm. These are higher than the minimum inhibitory strength of 4, 0.4 and 0.08 in our series.

In Singh's (1956) series also the strength of the I.N.H. used was higher. Their cases are stated to be pretreatment and expected to be sensitive. The presence of a few resistant strains in their series could be 'due to either unreliable history or infection by resistant strains.

Total number of strains resistant to I.N.H. Streptomycin and P.A.S. came upto 82, 70 and 45 per cent respectively. Comparison of our finding with those Singh (1956) and Ganguli and Bardhan (1960) is shown in Table IV.

TABLE IV

	Present series	Ganguli and Bardhan's series (1960)	Balbir Singh series (1956)
Figures in per cent			
Resistant to I.N.H.	82.0	10.45	24
Resistant to Streptomycin ...	70.0	8.9	16
Resistant to P.A.S.	45.0	6.73	8

The above table shows that though the overall rate is markedly low in both the other cases the ratio between the three types is practically of the same order.

In the present series strains resistant to Streptomycin and I.N.H. and P.A.S. alone are 7.6, 12.9 and 1.1 per cent respectively as compared to 6.9, 7.9 and 5 per cent of Ganguli and Bardhan's (1960) series. The reason for a

higher rate of P.A.S. is not clear especially when in our series the resistant shown even for P.A.S. with Streptomycin were only 1 per cent. The increased figures of resistance for P.A.S. with I.N.H. (7 per cent) and P.A.S. with I.N.H. and Streptomycin (36 per cent) in our series can be due to the common practice of administration of P.A.S. in combination with other two drugs. The percentage results do not show any significant change in 6 years.

In our series practically all the patients had received treatment before their sputa were examined. In only six cases it was mentioned that no history of treatment was given and in all the six, the strains were resistant to the three drugs. Obviously in these cases either the history was not reliable or they were infected with resistant strains. From Table III one finds that some strain were resistant to drugs which they had not received. Here again the explanation can be either the non-reliability of history or infection with resistant strains as the sensitivity test were not done before treatment.

At the tuberculosis chemotherapy centre Madras the finding (1959) indicate that the practically all the organism were sensitive in the pretreatment stage and though many developed resistance to these drugs some were still sensitive. According to these observers

the isonizaid—sensitive cultures re-appeared after bacteriological negativity and sometimes even when resistant bacteria have been reported previously. It may be due to opening up of old pockets where the drugs did not have access. The above discussion gives an idea of the pattern of increasing resistance of tubercle bacilli to drugs in the hospital population. The resistance studies should be done in each patients from the beginning and at regular intervals. It is only then the physician can have a useful idea about the line of treatment with and dosage of chemotherapy and that is only possible if adequate laboratory facilities are provided for this work by the authorities concerned.

Summary

The results of Sensitivity test during the last six years are presented. 356 strains of mycobacterium tuberculosis were tested with Streptomycin, P.A.S. and I.N.H. 8.2 per cent strains were sensitive while 36.3 per cent were resistant to all the three drugs. Total resistant to I.N.H. Streptomycin and P.A.S. were 82, 70 and 45 per cent respectively. The resistance to individual drug alone and specially to P.A.S. was much lower. The percentage of resistance is much higher than the strains tested by other workers.

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SPONTANEOUS PNEUMOTHORAX DURING STEROID THERAPY IN PULMONARY TUBERCULOSIS

N. K. MENON

(Institute of T.B. and diseases of Chest, Hyderabad, A.P., India)

Spontaneous pneumothorax has been mentioned as a possible complication of steroid therapy in acute progressive pulmonary tuberculosis because of the inhibitory action of steroids on fibrous tissue formation.

The present communication examines the incidence of this - complication in the light of published reports and personal experience.

Armstrong and Mitchell (1960) reported two instances of spontaneous pneumothorax in a series of seven cases of acute progressive far advanced tuberculosis during steroid therapy in conjunction with anti-bacterial drugs and also mentioned two further cases in another series of 12 cases similarly treated. This meant that the incidence of this complication was over 20 per cent in their two series put together.

Segarra and Sherman (1962) reported one case of spontaneous pneumothorax among a series of 54 cases receiving adjunctive steroid therapy, but doubted the role of corticosteroids as the cause in this case, as the patient was almost in the terminal stages of tuberculosis and had tubercle bacilli resistant to isoniazid. Considering the fact that several hundreds of patients had been treated with steroids and only a few instances of this complication had been cited, they felt that the occurrence of spontaneous pneumothorax as a complication of steroid therapy is rather exceptional.

At the Hospital for Diseases of Chest and Tuberculosis, Hyderabad during a three year period (1959-62), 34 patients of Pulmonary Tuberculosis and 25 patients of moderate to massive tuberculous pleural effusion, making a total of 59 patients, were treated under the author's care with steroids in addition to anti-bacterial drugs.

Treatment schedule

All the fifty nine patients were given streptomycin IG. in a single intramuscular injection daily or on alternate days and IOG. PAS plus isoniazid 200-400 mgm. daily in two equal

doses. In addition, prednisolone 5 mgm. t.i.d. (or in a few cases, dexamethasone equivalent dose) were administered for a period of 4 to 12 weeks and thereafter gradually tapered off and given up.

Incidence of spontaneous pneumothorax

The development of spontaneous pneumothorax in the series of 59 cases in relation to the administration of steroids was studied. Out of 59 steroid treated cases only one instance of spontaneous pneumothorax was encountered during steroid therapy whereas four instances of this complication had been seen before its commencement. It would, therefore, seem that the development of spontaneous pneumothorax is coincidental rather than a consequence of steroid therapy. Further, since twenty patients in this group had far advanced cavitory tuberculosis and drug resistant sputum cultures, the administration of steroids for these patients could be expected to carry an increased risk of progression of the disease without overt symptoms and development of spontaneous pneumothorax, as the antituberculosis drugs administered concurrently do not give effective coverage due to drug resistance. But yet, none in this group developed spontaneous pneumothorax during or following steroid therapy.

No instance of spontaneous pneumothorax during steroid therapy was also mentioned by Turner (1959) in his series of 9 patients with chronic pulmonary tuberculosis with resistant cultures and by Mathur *et al* (1961) in their series of 25 cases of clinically resistant pulmonary tuberculosis with sputum cultures resistant to not more than one of the three antituberculosis drugs concurrently administered.

The question also arises whether steroid therapy in pulmonary tuberculosis complicated with spontaneous pneumothorax would adversely affect recovery by hindering or delaying

expansion of the collapsed lung. Four patients in the series had spontaneous pneumothorax initially and were desperately ill when steroid therapy was instituted. Their recovery had been rapid and uneventful and complete expansion of the lung took place within 1-7 weeks.

Our limited experience and other published reports indicate that adjunctive steroid therapy neither significantly increases the risk of development of spontaneous pneumothorax in pulmonary tuberculosis nor adversely affects recovery and expansion of the collapsed lung.

Case Report

(P333) A sixteen year old boy from a village was admitted to the hospital in April 1962 with a history of continuous fever, dyspnoea and cough productive of scanty whitish sputum of one month duration. Past and family history was non-contributory.

Physical examination revealed a thin emaciated and anaemic boy of about 16 years appearing toxic and critically ill with temperature 104° F, pulse rate 130 and respiration 40 per minute. He was drowsy and apathetic and had stiffness of the neck, positive Kernig's sign and bilateral extensor plantar response. His chest skiagram showed bilateral diffuse miliary mottling more

pronounced in the left lung field. C.S.F. was normal in tension, biochemical findings and in cell count. He was started on daily streptomycin and PAS. 5 G. plus isoniazid 150 mg. twice daily together with prednisolone 5 mg. t.i.d. His improvement was rapid and was able to walk about with out discomfort in 4 weeks time. Two weeks later, he complained of slight pain and discomfort over the left side of his chest and slight dyspnoea on walking. Physical examination revealed signs of left sided pneumothorax and skiagram of the chest confirmed the presence of pneumothorax producing collapse of about half of the left lung. The pneumothorax was left alone without interference and the treatment was continued for a further period of 6 weeks with rapid and steady improvement. Skiagram taken at this time showed complete expansion of the left lung and almost complete clearing of the mottling. The culture report of his sputum on admission was received as positive and sensitive to streptomycin and isoniazid. Prednisolone was gradually reduced and given up in another three weeks. His subsequent recovery was uneventful and when discharged 3 months later he had no complaints, his chest skiagram and E.S.R. were normal, and he had three negative sputum cultures.

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DIAGNOSTIC SIGNIFICANCE OF QUANTITATIVE TUBERCULIN REACTIONS

M. L. MEHROTRA, RAM SINGH, P. N. PANDE AND S. K. DAS

(T.B. Demonstration and Training Centre, Medical College Campus, Agra)

One of the greatest needs in India is of finding a cheap and easily applicable method to detect Tuberculosis infection which can be applied to the mass of people in rural areas.

In the Newsletter of the International Union Against Tuberculosis, leading tuberculosis experts in the western countries have expressed themselves in favour of sputum examination by direct microscopy in the villages where Mass Miniature Photofluorography is not possible. These opinions were expressed at a debate organised by the International Union against Tuberculosis in Paris in March 1962.¹

With the existing services and multiple pressures of work, our experience indicates that neither sputum examination nor mass miniature radiography is possible on such a large scale throughout this large country. Under the circumstances probing the diagnostic potentialities of Tuberculin Test for application on a large scale and screening the Active, Probably Active and Potential cases from the Healthy masses need to be looked into with greater detail.

With the above aim in view, the present study has been undertaken and the preliminary report is being presented.

Material and Methods

In the T.B. Demonstration and Training Centre, at Agra, every person reporting for check-up including healthy students, infants, children and those with chest complaints and their close contacts have all been put through the following routine investigations:

- (i) Tuberculin test.
- (ii) Sputum Examination.
- (iii) Total and Diff. W.B.C. Count.
- (iv) Photofluorographic investigations.
- (v) Clinical Examination.
 - (a) Symptomatology.
 - (b) Physical findings.
 - (c) Temperature record.

The findings of one investigation has usually been corroborated by the other tests, and the disease has been labelled as Tuberculosis only

when at least three or more of the above investigations have been positive.

Between the period from 1st to 31st December 1962, 892 persons underwent the above five investigations and the following methods were used in recording the Tuberculinization status of the persons.

Tuberculin: The PPD Tuberculin Batch RT 23 prepared by State Serum Institute, Copenhagen and supplied to us after further dilution by BCG Vaccine Laboratory, Guindy, Madras with date of dilution Nov. 14, 1962 was delivered at Agra on Nov. 27, 1962 was used in the present series of cases. Care was taken to ensure that the diluted solution was kept under constant refrigeration between 2-4°C up to the time of its introduction into the skin. The prescribed dose according to WHO Specifications i.e., One T.U. weighing .02 microgramme of RT 23, in 0.1 ml. of stabilizing diluent was used in every case.

Technique of injection: 0.1 ml. of the above mentioned Tuberculin solution was introduced into the superficial layers of the skin of the volar aspect of the left forearm (Mantoux). The volume of injection was measured both by the syringe as well as by the wheal raised thereafter. These tests were done alternately by M. L. Mehrotra and P. N. Pande; both having experience of over a million Tuberculin Tests each, with the necessary experience obtained during work with the W.H.O. Assessment Team in 1953-1954, and later.

Reading and Recording of reaction

In every case the test site was read at 72 to 96 hours after the injection. The reading was done independently by the two readers in whose case a previous assessment had shown no significant differences; induration (infiltration) and consistency of the reaction were the only two criterion, though any other abnormality was also taken notice of and recorded.

The widest transverse diameter of induration was recorded in millimetres.

After reading and recording the reactions, the left and right arms of every person in the

study were also checked for any BCG scars which, if present, were noted and transverse diameters recorded in millimetres.

Results

Fig. 1, gives the resultant frequency distribution in groups of 2 mm. each which has been presented in the form of a histogram in which the horizontal scale shows the size of the reaction and the vertical columns show the percentage of persons with specified sizes of reactions. Care was taken to minimise absenteeism; out of a total of 892 persons tested, only 68 persons i.e., 7.5 per cent, defaulted. The mean size of tuberculin reaction in the entire group including Fifty eight persons with BCG Scars is 19.6 mm.

Out of the above group those who were diagnosed as tuberculous patients (pulmonary and non-pulmonary both) numbered Four Hundred Ninety-nine and their reactions have been analysed and are shown in the histogram given in Fig. 2.

The mean size of reaction in this group of tuberculous patients with the same batch of Tuberculin is 25.4 millimetres.

It was surprising to find that out of four hundred ninety nine persons diagnosed as tubercular, five were recipients of BCG Vaccination in earlier years, their status of Vaccination could be checked by the typical scars. All the five patients in this group had minimal disease.

It was evident from the records that out of the group of 499-patients suffering from Tuberculosis 442 persons gave a reaction greater than the mean for the entire series in this study. Sputum was positive in Sixty persons, X-ray in Four Hundred Seventy-eight.

Conclusion

The distribution of reactions of Tuberculosis patients in the histogram (Fig. 2) is fairly Unimodal, indicating the specificity of the dose and batch of tuberculin. The mean size of reaction in the patients in this group is 25.4 mm. and out of a total of Four Hundred Ninety-nine tuberculous patients diagnosed in this group 313 persons gave reactions which are larger than the mean size, and the number of tuberculous patients who have reactions larger than 20 mm. is 442. Whereas in the entire series where the

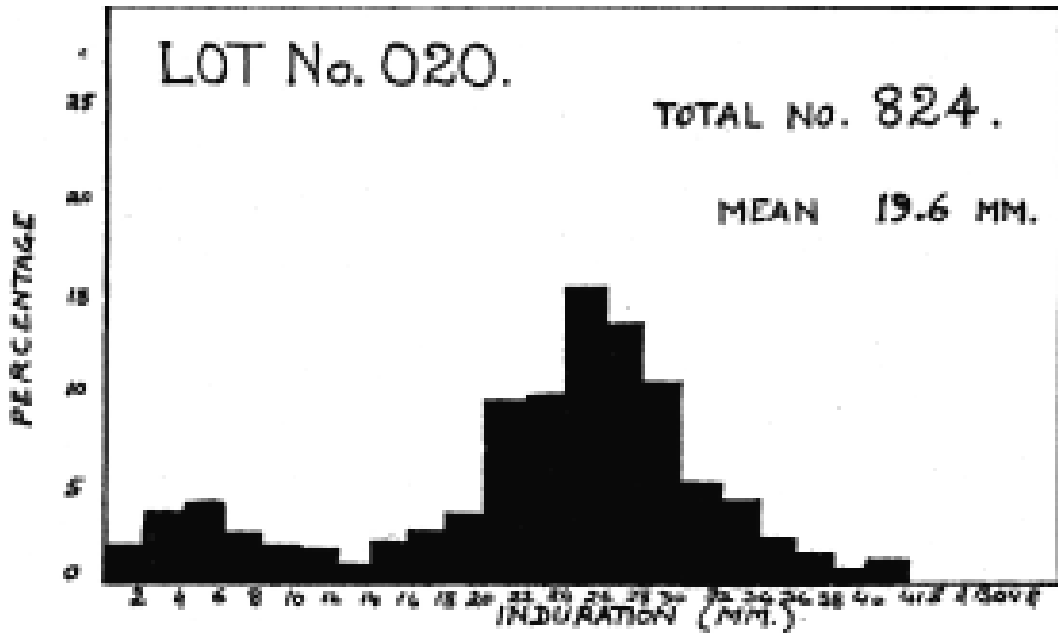


FIG. 1. Distribution of Mantoux reaction of all persons attending T.B. demonstration and training centre, Agra

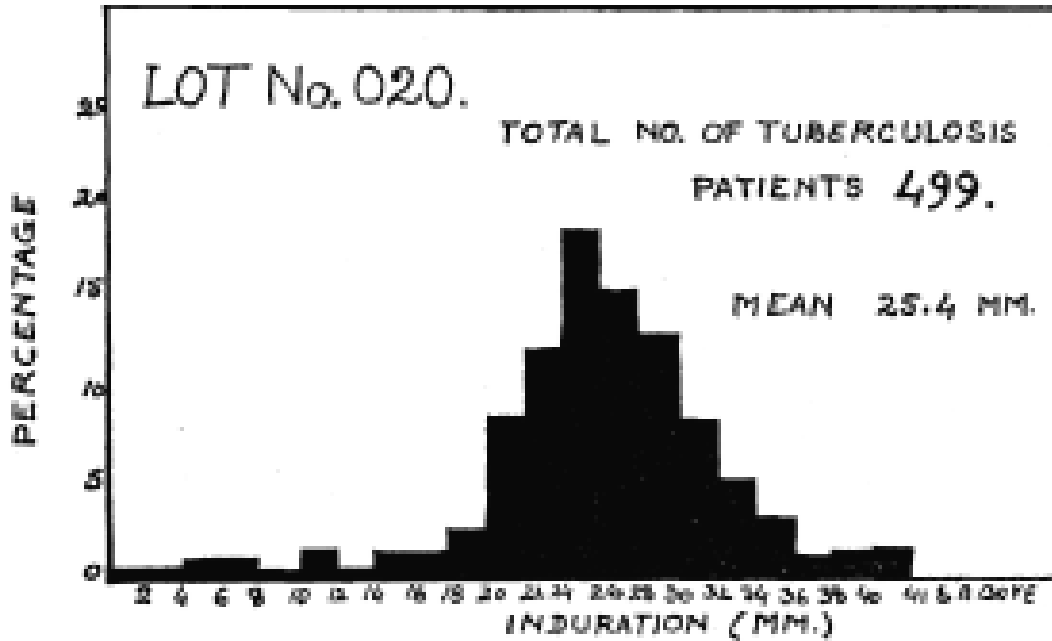


FIG. 2. Distribution of Mantoux reaction of tuberculosis patients attending T.B. demonstration and training centre during the same period

mean size of tuberculin reaction is 19.6 mm., the number which gave reactions larger than the mean is 620.

Therefore, it would be seen that the greatest yield of tuberculous patients would be from amongst those reactors whose size of Tuberculin reactions is 20 mm. or more.

Groth Peterson (1959)² in his report of the Danish Tuberculosis Index while analysing the relationship between the degree of tuberculin sensitivity and the risk of developing tuberculous disease has brought out the fact that in his own country amongst young persons between the ages of 15 to 34 years a strong Mantoux reaction is a danger signal. The risk is almost proportional to the degree of sensitivity. There is the possibility, of course, that the population who initially had a strong tuberculin reaction is most exposed to reinfection and might therefore have a higher rate. Nearly, two-thirds of their new cases arose from amongst tuberculin positives, whereas all of these had previous normal photofluorograms. For those with a reaction measuring 12-17 mm. the rate is more than twice as high, and for those with

reactions of 18-23 mm. it is more than three times higher.

In our country and in our area this tuberculin reaction-morbidity relationship may shift further to the right because of the prevalence of low grade sensitivity.

Of course, it would be ideal to use all the three Diagnostic Methods (photofluorography, sputum and tuberculin) in any intensive case finding programme, but in the absence of mobile mass photofluorography units, and technical difficulties in carrying out the sputum examination in rural areas under the present conditions in our country, an alternative simple but fairly specific approach would be most welcome. From this point of view, after studying a few more groups on the above lines it is proposed to launch a Rural mass case finding programme in the district of Agra, mainly with the help of Tuberculin testing, those giving a reaction of more than 20 mm. would be recalled for photofluorographic examination.

It is anticipated that this single, quantitative test, if carried out properly by specially

trained personnel, would be capable of finding a larger percentage of tubercular patients, than a single sputum examination where personal factors, chances of error, and operational difficulties are many.

A study for determining the case finding significance of each of the three investigations, tuberculin testing, sputum examination, and photofluorography, separately, and their co-

relation with the combined results of all the three would be more interesting and revealing.

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REDUCTION OF POTASSIUM TELLURITE BY VARIOUS SUB-STRAINS OF BCG

K. C. GUPTA*, A. FRAPPIER, M. PANISSET AND J. C. BENOIT

(*Institute of Microbiology and Hygiene, University of Montreal-Canada*)

The reaction of reduction of tellurite was first described by Gosio (1905). Belfanti (1913) and Corper (1915) reported that living human, bovine and avian tubercle bacilli reduce tellurite in a few hours. The tellurium reaction was not evident with dead bacilli.

Sula (1957) employed the test for the colonies of tubercle bacilli and observed that fresh colonies from fluid ascite medium give a positive tellurite test.

During the course of our studies on BCG strain, we undertook various enzymatic tests with the aim of finding new criteria for differentiation of the sub-strains. We have already reported (Gupta *et al.*, 1959) that the BCG Moreau (Brazilian strain of BCG) and BCG Rosenthal 946 BL (Tice Laboratory strain), differ from other strains of BCG in their power of reduction of 2, 3, 5 triphenyltetrazolium chloride. This report deals with the reduction of tellurite by the colonies of various sub-strains of BCG.

Materials and Methods

BCG Cultures. The various sub-strains of BCG employed in the present investigation were obtained from the following sources.

- (a) Institute of microbiology and Hygiene, University of Montreal. For the sake of brevity, this strain is designated as BCG IMH.
- (b) BCG Copenhagen—Culture obtained by the courtesy of Dr. Tolderlund of Serum Institute, Copenhagen.
- (c) BCG Swedish. Culture obtained by the courtesy of Dr. Siever of Sweden.
- (d) BCG Rosenthal. Culture obtained from Tice Laboratory, Chicago.
- (e) BCG Moreau. Culture obtained from Dr. de Assis of Brazil.

Reduction of Tellurite. Three week old colonies of BCG grown on the surface of Dubos solid medium, were flooded with 2

per cent freshly prepared sterile solution of potassium tellurite.

The plates were incubated at 37°C for 12 hours and the readings were taken at an interval of 3, 6, and 12 hours.

Results

The results of our studies show that the BCG cultures show differences in the reduction of tellurite. The colonies of BCG Moreau, which are predominantly non-spreading type, reduce tellurite very strongly in 3 hours.

The colonies of BCG IMH, BCG Copenhagen and BCG Swedish which are predominantly spreading type, show only a slight reduction at the centre of the colony in 6 to 12 hours, the periphery remains colourless. Similar results are obtained with BCG Rosenthal which consists of both spreading and intermediate type of colonies.

Conclusions

The colonies of BCG Moreau which are predominantly non-spreading type, reduce tellurite very strongly in 3 hours. The colonies of BCG IMH, BCG Swedish, BCG Rosenthal and BCG Copenhagen, show only a very slight reduction at the centre of the colony.

It is interesting to note that although BCG Moreau and BCG Rosenthal both reduce triphenyltetrazolium chloride, (Gupta *et al.*, loc. cit) only BCG Moreau reduces tellurite. The test of reduction of tellurite can serve as a useful criteria for differentiation of various sub-strains of BCG employed in different laboratories.

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* Present address: Regional Research Laboratory, Jammu-Tawi, India.

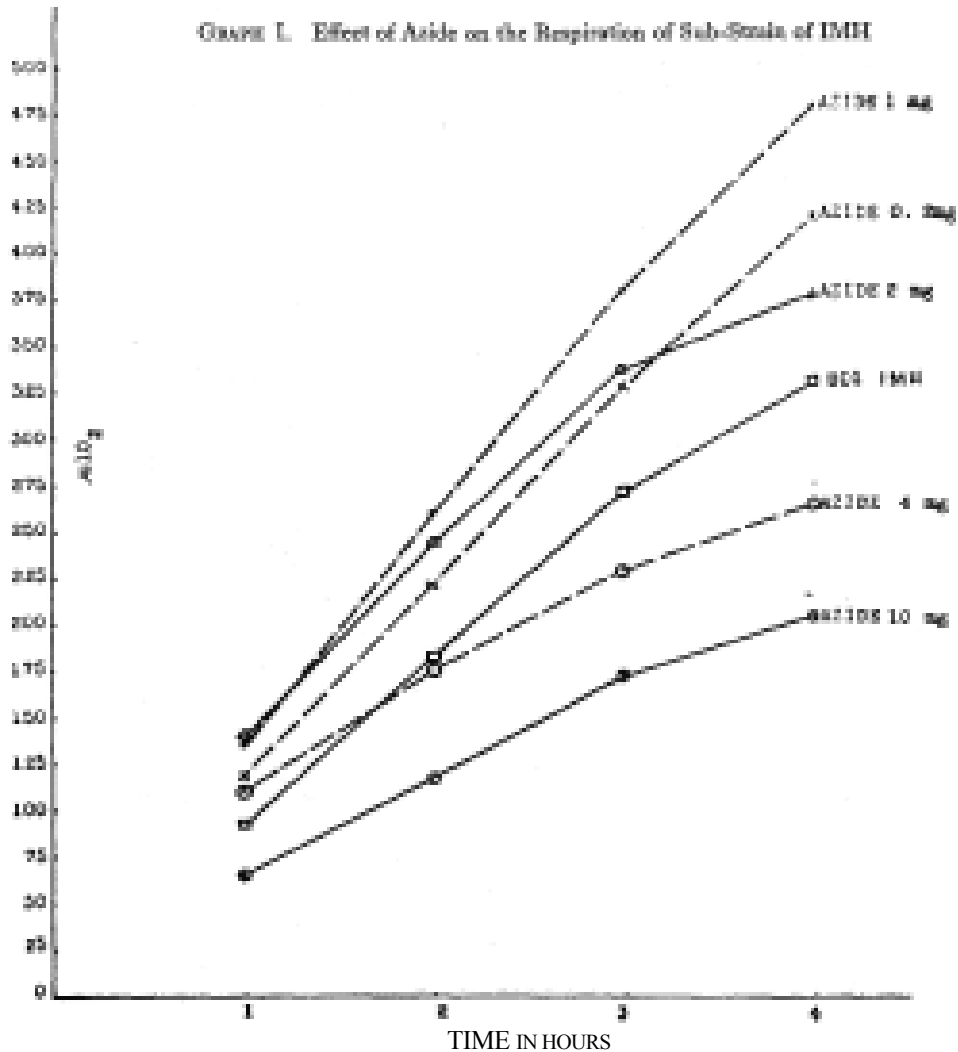
Dr K. C. Gupta is at present working in the Regional Research Laboratory, Jammu and Kashmir, but this paper formed part of the work done in the Dept. of Bacteriology and Institute of Microbiology and Hygiene, University of Montreal in partial fulfilment of the requirement of the Faculty of Medicine, University of Montreal for Ph.D. degree in Bacteriology and were included in the thesis presented in March 1959 under the title 'Could reverting to original media and maintaining through usual cultural cycles influence some in vitro properties of different populations of BCG'.

**EFFECT OF SODIUM AZIDE ON THE OXYGEN UPTAKE OF VARIOUS
SUB-STRAINS OF BCG**

K. C. GUPTA,* A. FRAPPIER, M. PANISSET AND J. C. BENOIT

(Institute of Microbiology and Hygiene, University of Montreal-Canada)

During the course of our studies on BCG we undertook studies in order to find out whether strain, the various cultural and enzymatic tests the genotype or the phenotype of the BCG



* Present address: Regional Research Laboratory, Jammu-Tawi, India.

Dr K. C. Gupta is at present working in the Regional Research Laboratory, Jammu and Kashmir, but this paper formed part of the work done in the Dept. of Bacteriology and Institute of Microbiology and Hygiene, University of Montreal in partial fulfilment of the requirement of the Faculty of Medicine, University of Montreal for Ph.D. degree in Bacteriology and were included in the thesis presented in March, 1959 under the title 'Could reverting to original media and maintaining through usual cultural cycles influence some in vitro properties of different populations of BCG.'

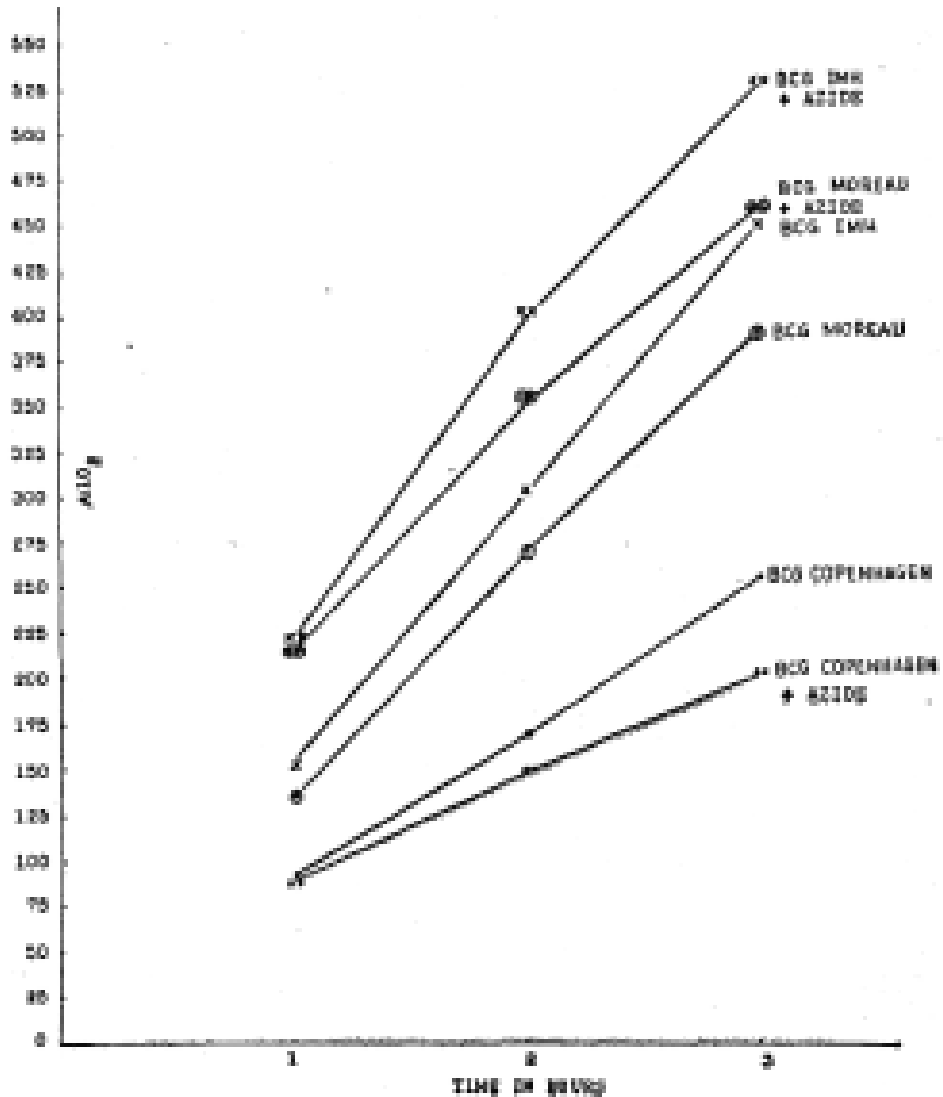
Ind. J. Tub., Vol. X, No. 4

strain and its sub-strains has varied. We have already reported (Gupta, Panisset, Benoit and Frappier, 1959) that BCG Moreau (Brazilian strain of BCG), BCG Rosenthal 946 BL (Tice laboratory strain) differ from BCG IMH (Canadian strain of BCG), Swedish strain of BCG and Copenhagen strain of BCG in the reduction of triphenyltetrazolium chloride. This difference in the reduction of tetrazolium salt, is genotypic in nature. It was also

reported by one of us (Gupta, 1959) that salicylate stimulates the uptake of oxygen by BCG IMH, BCG Copenhagen, BCG Moreau and BCG Rosenthal. The uptake of oxygen by Swedish BCG is not affected.

Clifton and Co-workers (1937-39) and Winzler (1943) have shown that sodium azide acts like dinitrophenol in preventing assimilation of added metabolites by certain micro-organisms. Bernheim (1954) studied the effect

GRAPH II. Effect of Azide on the Respiration of Different Sub-Strain of BCG



of azide and cyanide on the respiration of *Myc. tuberculosis* ATCC 8420. According to him azide increased the auto-respiration from 25 to 100 per cent.

The present report deals with the effect of sodium azide on the respiration of various sub-strains of BCG.

Materials and Methods

The methods of maintenance of BCG cultures and preparation of BCG suspensions for tests, are described elsewhere.

Standard manometric procedure was employed. Lyophilized suspensions of BCG from 7 days old cultures were used and the concentration of BCG was kept 60 mg.

Results

Graph I shows the effect of various concentration of sodium azide on the respiration of suspension from 7 days old culture of BCG IMH. It is evident from the graph that azide in a concentration of 0.2 mg., 1 mg., and 2 mg. increases the oxygen uptake while a concentration of 4 to 10 mg. produces a decrease in the respiration. The optimum response is obtained with a concentration of 1 mg. We have

employed this concentration in our further tests.

The results of effect of 1 mg. of sodium azide on the uptake of oxygen by various BCG cultures are shown in Graph II. It is seen that under the influence of azide, BCG IMH, BCG Moreau and BCG Swedish show an increase in respiration while there is a slight decrease in the oxygen uptake in the case of BCG Copenhagen.

Conclusions

The uptake of oxygen by young cultures of BCG IMH, Swedish and Moreau is increased under the influence of sodium azide while that of BCG Copenhagen is slightly decreased.

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NEWS AND NOTES

19th TB Workers' Conference

The 19th Tuberculosis and Chest Diseases' Workers' Conference will be held in New Delhi under the auspices of the Delhi State TB Association some time in March, 1964 at the time of the Silver Jubilee celebrations of the Association.

Dr L. R. Dongrey, Chairman of the Standing Technical Committee will preside over the conference.

The Railway Board authorities have been moved to renew the question of granting the rail travel concessions to the delegates attending the conference, but it is not possible to anticipate their decision.

Fourteenth Seal Sale Campaign

The fourteenth Seal Sale Campaign will commence on October 2, Mahatma Gandhi's birthday and terminate on 26th January, the Republic Day.

A TB Seal costs ten naya paise and are available all over India.

Tuberculosis Health Visitors' Course

The next Tuberculosis Health Visitors' Course will be organised by the Tuberculosis Association of India from January, 1964. The duration of the course is one year of which one month will be in the College of Nursing, seven months in the New Delhi TB Centre and one month in the Lady Linlithgow Sanatorium, Kasauli. The candidates will be examined at the end of this nine months' training and those who are successful will be required to do practical work in home visiting for three months at the New Delhi TB Centre. Certificates will be awarded at the end of one year after successful completion of practical training in the field.

The minimum qualification for admission to this course is Intermediate with Science/or Hygiene and physiology in the Matriculation.

Applications for admission to this course are to be submitted on prescribed form and reach the Secretary, Tuberculosis Association of India, 3, Red Cross Road, New Delhi on or before 30th November, 1963.

Post-graduate Refresher Course, Calcutta

A two-week post-graduate refresher course in Tuberculosis will be held in Calcutta from 18th November to 30th November, 1963 by the Bengal Tuberculosis Association for registered practitioners of modern medicine. Preference will be given to doctors from

Mofussil. For details please contact Dr K. N. De, Hony. General Secretary, Bengal TB Association, 21 Dr Sundari Mohan Avenue, Calcutta-14.

Post-graduate Refresher Course, New Delhi

A Post-graduate refresher course in tuberculosis for medical practitioners outside Delhi will begin in New Delhi Tuberculosis Centre on November 11, 1963, under the auspices of the Tuberculosis Association of India. The course will be of a week's duration.

The training covers lectures and demonstrations on Pulmonary Tuberculosis.

Medical practitioners from out-side Delhi desirous of availing of this training may apply for admission to the Director, New Delhi Tuberculosis Centre, Circular Road, New Delhi.

The training is free. The last date of receipt of applications is October 21st, 1963.

Chest and Heart Association Scholarship

Dr L. K. Sukul, Deputy Assistant Director of Health Services, Government of West Bengal, has been awarded the Chest and Heart Association Scholarship (1963) by the Tuberculosis Association of India.

Dr Sukul will start his three months training in London in September this year.

XVIIth International TB Conference, Rome

As announced earlier, the XVIIth International Tuberculosis Conference will be held in Rome (Italy) from September 24th to 28th, 1963 under the auspices of the International Union Against Tuberculosis and Italian Federation Against Tuberculosis.

Asian Congress of Gastroenterology, Chandigarh

At the invitation of the Indian Society of Gastroenterology the Asian Association of Gastroenterology will be holding its next Asian Congress in India from 27th to 29th, January, 1964 at Chandigarh.

The scientific session will include Symposia on "Viral Hepatitis" (Moderator: Dr V. Ramalingaswamy); "Hiatus Hernia" (Moderator: Dr F. M. Narievala); and "Changes in the composition of bile with reference to the pathogenesis of Gall-stones" (Moderator: Dr S. Kawashima).

For full particulars write to Dr B. L. Talwar, organising Secretary, Post-graduate Institute of Medicine and Research, Chandigarh.

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The Indian Journal of Tuberculosis

ABSTRACTS

Vol. X

September, 1963

Abst. No. 4

The Effects of Bronchitis, Smoking and occupation on Ventilation

Chest roentgenogram and spirogram was obtained in 1317 men, age 40-65, working full time.

These were divided into four categories.

1. No industrial exposure: 175
2. Industrial but no silica exposure: 598
3. Silica exposure for more than 20 years, normal chest roentgenogram: 404
4. Silica exposure for more than 20 years, roentgenogram showed silicosis in 140.

Forced expiratory volume (FEV); one second forced expiratory volume (FEV₁); the one second forced expiratory volume as a percentage of the forced expiratory volume (FEV₁%); and Maximal mid expiratory flow (MMEF).

All these measurements fall with increasing age and are adversely affected by Bronchitis and cigarette smoking. Occupation did not have any effect on ventilation.

(*Geoffrey L. Brickman and E. Osborne Coates fr.*)

(*Amr. Rev. Resp. Dis.; Vol. 87, No. 5, May, 63.*)

Chemotherapy of Pulmonary Tuberculosis with Pneumoconiosis

83 patients with pulmonary tuberculosis and Coal Workers Pneumoconiosis were submitted for comparison of one, two or three years of standard chemotherapy (The duration being allocated at random).

Of these only 57 have been submitted for detailed analysis.

The drug regimen prescribed was Isoniazid 200 mgm. daily, with P.A.S. 10 Gm. daily in two equal doses and 50 out of 57 had an initial supplement of 1 Gm. Streptomycin daily for more or less 6 weeks.

At one year, 79% of 57 patients had quiescent disease, by 84%. Of the 50 who had Streptomycin initially and 3 (45 %) of the 7

who had no Streptomycin (These differed in severity of disease and time of intake).

Drug reaction occurred in 15 (26%) of the patients, 7 attributed to Streptomycin and 8 to P.A.S. and in 6 (26%) of 23 patients excluded from analysis.

During the 2nd year, bacteriological relapse occurred in 48% of 23 patients who stopped chemotherapy with quiescent disease at one year and 6% of 17 who continued, a significant difference at the 1 % level.

During the 3rd year, bacteriological relapse occurred in 3 of 10 patients who had stopped chemotherapy with quiescent disease at one year there was no relapse among 10 patients who stopped at two years nor among the 4, who continued chemotherapy for the third year.

11 (48%) of 23 patients relapsed in the 2nd year (after stopping chemotherapy at one year) compared with none of 10 in the 3rd year (after stopping chemotherapy at two years).

It is concluded that :

1. One year of the prescribed chemotherapy was inadequate for patients with pulmonary tuberculosis and Pneumoconiosis, but two years or more of this regimen led to better results.

2. The addition of an initial streptomycin supplement improved the response to Isoniazid plus P.A.S.

3. The presence of Pneumoconiosis has an adverse effect on the response of Pulmonary Tuberculosis to the prescribed Chemotherapy.

(*Report to the Medical Research Council from Joint Investigators, (Tubercle, London; (1963), 44, 47.*)

A Controlled Trial of Chemotherapy in Pulmonary Tuberculosis of Doubtful Activity

(*Five year Follow Up*)

Two hundred and nineteen patients with doubtfully active pulmonary tuberculosis were allocated at random to two groups.

One group treated with Soda P.A.S. 10 Gm. plus Isoniazid 200 mgm in two divided doses for at least six months and other was observed without treatment.

Of 219 patients, only 189 patients were followed up for 5 years. Of these 95 were in the Control group and 94 in the treatment group.

30% deteriorated in the control group compared with 18% in the treatment group.

The number of patients in the treatment group who deteriorated might have been much less, had treatment been given for a longer period or under hospital supervision. Chemotherapy is recommended to patients especially if they are:

- (a) Under thirty years of age;
- (b) In those in whom evidence of fibroses is absent from the radiograph;
- (c) And those who are likely to co-operate in treatment.

Untreated patients should be kept under supervision for a minimum period of five years and treated at once if deterioration occurs. The importance of taking Chemotherapy must be emphasized.

(Report from the Research Committee of the Scottish Thoracic Society.) (Tuber. Lond., (1963), 44, 39.)

Acquired Drug-Resistance in patients with Pulmonary Tuberculosis in Great Britain—A National Survey 1960-61

A single sputum examination from 514 old patients with pulmonary tuberculosis and positive sputum at the time of survey and also 12 months or more previously were compared with 289 newly diagnosed untreated cases with pulmonary tuberculosis.

The sputum examination was done by smear and culture and cultures were tested for their sensitivity to Isoniazid, Streptomycin and P.A.S. at two Central Laboratories.

81.7% of the 410 cultures from old patients had acquired resistance to one or more of three drugs, 14.9% being resistant to one drug, 25.6% to two drugs and 41.2% to three drugs. Resistance to Isoniazid was found in 73.7%, to Streptomycin in 63.2% and to P.A.S. in 52.9% of the cultures.

11.1% of the 171 cultures from New Patients were resistant to one or more of the

drugs, 8.8 being resistant to one drug, 2.4% to two or three drugs.

Streptomycin resistance was more frequent than resistance to Isoniazid or P.A.S. Thus resistance to a single drug was more common and resistance to Isoniazid and P.A.S. was less common in patients with primary resistance than those with acquired resistance.

In old patients, 49% of the 253 males and 26% of 82 females were with resistant cultures and amongst the new patients, acquired resistance occurred more frequently in males than in female patients.

(A Report from the Research Committee of the British Tuberculosis Association.) (Tuber., Lond., (1963) 44, 1.)

B.C.G. and Vole Bacillus Vaccine in the Prevention of Tuberculosis in adolescence and early adult life

In a controlled clinical trial of B.C.G. and Vole bacillus vaccine in the prevention of tuberculosis in England, the incidence of tuberculosis in the B.C.G. vaccinated group was 0.40 per 1000 compared with 1.91 per 1000 among those in the Tuberculosis negative unvaccinated group. This represents reduction of 79% attributed to vaccination.

The incidence of tuberculosis in the vole bacillus vaccinated group was 0.43 per 1000 compared with 2.30 per 1000 in the tuberculin negative unvaccinated group, this represents reduction of 81%.

Thus protective efficacy of each vaccine was substantial. The average period of follow up was 8.8 years.

(Third Report to the Medical Research Council by their Tuberculous Vaccines Clinical Trials Committees.) (Brit. Med. Jour., April 3, 63.)

The case against routine scalene Node Biopsy in Bronchial Carcinoma

Routine scalene node biopsy was done in 107 cases of Bronchial Carcinoma.

Only one out of 81 patients without palpable glands, scalene node biopsy gave positive results. Use of Routine Scalene Node Biopsy is not recommended.

(W.J.H. Leckie; R.J.M. McCormack and P. R. Wai Bourn; Lancet Vol. 1, No. 7286, 20, April, 63.)

Status of Disease Due to Unclassified Mycobacteria

(a) Grouping

Term unclassified rather than atypical or anonymous Bacteria be used for micro-organisms causing Pulmonary disease which is clinically indistinguishable from Tuberculosis.

These organisms are classified into 4 groups.

Group I: Photochromogens, *M. Kanasii*.

Group II: Scotochromogens.

Group III: Non-Photochromogens, including the Battey Bacilli.

Group IV: Rapid growers including *M. fortinitus*.

(b) Significance

Under appropriate conditions in the host, saprophytic mycobacteria may cause disease and conversely saprophytes or pathogenic mycobacteria may maintain themselves in man for years without causing disease.

Some indications of etiologic significance of mycobacteria recorded from patients may be derived from:

- (1) The number of colonies per culture.
- (2) The number of specimens positive over a period of time.
- (3) The absence of other recognized etiologic agents for observed disease.

(c) Methods of Characterization

1. Incubate all cultures in the dark.

2. All cultures to be examined after five to seven days of incubation. Cultures with rapid growth should be sub-cultured at room temperature (below 25°C). The presence of good growth (elevated colonies) within seven days at room temperature confirms the presence of Group IV rapid growers.

3. Weekly examination of cultures which do not grow rapidly and note its character and colour.

If colonies are not yellow or orange expose them to bright light for several hours, incubate for 24 hours and re-examine. Acquisition of bright yellow colour characterizes *M. Kanasii* (Group I).

Make two sub-cultures for growth at room temperature, one exposed to the laboratory light and other darkened. The *M. Kanasii* strain grows slowly at room temperature and yellow if exposed to light.

Cultures which have never been exposed

to light and which are bright yellow or orange upon first examination are Group II Scotochromogens.

4. Colonies which are slow growing and not pigmented significantly may be tubercle bacilli or Group III strains and are differentiated by:

(a) Colony Morphology. (Group III colonies are smoother and more moist than *M. Tuberculosis*).

(b) Serpentine Cords (Group III strains usually not corded).

(c) Drug Susceptibility: (Group III strains usually are completely resistant to Isoniazid).

(d) Catalase Activity: (Group III strains usually are Catalase positive although Isoniazid resistant).

(e) Niacin Formation: (Group III strains are negative, *M. Tuberculosis* is positive).

(d) Clinical Picture

Is almost identical with those caused by *M. Tuberculosis*. Pulmonary infection caused by Group I and III are characterized by their chronic, indolent course as well as associated with emphysema.

Extra pulmonary cases are mostly due to Group I and II.

(e) Pathology

Histopathological Findings in Group I, II and III are identical with those produced by *M. Tuberculosis* while those caused by Group IV do not produce caseating granulomatous disease.

(f) Epidemiology

The natural source of the organism is not known and no instance of person to person transmission has been seen.

Infection due to Group I & III mycobacteria have been predominantly in emphysematous males.

Protein Purified derivative of Group III offer more specificity in relation to Group III infections with less tendency to show cross reaction with heterogeneous mycobacteria.

(g) Therapy

All patients with Group I and III be started on daily Streptomycin, Isoniazid and P.A.S. Change of regimen should be based upon the clinical course of the patient and on the results of drug susceptibility tests.

The use of only one effective drug, either alone or in combination with ineffective drugs should be avoided. Group I infections appear to be more susceptible to Chemotherapy than those of Group II and Group III. No specific drug is known to be effective in diseases due to unclassified mycobacteria.

Surgery should not be postponed indefinitely in the hope of achieving cultures conversion on chemotherapy.

(h) Public Health Aspect

After the final diagnosis patients with unclassified mycobacterial infections be segregated from those due to M. Tuberculosis to decrease the likelihood of superinfection with the more virulent human tubercle bacilli. Person to person transmission of unclassified mycobacterial infection does not occur.

(A statement of the Sub-Committee on unclassified Mycobacteria of the Committee on Therapy, Amr. Rev. Resp. Dis.; Vol. 87; No. 3; March, 63).

B.C.G. Vaccination

In a tuberculous Vaccine trial by the Medical Research Council of Great Britain, over 50,000 children of both sexes between the ages of 14 and 15½ years were included. Those with negative tuberculin reactions were vaccinated with B.C.G. or Vole bacillus or were left unvaccinated according to a method of random allocation. Those with positive tuberculin reaction were followed up with great care.

Follow up showed that the annual incidence of tuberculosis was 0.40 per 1000 in the B.C. G. vaccinated group compared with 1.91 per 1000 in the tuberculin negative unvaccinated group. The protective value of each vaccine was therefore considerable.

When the vaccine is not perfect—the incidence of tuberculosis in the vaccinated was one fifth of the incidence in the tuberculin negative unvaccinated. Vaccination will not remove the need for occasional and regular examination of contacts. However, it does greatly diminish the danger of miliary tuberculosis and tuberculous meningitis. Official policy in the U.K. is to offer B.C.G. vaccination to special risk groups, which includes children of tuberculous patients, school leavers, medical

workers and travellers to areas where the disease is rife. There is further justification for its use after the latest results of M.R.G. trials.

In under developed countries the use of B.C.G. vaccination may be unwise on the results of M.R.C. trials because no satisfactory efficacy of B.C.G. vaccination has as yet been obtained. South Indian investigation by Fridmott Moller showed no particular protection to have been obtained from B.C.G. vaccination.

Deterioration of vaccine and technical difficulties may be one of the possible reasons, but there is urgent need for local research of the same careful standard as that of M.R.C. trials.

Research is also needed to improve the vaccines.

(Leading Article, Brit. Med. Jour. April 13, 63.)

Tuberculin Tine Test

Tuberculin tine test should be regarded as a very useful and important addition for detection of infection and control of Tuberculosis.

The tuberculin tine test, a multiple-puncture intradermal skin test has been compared with P.P.D.-5 intermediate strength (5 Tu) in 976 hospitalized patients for a variety of reason.

A close concordance was seen for the tine test of 3 mm plus (or 2 mm plus) with PPD-5 of 6 mm plus.

A less good concordance of the tine test of 6 mm plus with a PPD-5 of 10 mm plus of induration was noted.

A minimal positive tine test was of 3 mm (or 2 mm) or more of palpable induration. Correlating test with PPD-5 test of 6 mm or more.

Reading the test on a single day only, the third day or 72 hours after administering the test proved best for both.

The tuberculin test, a self-sufficient disposable plastic unit, easily administered, easily read is a useful case-finding skin test in mass survey work office practice and in home contact testing.

(Theodore L. Badger, E. Ruth Breitweiser and Hugo Muench. Am. Rev. Resp. Dis.; Vol. 87. No. 3, Part 1 of 2 parts, March, 63.)