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## CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Chronic obstructive pulmonary (or lung or airway) disease (COPD) is undoubtedly the most important and frequent chest disease in the world today. Prevalence in U.K. is estimated to be about 8% in males and 3% in females. The respective figures for those more than 40 years old are 17% and 8%. Urban women suffer more than rural (the result of smoking habits). It ranks second to coronary disease as the cause of permanent disability in men over 40 years old and accounts for 10% of all deaths. Mortality in USA rose from 1.3 in 1960 to 12.6 in 1964 and is continuing to rise. Morbidity in U.S.A., estimated at about 3 to 6% is significantly less than in U.K.

There is paucity of authentic data in our country. Estimates based on hospital figures cannot reflect the exact situation in the community. Estimates based on small limited surveys carried out by Wig et al<sup>1</sup> and Viswanathan<sup>2</sup> varied from 1 to 6%. New Delhi TB Centre<sup>3</sup> found prevalence in a congested locality of Delhi to vary from 4 to 6% among persons 15 years or more in age. A noteworthy feature of the Delhi survey was that the disease was significantly more in women of households where cow-dung and firewood were used as fuel than in women of households where other types of fuel were used.

With urbanization, rapid and unbridled (in respect of environmental factors) industrialization, increasing addiction to tobacco smoking and environmental pollution, the prevalence is likely to rise rapidly in our country too. What is highly disturbing is that even a large number of children have started presenting with symptoms of airway obstruction.

Clinical entities grouped under the term COPD have for long been a diagnostic conundrum. The same condition was labelled chronic bronchitis by one, emphysema by another and chronic bronchitis cum emphysema by still another. Adoption of the term COPD or GOLD has resolved the semantic confusion but exact identification of the pathological condition still remains difficult. When bronchiectasis supervenes, as it often does, the picture gets further confused. Distinction between 'blue bloaters' and 'pink puffers' is neither easy nor precise. Symptoms may be common to conditions like pulmonary tuberculosis on one side and heart disease on the other. While the airway obstruction is usually reversible in Asthma, it is irreversible in COPD.

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  2. Viswanathan R.: *ibid.* Jour. Chest. Dis.; 1964, 6, 171,
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Radiological features are mainly not pathognomonic. Emphysema, at least in early stages, can only be established histo-pathologically-

Recent advances in the field of patho-physiology, described in the review article appearing in this issue clarify the position considerably. But the sophisticated function tests are, by and large, not available especially to the practitioners located far from the academic centres. They have to depend on the time-honoured crude tests of pulmonary function like presence of cyanosis, jugular vein prominence, match stick and exercise tests etc., Four diagnostic criteria have been recommended viz. intensity of breath sounds during deep inspiration, palpable tenseness of scalene muscles during tidal ventilation, expiratory wheeze and occurrence of moist sounds in expiratory phase of voluntary cough. These signs have shown a very good correlation with pulmonary function tests and help tremendously in establishing the diagnosis and determining the prognosis of a patient.

The two articles on the subject in this issue jointly cover the entire field and present an excellent picture of all aspects of this entity. Not only is diagnosis uncertain, management is equally unsatisfactory. That being so, systematic efforts to prevent become even more important. Prevention in order to be rational and effective, has to be based on aetio- pathogenesis. Unfortunately, there are big lacunae in our current knowledge in this respect also.

While the aetiological role of virus and bacteria, environmental factors like smoking and air-pollution, hypersecretion of mucous and inhibition of its clearance leading to increased propensity to infection, surfactant etc. are well recognised and fairly well understood, the role of many other factors is not yet perfectly clear. Lot of work is being done on the host factor and the role of alveolar macrophages. Some factors in whole blood have a mainly suppressive effect on lymphocyte responsiveness. Presence of a large number of immunological and non-immunological mediators which are able to modulate the immunological response is suspected but remains to be established. Identification of these factors and their co-relation with natural history of COPD is being looked into.

It is well recognised that patients with predominantly emphysematous features tend to remain normocapnic despite severe expiratory flow limitation and exertional dyspnoae, while patients with largely bronchitic features are less dyspnoeic but more prone to develop chronic hypercapnia. Mechanism responsible for this difference is also poorly understood at present. Pattern of respiratory control in COPD appears to be regulated by neural and chemical mechanisms. Genetically determined and acquired hyposensitivity to chemical stimuli seems to play a significant role in the aetio-pathogenesis.

In the present state of knowledge three definitive preventive actions are recommended. Primary prevention aims at reduction in smoking, atmospheric pollution and infection. Secondary prevention aims at defining, as far as possible, the groups at risk of developing respiratory insufficiency and tertiary prevention aims at retarding the progress of insufficiency and diminishing the complications.

Thus **COPD** is a serious health hazard with increasing incidence, protracted course and a fairly heavy toll of human life. That it makes many of its victims almost respiratory cripples in later stages is even more distressing. While all-out efforts to curb smoking and environmental pollution are imperative, urgent studies are equally necessary to fill in the gaps in the existing knowledge about its aetio-pathogenesis in order to contain its ravages.

## REVIEW ARTICLE

### PHYSIOLOGICAL ASPECTS OF CHRONIC OBSTRUCTIVE LUNG DISEASE

S.K. JAIN

#### **Introduction**

The term chronic obstructive lung disease (COLD) clearly has a functional connotation and implies that there is generalised narrowing of bronchial lumen causing obstruction to airflow in the lungs. It is often used as a "diagnostic label" in a clinical sense to describe a syndrome manifested by laboratory evidence of permanent airflow obstruction although some reversibility may be present. It apparently represents a stage in the evolution of either simple chronic bronchitis even though initially without demonstrable obstruction to airflow by routine spirometric tests, or of spasmodic asthma in which the airflow obstruction is no longer completely reversible (Loren et al., 1978). True bronchial asthma can be easily differentiated from COLD by its episodic nature, complete remissions occurring spontaneously or after treatment and exacerbations in response to extrinsic allergens. Chronic obstructive lung disease, however, includes a condition—sometimes referred to as chronic infective asthma or asthmatic bronchitis—in which the primary pathology seems to be chronic bronchitis but attacks of acute chest infection are characterised by unusually severe bronchoconstriction which responds immediately to bronchodilator therapy (Rakeman, 1947; Welch, 1977; Burrows, 1980). In addition, some patients of COLD have neither of these features and present simply with progressive dyspnoea. Alternative terms used for COLD are chronic obstructive pulmonary disease (COPD), chronic non-specific lung disease, diffuse airways obstruction etc.

During the past twenty years, researches by the epidemiologists, chest physicians and pulmonary physiologists have led to important new knowledge which has greatly helped in understanding and evolving a rational approach to the management of COLD. The clinical features of this syndrome are described elsewhere in this volume (Pancle, 1980). The present communication reviews some of the physiological aspects relevant to the diagnosis and management of this syndrome.

#### **The airways**

As stated above, COLD primarily involves

impact of pathological changes on their function. It is important to highlight some of the morphological and structural characteristics.

A single trachea divides and subdivides to give rise to twenty-three generations of airways; the last generation constitutes the alveolar sacs. As the airways progressively branch, the individual daughter branches become smaller in diameter than the parent branch, but the total cross-sectional area of the airways of a given branching generation becomes progressively higher (Wiebel, 1963). For example, the cross-sectional area of trachea is 2.5 sq. cm while the corresponding figures for the terminal and respiratory bronchioles (generations 16 and 19 respectively) are 180 sq. cm and 944 sq. cm respectively. The airways may be arbitrarily divided into large or central cartilaginous and small or peripheral (non-cartilaginous). This division occurs about the eleventh generation. Another way of dividing the bronchial tree into small and large airways is: the former are <2 mm and the latter >2 mm diameter. The large airways are prevented from collapsing by the cartilage, and the small airways by the elastic recoil of the alveolar septa. The calibre of small airways is thus mainly influenced by lung volume, as the elastic recoil is stronger at higher lung volumes.

The airway walls consist of ciliated epithelium and goblet cells, smooth muscle, cartilage and glands in a framework of connective tissue. The relative amount of smooth muscle increases in small bronchi, occupying the largest fraction of the wall thickness in the terminal bronchioles (Macklin, 1929). Both glands and goblet cells produce mucus which coats the epithelial surface of the airways. Glands and goblet cells are absent in terminal airways; instead these are coated with a thin fluid layer. Vagal stimulation and inhalation of irritants like sulphur dioxide or cigarette smoke produce extensive glandular hypertrophy as well as development of goblet cells in bronchioles (Megahed et al. 1967). Mucus glands are commonly hypertrophied in asthma (Huber and Koessler, 1922) and in chronic bronchitis (Reid, 1960; Thurlbeck and Angus, 1967). The lumen of the airways is also controlled by visceral sensory and motor fibres as well as the sympathetic nerve fibres.

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For airflow to take place through the tracheobronchial tree, it is necessary to develop a pressure difference ( $\Delta P$ ) between the alveoli and the mouth. The  $\Delta P$  per litre of gas flow is called the airway resistance—expressed as cm H<sub>2</sub>O/litre/sec (Dubois et al. 1956). In normal subjects the airway resistance measured in the tidal range is 0.5 to 2.0 (mean 1.2) cm H<sub>2</sub>O/L/sec. The resistance to airflow is directly proportional to the length of the airways and inversely proportional to the fourth power of radius. It follows that large changes in resistance can occur with relatively small changes in the radius of airways. During inspiration the airways distend while during expiration and coughing these are compressed. The dimensions of the airways also depend upon the resting tone of the bronchial smooth muscle. The airflow is turbulent and has a higher velocity in the larynx and in the large airways, but the velocity is very much reduced and the flow becomes absolutely laminar in small airways owing to a large cross-sectional area of the latter. These factors determine the distribution of airway resistance in the normal airways: larynx and pharynx 0.5 cm H<sub>2</sub>O/L/sec (Hyatt and Wilcox, 1961; Ferris et al., 1964); bronchi >2 mm diameter, 0.5 cm H<sub>2</sub>O/L/sec; and bronchioles <2 mm diameter, 0.2 cm H<sub>2</sub>O/L/sec (Hogg et al., 1968). It is noteworthy that resistance to airflow in the small airways is negligible. It follows that a considerable amount of disease of small airways can be present without producing any definite increase beyond the upper range of normal value of the total airway resistance.

### Pathophysiology of airways obstruction

Although the etiology of airways obstruction is diverse, the mechanisms by which narrowing of airways leading to airflow obstruction are common:

1. inflammatory mucosal oedema and thickening of basement membrane due to infection, irritation or allergy,
2. accumulation of secretions and debris in the lumen.
3. stenosis and scarring of airways,
4. glandular hypertrophy.
5. narrowing of small airways under static as well as dynamic conditions due to loss of parenchymal elastic recoil,
6. mucus plugs,
7. humoral and neurological mechanisms leading to inappropriate contraction of smooth muscle.
8. collapse of airways during forced expiration if destruction of cartilage or fibrous replacement have made them less able to withstand compression
9. distortion of airways due to lung fibrosis.

The pathological lesions enumerated above, irrespective of etiology, would produce: (1) clinically, cough with expectoration, dyspnoea, wheezing, abnormal shadows in chest radiograph, respiratory failure and cor pulmonale; (2) by laboratory methods, evidence of airflow obstruction, abnormal arterial blood gas tensions and pH and pulmonary hypertension. A diagnosis of chronic obstructive lung disease is essentially based on the presence of clinical features plus demonstration of airflow obstruction by routine spirometric tests or measurement of peak expiratory flow rate. Tuberculosis, bronchiectasis and allergic asthma have to be ruled out as the primary and the only cause of the observed airflow obstruction. These diseases may, however, co-exist with COLD. A question may be legitimately raised: can a diagnosis of COLD be made before the clinical symptoms and spirometric abnormalities become manifest? This question has become more relevant for two other considerations: (1) The morphological characteristics of airways are such that in the early stages of the disease, efficiency of mucociliary and other defence mechanisms may delay the onset of symptoms. Similarly, the spirometric tests are known to miss out even moderate to severe abnormalities in the peripheral airways. (2) The increasing morbidity and mortality of COLD is attracting the attention of scientists because of its cause and effect relationship with smoking and atmospheric pollution. In order to prevent the enormous loss of work hours and the menacing effects of this disease, it is imperative that the diagnosis is made at the earliest stage so that the population at risk can be protected or at least warned. For this purpose a number of newer methods of investigation have been evaluated. In fact, during the past 20 years there has truly been an explosion in the knowledge on COLD. While it is impossible to review all the literature, the following aspects will be considered.

1. Mucociliary function and cough
2. Physiological mechanisms underlying the sensation of dyspnoea
3. Pulmonary function impairment
4. Physician's dilemma: the problem of early diagnosis— an integrated approach

### I. Mucociliary Function and Cough

Ciliated epithelial cells are found in all airways as far peripherally as the respiratory bronchioles. The respiratory secretions are slowly moved up by the ciliary action to stimulate the cough receptors in the main bronchi, trachea and larynx to expel the sputum. Mucociliary action is impaired by irritants such as

tobacco smoke, by inflammation or by inhalation of chemical irritants, fog or dry air. When mucus production is increased and the ciliary function impaired, these secretions are likely to get infected, thus aggravating the airway obstruction. Rarely, the cilia may be congenitally immotile. Severely impaired mucociliary transport present in chronic bronchitis and in many symptom-less smokers may be directly involved in the development of COLD (Mossberg, 1980). Cough can only partly compensate for the impaired mucociliary transport. The cough reflex may be depressed during sleep, administration of sedative drugs and during severe respiratory acidosis; this would aggravate the obstruction to airflow.

## II. Physiologic mechanisms underlying the sensation of Dyspnoea

Dyspnoea is one of the cardinal symptoms of chronic obstructive lung disease. It is felt as obstructed, hindered breathing; as lightness in chest or as breathlessness. The tightness of chest is most marked in the morning and as the patient coughs up the secretions retained overnight, he feels better. The sensation of dyspnoea is not related to arterial blood gas disturbances. Indeed, dyspnoea is most marked in 'pink puffers' emphysema in which the arterial blood gases are kept near normal levels while in "blue bloaters" characterized by intense cyanosis respiratory acidosis and cor pulmonale the sensation of dyspnoea may not be so marked. It is, however, related to the severity of disturbed mechanics. Dyspnoea is a subjective sensation and must therefore have a neurophysiological basis, i.e. a sensory receptor-afferent-fibre system to transmit impulses and affect its perception centrally. The related sensory-receptor-fibre system has not yet been clearly identified. The subject has been extensively reviewed by Jain (1979) and Noble (1976). Dyspnoea in left ventricular failure, diffuse interstitial lung disease and pneumonia are now known to be mediated to a large extent by the pulmonary vagal sensory fibres. By contrast, vagal block in patients with chronic bronchitis did not relieve the sensation of dyspnoea and did so only partially in emphysema (Guz et al., 1970). During tidal breathing the airway resistance in the normal man varies between 0.5 and 2 cm H<sub>2</sub>O/L/sec. This does not produce any discomfort during breathings. When the airway resistance is suddenly increased by 0.75 cm H<sub>2</sub>O/L/sec or more, the patient feels a sense of loaded breathing. That is presumably the explanation of dyspnoea during exercise or during an acute episode of chest infection. The sensory receptors for this sensation are probably located in the rib cage, diaphragm and upper air passages. It has been sug-

gested that sensory receptors in intercostal muscles mediate the sensation of dyspnoea but there is no definite evidence for it (see Review by Jain, 1979).

## III. Pulmonary Function Impairment

The effect of bronchopulmonary diseases on lung function has been extensively studied by Viswanathian and Jain (1963). The disordered lung function in COLD is more easily understood by dividing it arbitrarily into three stages:

- (i) the stage of pure ventilatory insufficiency
- (ii) when impairment of gas exchange becomes added to ventilatory insufficiency; and
- (iii) progress to cor pulmonale

### I. Stage of ventilatory insufficiency

Diffuse pathological changes in the airways produce increase in the resistance to airflow either by narrowing due to incomplete obstruction, or by reduction in the number of airways by their complete occlusion. The radius of airways normally increases with expansion of lungs during inspiration, but decreases with reduction in lung volume on expiration. As the resistance to airflow is inversely proportional to the fourth power of radius, airway narrowing, even though slight, obstructs and retards the expiratory airflow far more seriously than the inspiratory airflow. The lungs can be emptied completely only with prolongation of the expiratory phase and with the active contraction of expiratory muscles. After a time this fails to overcome the bronchiolar narrowing and alveolar distension results. The pressure of such distended alveoli on the adjacent intrapulmonary peripheral airways may further narrow their lamina leading to a check valve mechanism with increased distal trapping of air. The chest is kept at a partial inspiratory position, which helps to prevent the peripheral airway & from collapsing. With the further progression of disease, the combined effects of prolonged alveolar distension and raised intra-alveolar pressure aggravated by coughing produce rupture of the alveolar septa. The capillaries in the alveolar septa are destroyed and the adjacent alveoli are converted into large alveolar spaces. This leads to a progressive loss of elasticity. At this stage, physical signs of obstruction in the airways and of hyper-inflation of lungs can be detected. Besides, hyperinflation of lungs may be evident on chest radiography. Measurement of pulmonary function tests reveals the following abnormalities:

- (a) *Lung volumes* : Vital capacity is reduced

depending upon the severity of airway obstruction. This reduction can be explained by premature closure of airways and for this reason the reduction will be more marked during forced vital capacity manoeuvre than during slow expiration. During forced expiration, the raised intrathoracic pressure may produce additional narrowing by dynamic compression of airways. The residual volume (RV) is increased partly by the premature closure of airways and partly because of distal air trapping. The functional residual capacity may be normal or only slightly increased in chronic bronchitis, but is definitely increased in emphysema owing to loss of elastic recoil of alveoli. The total lung capacity (TLC) may be normal or only slightly increased in chronic bronchitis but is definitely increased beyond normal in the case of emphysema. The RV/TLC ratio is also increased. The FEV<sub>1</sub> is reduced both as absolute volume as well as per cent of vital capacity. For clinical purposes, U is useful to grade the severity of airway obstruction on the basis of reduction in the FEV<sub>1</sub>/VC % for example 40%, very severe; 40-50%, severe; 50-60%, moderately severe and 60-75% mild.

During forced respiratory manoeuvres, the flow rates which are generated during different phases of expiration and inspiration are determined by the elastic properties of lungs, airway calibre and muscular force applied. Measurement of flow rates forms the basis of several dynamic ventilatory function tests :

- (i) maximum expiratory flow rate at high lung volume—measured with Wright peak flow meter;
- (ii) average flow rate during the middle half of forced expiratory vital capacity (FEF<sub>25-75%</sub>)—calculated from a forced expiration
- (iii) maximum expiratory flow rates at 15%-25% and 50% of forced expirogram—measured by simultaneously recording volume and flow rates on a X-Y recorder.

All maximum expiratory flow rates are reduced in chronic obstructive lung diseases, and the degree of reduction indicates severity of disease. These tests are considered more sensitive than FEV<sub>1</sub>. There are essentially no qualitative or quantitative differences in chronic bronchitis compared with emphysema.

(b) *Compliance of lungs.* The ratio of lung volume change to the transpulmonary pressure is a measure of compliance of lungs. When we plot transpulmonary pressure on X-axis and absolute lung volume on the Y-axis under static

conditions we observe almost linear values near the tidal range but the curve slightly flattens off at higher lung volumes. In emphysema the curve is shifted upwards and to the left. i.e. the static compliance is increased beyond normal values (Macklem and Becklake, 1963). This is an important test to confirm the diagnosis of emphysema. Although static compliance is increased in emphysema, there may be a significant overlap between patients of early emphysema and the normal. The value for dynamic compliance is, however, lower than normal and is frequency dependent. With the increasing frequency of breathing during the measurement of dynamic compliance, the value of the latter is further reduced, This is explained by different time constants of the different alveolar units (Otis et al., 1956).

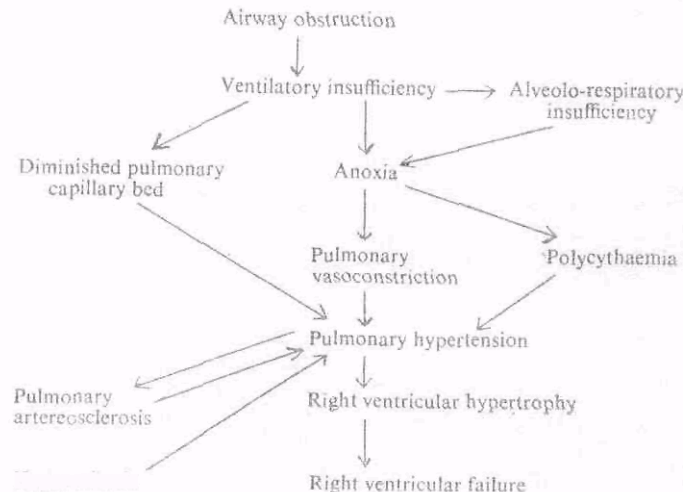
(c) *Airway resistance* : As the airway narrowing occurs, the airway resistance increases—as measured by the whole body plethysmographic technique of Dubois et al. (1956). As the resistance in the peripheral airways is normally only about 10-15% of the total resistance, even a four-fold increase of resistance at these sites may not produce a significant increase beyond the normal value of 0.5—2.0 cm H<sub>2</sub>O/L/sec. This test is therefore not very sensitive to detect airway obstruction in the peripheral airways. On the other hand, this method is very sensitive in detecting changes in the large or central airways.

*Impaired pulmonary gas exchange and arterial blood gas tensions.* Estimation of pulmonary diffusing capacity of lungs by the single breath carbon monoxide method (DLCO) can help in the diagnosis of emphysema. The reduction in DLCO is mainly because of loss of pulmonary capillaries in the alveolar septa. The diffusing capacity is maintained near normal values in chronic bronchitis.

Arterial blood gases behave differently in emphysema from chronic bronchitis (Briscoe and Nash, 1965). In emphysema without much bronchitis the arterial oxygen tension (Pao<sub>2</sub>) is slightly reduced but the carbon dioxide tension (Paco<sub>2</sub>) is within normal limits or may be even below normal values. This is because—for reasons which are not completely understood—the ventilatory drive is well maintained in these cases. These patients are often referred to as 'pink puffers'. In chronic bronchitis, on the other hand, as the disease progresses or following an acute chest infection, the Pao<sub>2</sub> is reduced and Paco<sub>2</sub> rises. The magnitude and severity of change will depend upon the rate of progression of airway obstruction as also the baseline lung function in the chronic state. As the Pao<sub>2</sub> falls below 60 mm Kg and if haemoglobin is more than 10 g %, cyanosis appears. As Paco<sub>2</sub> increases,

pH falls to produce respiratory acidosis. The latter is compensated by retention of bicarbonate in an attempt to bring back the pH to normal values. At this stage, the patient has symptoms attributable to hypoxaemia and hypercapnia. These are : impaired judgement, confusion and sometimes frank psychosis, irritability, inability to concentrate, headache, tachycardia, bounding pulse, raised systemic blood pressure, engorged fundal reins and even papilloedema. There may be muscular twitchings, diminished tendon jerks, extensor planter response and finally stupor and coma. Blood gas tensions do not correlate directly with clinical features (Mithoefer et al., 1968). The severity of symptoms depends upon the rapidity with which the blood gases deteriorate. These features appear to be mainly due to the uncompensated respiratory acidosis which has the effect of lowering cerebral oxygen consumption and when this falls to below 2.1 ml per 100 g of brain tissue per minute, unconsciousness invariably occurs. A depression of the arterial pH to 7.2 produces mental disturbance and at levels of 7.1 coma is usual. If the deterioration of blood gases has been slower and there is ample time for compensatory metabolic alkalosis, even  $P_{aCO_2}$  of 70-80 mm Hg may be tolerated without much disturbance of consciousness. The drive to ventilation in respiratory failure is provided mostly by the stimulation of carotid body chemo receptor as the medullary respiratory centres becomes insensitive to the increased carbon dioxide content of the blood. Elevation of the  $P_{aO_2}$  by administration of uncontrolled oxygen will remove the hypoxic carotid body drive and may lead to further alveolar hypoventilation and precipitate carbon dioxide narcosis.

*Cor pulmonale* : The factors leading to cor pulmonale are multiple and are summarised below :



### Reversibility of airway obstruction

Of the numerous pathological changes, those due to inflammatory lesions of the mucosa and glands are reversible on treatment with antibiotics, corticosteroid drugs, postural drainage and physiotherapy and correction of hypoxaemia and respiratory acidosis. In addition some patients respond favourably to treatment with bronchodilators drugs following which  $FEV_1$  may improve considerably although it never returns to normal values. These patients are sometimes labelled as asthmatic bronchitis and this leaves the margin between COLD and bronchial asthma a little blurred,

It is possible that in some of the patients with COLD, there may be additionally some degree of reflex bronchoconstriction either to nonspecific stimuli or some chemical mediators released during epithelial injury in the airway (Dubois and Dautreband, 1958; Yu et al., 1972). These patients, however, are quite distinct from atopic bronchial asthma, No wonder, it is almost impossible to define bronchial asthma (Ciba Group 1971). The favourable response to bronchodilator therapy has a great clinical significance. In every patient of COLD this component of reversibility must be determined.

### Physician's dilemma : The problem of early and precise diagnosis and management

The chest physician diagnoses chronic obstructive lung disease on the basis of clinical symptomatology and radiological findings and also makes an attempt to define the underlying pathology in terms of chronic bronchitis, emphysema or bronchial asthma or combinations of these according to the accepted criteria (Ciba Group Symposium, 1959: Medical Research Council,

1965; Ciba Study Group, 1971). However, several pertinent questions can be raised :

1. What is the correlation between physical findings and lung function changes?
2. Is emphysema present?
3. Can the diagnosis of COLD be made in the presymptomatic stage?

#### **Correlation between physical findings and lung function changes**

Follow-up studies of COLD have shown that the long term prognosis and survival of patients is determined to a large extent by the degree of pulmonary function impairment rather than the type of obstructive disease present (Mitchell et al, 1964; Martin et al., 1966; Diener and Burrows, 1975). Recently, Pardee et al. (1980) have observed that patients whose airway obstruction is not severe may have little or no disability and relatively good prospects for long term survival. On the other hand, FEV<sub>1</sub> of less than 1 litre may carry a five-year mortality risk of 75% or more. Despite the fact that the methods of detecting established airway obstruction are easily available, the physicians often tend to ignore this and make an attempt to determine the impairment in function on purely physical and radiological examination. All such attempts in the past have proved disappointing (Godfrey et al., 1969; Forgacs, 1978). On clinical grounds alone a potentially dangerous state of respiratory failure may remain hidden.

Pardee et al (1980) have recently investigated four physical signs—intensity of breath sounds during brisk deep inspiration, palpable tensing of scalene muscles during tidal ventilation, expiratory wheeze and occurrence of a moist crackling sound in the expiratory phase of voluntary cough—for their ability to detect abnormalities of FEV<sub>1</sub>. All four signs were significantly related to abnormality of FEV<sub>1</sub>. A normal examination does not exclude mild or moderate degree of functional abnormality but, if obstructive disease is present, it is not severe enough to carry with it a serious risk of 5-year mortality, due to ventilatory failure. Three or more points of abnormality make the diagnosis of airway obstruction near-certain and indicate that the underlying ventilatory defect is severe. The literature provides some support for this notion (Raper et al., 1966; Leblank et al., 1970; Hall and Gandeva, 1971; Forgacs, 1978).

#### **Is emphysema present?**

The presence of emphysema has a tremendous prognostic value in COLD. As stated above,

the diagnosis of emphysema depends upon the destruction of alveolar walls. As such, it is impossible to distinguish by purely physical methods between simple hyperinflation as may occur in bronchial asthma from chronic obstructive emphysema with destruction of alveolar septa. Several studies have suggested that radiologic examination of the chest is useful in recognising the amount of emphysema present (Reid and Millard, 1964; Nicklaus et al., 1966; Thurlbeck et al., 1970). Unfortunately, the intra and interobserver variation in the interpretation of the chest radiographs are too many to make this a useful procedure in the hands of average physician. The only reliable indices, so far available, of emphysema are increase in static lung compliance with a reduced and frequency-dependent dynamic lung compliance; and reduced membrane diffusing capacity.

*The problem of early diagnosis.* In recent years sophisticated technology used in the measurement of lung mechanics has greatly contributed to our understanding of COLD. The pioneering studies of Mead et al. (1967); Macklem and Mead (1967) and Hogg et al. (1968) suggest that COLD begins in the periphery of the lung first. It affects the ventilatory function of the small airways before there are diagnostically interpretable symptoms or evidence of abnormal spirometric function. Because of the morphological characteristics of the peripheral airways, the affected patients usually continue to remain asymptomatic at rest (McFadden and Lyons, 1968, 1969; McFadden et al., 1973), thus delaying recognition and treatment until obstruction is advanced and often irreversible changes have taken place. Also, it may be argued that if the obstruction of peripheral airways can be detected in the presymptomatic stage and before the spirometric abnormalities become manifest, the course of the disease may be modified by instituting proper measures (Ingram and Cain, 1971; McFadden and Linden, 1972). It has been clearly documented that patients with isolated obstruction in the peripheral airways can have alternations of dynamic compliance (Ingram and Cain, 1971; McFadden and Linden, 1972; Woolcock et al., 1969), forced expiratory flow rates (McFadden and Linden, 1972; Sobol et al., 1973; Bouhuys et al., 1969; Da Silva and Homosh, 1973), closing volumes (Buist et al., 1973; McCarthy et al., 1972), and or residual volumes (McFadden and Linden, 1972; Bates, 1966) long before other aspects of their lung function become abnormal. Of these tests designed to study the small airway function, there is no test as yet which is universally acceptable. The present climate seems to favour the use of maximum expiratory flow volume curves using low density gas—helium (Wellman et al.,

1976) and the closing volumes. Recently, at the Vallabhbhai Patel Chest Institute a new method of detecting peripheral airway disease has been developed (Agrawal and Kumar. 1980). In this method airway conductance at low lung volume is determined. This method may prove more sensitive than all other known techniques but more studies are indicated to evaluate it.

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## REVIEW ARTICLE

### CHRONIC OBSTRUCTIVE LUNG DISEASE —CLINICAL ASPECTS

J.N. PANDE

Chronic obstructive pulmonary diseases (also referred to as chronic obstructive airway diseases) are amongst the commonest respiratory disorders encountered in clinical practice (Wig et al, 1964; Viswanathan, 1964). They produce disability and discomfort over a large segment of the sufferer's life span on account of their chronic or recurrent nature. As the name itself indicates these diseases are characterized by increase in airway resistance causing obstruction to airflow. At a Ciba Guest Symposium (1959) it was decided to subdivide these diseases into two categories, namely, reversible and irreversible chronic obstructive lung disease. The former is exemplified by bronchial asthma. Under the category of irreversible chronic obstructive lung diseases are included conditions like chronic bronchitis and emphysema. Although patients with extensive bronchiectasis (Pande et al, 1971), tropical eosinophilia, fibrosing alveolitis, extensive pulmonary tuberculosis etc. may also exhibit irreversible airway obstruction, these disorders are not included under the category of chronic obstructive lung diseases. The present communication will highlight some of the clinical aspects of irreversible chronic obstructive lung diseases, namely, chronic bronchitis and emphysema.

#### Definitions

Bronchial asthma is defined as a disorder characterized by recurrent episodic dyspnoea with wheezing due to bronchospasm which is reversible either spontaneously or in response to treatment (American Thoracic Society, 1962). Certain patients with bronchial asthma, however, after many years of the disease may exhibit persistent wheezing and the response to conventional bronchodilators may be poor. This is not very surprising because bronchial asthma is a multi factorial disease whose aetiology is incompletely understood. These asthmatics with refractory bronchospasm may be wrongly labelled as having irreversible airway obstruction.

Chronic bronchitis has been defined as a condition characterized by overproduction of mucus resulting in cough and expectoration on

most of the days of three consecutive months over two consecutive years (W.H.O. Technical Report Series, 1961). Other conditions which are capable of producing cough and expectoration must, however, be excluded by appropriate clinical and radiological examination. This definition is satisfactory for epidemiological purposes but leaves much to be desired. For example, two years must elapse before a semantically correct diagnosis can be applied to a patient who is clinically symptomatic. In the early stages, chronic bronchitis may not be accompanied by demonstrably significant airway obstruction at least by routine spirometry.

The term 'emphysema' is defined on pathological basis. It is stated to be a condition of the lung characterized by overdistension of the respiratory passages beyond the terminal bronchioles along with disruption of the interalveolar septae (American Thoracic Society, 1962). The earlier definition proposed at the Ciba Guest Symposium (1959) did not incorporate destruction of the alveolar septae as an essential component in emphysema. This would lead to inclusion of temporary overinflation as seen in bronchial asthma and other types of reversible airway obstruction under the category of emphysema. This is undesirable, and therefore the current practice is to diagnose emphysema only when permanent destructive changes have occurred. Unfortunately, emphysema is difficult to diagnose with certainty during life (Fletcher et al, 1963). It produces peripheral airway obstruction due to the loss of the elastic recoil of the pulmonary parenchyma which is necessary to maintain normal airways in a state of patency. Certain types of emphysema in themselves may be the consequence of peripheral airway obstruction caused by chronic bronchitis. It must be emphasized, however, that the presence of chronic bronchitis is not essential for producing airway obstruction in emphysematous patients.

*Nature of airway obstruction:*— Chronic obstructive lung diseases are characterized by chronic or recurrent diffuse generalized airway obstruction. The site, severity and reversibility of airway obstruction may vary considerably. Irreversible chronic obstructive airway diseases

are associated with a peripheral airway obstruction in the 'small airways', i.e., airways less than 2mm in diameter. Because of the dichotomous pattern of bronchial branching, the total cross-sectional area of the peripheral 'small airways' is several times greater than that of the trachea. The peripheral airways, therefore, contribute only 10% of the total airway resistance (Hogg et al, 1968). An increase in airway resistance in chronic bronchitis or emphysema is a late phenomenon. Bronchial asthma is associated with constriction not only of the peripheral airways, but also the large central airways where the smooth muscles are most plentiful. Administration of a rapidly acting bronchodilator brings about dramatic decrease in airway resistance in patients with asthma, whereas the change in chronic bronchitis is small and in emphysematous subjects almost negligible (Pande, Jain and Guleria, 1970). Generally speaking, an increase of more than 20% in FEV<sub>1</sub> (forced expired volume in the first second) following a bronchodilator is considered necessary to diagnose reversible obstruction.

The mechanism of airway obstruction in emphysema is quite different from that in chronic bronchitis or bronchial asthma. In primary emphysema the airways themselves are basically normal, but they become narrowed simply because of the lack of elastic pull on their wall normally exerted by healthy lung tissue. Thus the loss of elastic recoil of the lung causes peripheral airway narrowing in emphysema.

#### **Relationship between chronic bronchitis and emphysema.**

Chronic bronchitis and emphysema frequently co-exist (Thurlbeck and Angus, 1963). Both conditions share common aetiological factors such, as smoking and atmospheric pollution. Moreover, the peripheral airway narrowing produced by chronic bronchitis may in itself be responsible for the development of emphysema, particularly of the centrilobular variety (Thurlbeck et al. 1970). Clinical recognition of emphysema in presence of chronic bronchitis is very difficult and detailed physiological and radiological investigations may be required to confirm its presence during life. From the clinical point of view, the distinction between chronic bronchitis and emphysema may not be very useful as far as management of the patient is concerned (Pride, 1977). Emphysema occurs rather infrequently in asthmatics. This may be because bronchial asthma is most frequent in younger subjects and the airway narrowing is paroxysmal. Some elderly patients with perennial asthma may, however, develop emphysema as well.

#### **Clinical features**

The epidemiological features of chronic bronchitis and emphysema are well known (Wig, 1973, Viswanathan, 1964, Guleria, Pande & Gupta, 1969, Malik 1977, Joshi et al, 1975). Most of the patients are over 40 years of age and there is a male preponderance. A large majority of (he patients are smokers. There is a high incidence of the disease in rural women in India because of their constant exposure to the smoke generated by the burning fuel in ill ventilated rooms (Padmavati and Pathak, 1959). Hookkah and bidi smoking are as important in the causation of chronic obstructive pulmonary diseases as cigarette smoking (Malik, 1977). Severe forms of the disease are sometimes encountered in relatively younger subjects between the age of 25-40 years. A small percentage of these subjects are homozygous for alpha-1-anlityrspin deficiency which predisposes them to early development of emphysema. Others arc found to have been heavy smokers sometimes even before their teens. A few other conditions, however, may be kept in mind while dealing with chronic obstructive lung disease in the young. The recently described 'immotile cilia syndrome' in which morphological abnormalities of the cilia are present may produce premature chronic obstructive lung disease (N. Engl. J. Med, 1977). The spermatozoa are also frequently abnormal and the patients may be sterile. Kartagener syndrome appears to be an example of the immotile cilia syndrome. Patients with mucoviscidosis, who have an abnormality of mucus, may also develop chronic obstructive lung disease.

Whereas cough and expectoration are the dominant symptoms in patients with predominant chronic bronchitis, patients with primary emphysema present with exertional dyspnoea as the main symptom. This symptom subsequently develops in chronic bronchitis after a few years when airway obstruction has become fairly advanced. A large majority of the patients develop chronic bronchitis and emphysema simultaneously. Several investigators have attempted to classify chronic obstructive lung diseases on the basis of clinical, radiological and physiological features. Thus Burrows et al (1966) described two clinically distinct categories of patients, namely, 'Blue bloater' and 'pink puffers' with a large group of patients sharing characteristics of both. Blue bloaters are believed to have predominantly chronic bronchitis as the underlying pathology. These patients produce significant amount of sputum and develop severe respiratory failure, right ventricular hypertrophy and chronic cor pulmonale. Their pulmonary diffusing capacity for carbon mono-

xide (DLco) is normal and skiagrams of the chest do not show emphysematous changes. 'Pink pullers' on the other hand are constantly dyspnoic, but do not develop respiratory failure and chronic cor pulmonale except terminally. They show radiological and physiological evidence of emphysema.

It may be noted, however, that only a small proportion of patients with chronic bronchitis progress to the stage of 'blue bloaters'. It is speculated that these patients are genetically preselected on the basis of a low respiratory centre sensitivity to hypoxia and hypercapnia. Thus the natives of Papua, New Guinea, who have a high incidence of chronic respiratory failure, have been shown to have relative insensitivity of the respiratory centre to hypoxic stimulation. Moreover, it is likely that many of the so-called 'blue bloaters' have underlying centrilobular emphysema which is not clinically evident. In a clinico-physiological study of chronic obstructive lung disease in Northern India (Guleria, Pande and Gupta, 1969; Guleria & Pande, 1969) the patients were divided into two subgroups on the basis of their pulmonary diffusing capacity (DLco). Those with low DLco had a greater severity of emphysema radiologically, greater degree of overinflation, more severe blood gas abnormalities and frequent right ventricular hypertrophy. Patients with normal DLco, inspite of having a comparable degree of airway obstruction, had less of overinflation and respiratory failure and chronic cor pulmonale were infrequent. All the subjects in both the groups had clinical history of chronic bronchitis. It was concluded that the two groups of patients represented a continuous spectrum of the same disease. When chronic bronchitis was complicated by emphysema, presumably of the centrilobular type, respiratory failure and chronic cor pulmonale supervened.

The incidence of primary emphysema in Northern India appears to be less frequent (Guleria et al, 1969), The occurrence of  $\alpha_1$ -antitrypsin deficiency in emphysematous patients is comparable to the Western figures (Gupta et al, 1977). Indians have an impaired ventilatory response to  $\text{CO}_2$  (Gupta, 1980) and this may be one of the factors accounting for the frequency of  $\text{CO}_2$  retention in chronic bronchitis.

Late onset, asthma must be distinguished from chronic bronchitis and emphysema because the former is a reversible type of airway obstruction. Characteristically, the late onset asthma develops suddenly. Wheezing is much more prominent in bronchial asthma. This is because bronchial asthma is associated with narrowing of the central airways as well due to the abun-

dance of smooth muscles. Moreover the lack of terminal airway involvement minimizes V/Q abnormalities and hypoxaemia. For a comparable degree of airway obstruction the patients with chronic bronchitis and emphysema have a far less noisy chest and much greater hypoxia as compared to asthmatics. Late onset asthma may not exhibit marked reversibility in response to rapidly acting bronchodilators. It is recommended that a course of oral steroids for one week should be administered to study the reversibility of airway obstruction in these patients before labelling them as having irreversible obstructive lung disease (Pride, 1977).

#### **Radiological features:**

Chronic bronchitis can not be diagnosed on the basis of radiological features. Findings include the presence of overinflation, prominence of lung markings and presence of parallel linear shadows (Bates et al, 1966). Enlarged bronchial glands may be seen in bronchograms obtained for other reasons. Radiology is more helpful in the diagnosis of emphysema. Only advanced degree of emphysema can be diagnosed with confidence (Reid and Millard, 1964; Nicklaus et al, 1966). The radiological features of emphysema include depression and flattening of the diaphragm, irregular radiolucency of the lung fields, increase in retrosternal space and attenuation of the peripheral pulmonary vasculature. Centrilobular emphysema produces less conspicuous radiological changes (Reid, 1966).

#### **Pulmonary Function Tests:**

Early changes : It is now well recognized that chronic obstructive lung disease has a prolonged subclinical course. Anatomical and physiological changes in the lungs and airways occur early and remain clinically silent for many years. Conventional spirometric parameters, however, are not adequate for the detection of early disease. This is because the peripheral airways normally contribute very little towards total airway resistance on account of their very large total cross-sectional area. Hence one must rely on tests which depend upon the distribution function of air within the lung. One of the earliest physiological abnormalities in chronic obstructive lung disease appears to be frequency dependence of the dynamic compliance ("Woolcock, Vincent & Macklem, 1969). Increase in closing volume and the slope of phase III during nitrogen washout also occurs relatively early. Abnormalities of flow volume curves with reduction in flow rates at low lung volumes can be demonstrated (Pande et al, 1978). Some of these abnormalities are reversible following cessation of smoking.

Prospective studies of lung function in smokers and nonsmokers carried out over a period of more than a decade have revealed interesting results (Fletcher, 1976). Forced expired volume in the first second (FEV<sub>1</sub>) declines very gradually in nonsmokers and non-susceptible smokers with advancing age. A majority of smokers are susceptible to develop airway obstruction and exhibit an accelerated rate of fall in FEV<sub>1</sub>. Even in these subjects it requires on an average 20 years before clinical disability due to airway obstruction ensues. Cessation of smoking at any stage reverts the rate of decline in FEV<sub>1</sub> to control level. But if the smoking has been stopped after the appearance of dyspnoea, even the reduced rate of decline in FEV<sub>1</sub> may not be enough to prevent death due to airway obstruction over the next few years (Fletcher et al, 1976).

**Late changes :** In a patient with established airway obstruction, the diagnosis of emphysema requires sophisticated physiological investigations. Loss of the elastic recoil of the lung and impairment of single breath pulmonary diffusing capacity for carbon monoxide are suggestive of emphysema (Bates 1968). Reduction in DLco is mainly on account of decrease in the membrane diffusing capacity (Jain, Pande & Guleria, 1972). Specific conductance elastic recoil plots may be necessary to separate patients with chronic bronchitis from those with emphysema.

#### **Management:**

Management of patients with chronic obstructive lung disease requires cessation of smoking and exposure to polluted environment. Most of the patients with chronic bronchitis exhibit a certain degree of reversibility in their airway obstruction (Pande et al, 1970) and hence bronchodilators constitute an important part of the therapeutic regime. Patients with predominant emphysema usually show no change in airway obstruction after bronchodilators. In elderly patients the use of selective B<sub>3</sub>adrenergic stimulants like salbutamol or terbutaline is preferable in order to avoid cardiovascular side effects. Both the drugs produce effective bronchodilatation in asthmatics (Guleria et al, 1974 & 1979; Bhalla et al, 1978). Oral theophylline preparations are less effective in the usually administered doses.

Recurrent bacterial and viral infections are frequent in patients with chronic obstructive lung disease. The commonest offending organisms are H. influenzae and strep. pneumoniae. Routine cultures of the sputum are not necessary and the patients may be treated with ampicillin (or amoxicillin), tetracyclines or cotrimoxazole with good results. Patients with very

frequent respiratory infections may be given prophylactic antibiotics particularly during the winter months.

Breathing exercises and exercise training programs are useful in improving effort tolerance but their efficacy remains to be established with the help of controlled trials. Similarly the efficacy of various forms of aerosol therapy requires proper evaluation.

In spite of these measures a large number of patients develop respiratory failure. Chronic obstructive lung disease is the commonest cause of chronic respiratory failure (Guleria et al, 1971). Chronic cor pulmonale usually supervenes at this stage. Oxygen therapy, intravenous aminophylline and antibiotics are required for the management of acute exacerbations of respiratory failure. Diuretics should be used cautiously and potassium supplementation should be given in the management of right heart failure. Hypokalemia is frequent and the accompanying alkalosis may further depress the respiratory drive (Guleria et al, 1971). Respiratory stimulants have not been found to be very useful, except when employed as a short term measure to counter the respiratory depression produced by high concentrations of oxygen or hypnotics (Pande and Guleria, 1969). In patients having intractable chronic respiratory failure the administration of steroids often produces improvement in blood gas, tensions without significant change in lung mechanics (Pande & Guleria, 1972).

In patients with persistent and severe hypoxaemia, the occurrence of pulmonary arterial hypertension and right heart failure can be reversed by administering oxygen for at least 15 hours a day for several months (Stark et al, 1973). This is an expensive form of treatment which has been successfully used even in ambulatory patients with the help of portable oxygen cylinders. Acute episodes of respiratory failure can be treated by extracorporeal oxygenation in life threatening situations where assisted ventilation has been ineffective. Attempts to increase the elastic recoil of the lung in emphysematous patients by inducing radiation fibrosis have not been successful. Similarly lung transplantation as yet has not been promising and there have been no long survivals. Clearly the future hope of tackling this disease lies in its prevention by creation of pollution free environment and abolition of smoking.

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## FEASIBILITY OF INVOLVEMENT OF THE MULTI PURPOSE WORKERS IN CASE FINDING IN DISTRICT TUBERCULOSIS PROGRAMME

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**Summary :** To-day, case finding activity through symptomatics attending PHIs on their own, is at a low ebb. With the introduction of MPW scheme, a machinery has emerged through which this activity could be augmented. The study has revealed that if the MPWs collect sputum smears from the symptomatics of the age group of 20 years and above during their routine visits to each household of the specified population allotted to them and despatch the smears to the PHC for examination, there is a possibility of augmenting the existing case finding activity by 4-5 times. An intensive training of 2-3 days for this purpose seems adequate. The average work load for a MPW would be preparation of one smear a day initially for a couple of months and thereafter as a routine one slide a week. In an average PHC, the work load for the microscopist would be to examine 10 to 12 slides a day initially, the load will then progressively decline and subsequently as a routine it will not be more than 3-4 slides a day. An additional microscopist would probably be needed at PHC laboratory for examination of sputum smears as well as to assist the existing microscopist who at present is primarily engaged in malaria work. Meticulous supervision and regular flow of supplies and equipment is however a 'must' for the success of the scheme.

### Introduction

Efficient case finding is the corner stone of Tuberculosis Control Services. In the District Tuberculosis Programme (DTP) this activity has been going on through peripheral health institutions (PHI) and the District Tuberculosis Centres (DTC) from among symptomatics\* attending on their own. It has, however, been observed over the years that the case finding activity stands at about 30 % of the expected efficiency<sup>1</sup>. It has also been realized from a sociological study that the optimum potential of this activity could only be to the extent of about 50% of the existing infectious cases since not more than that proportion of the cases seek diagnosis<sup>2</sup>. This has been confirmed by a repeat study 12 years later<sup>3</sup>.

Under these circumstances, involvement of Multi Purpose Workers (MPW) in a recently introduced MPW Scheme to boost up case finding seems to be an attractive proposition\*. Under this scheme, a MPW is expected to maintain an up-to-date record of all households in his jurisdiction and is responsible for their total health care in a specified population wherein he visits each house once a month. His involvement may provide a permanent on-going service for sputum collection from symptomatics during his house to house visit in a systematic manner. If found operationally feasible this procedure could be adopted to supplement the already existing case finding methodology under DTP.

An operational study was therefore under-

taken to determine the feasibility of utilizing the services of MPWs in case finding.

### Study Area

For operational convenience, Andhra Pradesh was chosen for the study. At the time of commencement of this study in June 1978, the MPW Scheme was introduced only in 5 districts in Andhra Pradesh viz., Chittoor, East Godavari, Nalgonda, Nellore and Hyderabad. Chittoor district was selected as it was an average district in that state. The MPW scheme was fully implemented only in 5 primary health centres (PHC) of the district, namely, Karvetinagar, Empdu, Thambalapalli, Ramasamudram and Chowdappalli. Out of these, Karvetinagar, Thambalapalli, Ramasamudram PHCs were selected on random basis.

The number of male MPWs functioning was 16 each in Karvetinagar and Ramasamudram and 20 in Thambalapalli. In each of these 3 PHCs, 50 % of the male MPWs were chosen by a random process. Thus 8 MPWs each from Karvetinagar and Ramasamudram and 10 from Thambalapalli centres were taken for the study.

### Methodology of Training

The role of a MPW in respect of this study was to:

- (i) question all household members of the age group 20 years and above for symptoms suggestive of pulmonary tuberculosis.

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\*Symptomatics are those who have one or more of "Chest Symptoms" namely cough, chest pain, fever of two weeks' duration or more or haemoptysis irrespective of its duration.

- (ii) identify all eligibles for sputum collection (see infra)
- (iii) collect spot specimen of sputum from each eligible symptomatic
- (iv) prepare a smear, fix it, and dispose off the left over material (v) despatch the prepared slides to PHC through the respective supervisor
- (vi) communicate the results of sputum positive cases on his next round and motivate them for initiation of treatment and
- (vii) prepare second smear of those found sputum negative if the symptoms still persist on his subsequent home visit.

The collection of the sputa was confined to the symptomatics of the age group 20 years and above only, as 93 % of the total case prevalence is in this age group<sup>5</sup>.

All the MPWs were trained at the beginning of the study to perform the above functions satisfactorily. A two day training camp was held in the first week of June, 1978 in each of the 3 selected PHCs for these purposes. The training was imparted by a medical officer and a laboratory technician deputed by National Tuberculosis institute (NTI). All the MPWs involved in the study and their concerned supervisors were trained. The training was given as per lesson plan\* prepared for the purpose of the study.

### Procedures

Each MPW was provided with the necessary supplies and equipments for carrying out the work in the field. His normal fixed tour programmes were not at all disturbed. During his routine visit to each household in the allocated villages, the MPW questioned the persons aged 20 years or over about any of the symptoms suggestive of pulmonary tuberculosis. The symptoms to be enquired into were cough, fever, chest pain persisting for two weeks or more, occurring either singly or in any combination or haemoptysis irrespective of its duration. A tick mark was to be made against the names of the symptomatics so identified in 'remarks' column in the Household and Family Record' register<sup>6</sup>. He was also to make entries of the symptomatics in the village schedule<sup>111</sup> specially designed for the purpose of this study. Spot specimen collections were then to be made, smears prepared and fixed. The slides so prepared along with the village schedules in duplicate duly filled in with information on symptomatics, were to be despatched through the supervisor when the

\*Copy of the lesson plan and the village schedule can be directly obtained from Ilic authors.

latter met the MPW, on his supervisory visit, which in routine practice was twice a week.

PHC, it was examined by NTI laboratory technician deputed for the purpose and results were entered in both the copies of the schedule. One copy of the schedule was filed by him and the other was sent to the PHC Medical Officer who was requested to communicate the results to the patients whose smears were positive through a letter and request them to come for treatment. The schedule was then to be handed over to the supervisor who was to pass it on to the concerned MPW. The MPW in turn, on his next monthly visit in the concerned village, was expected to communicate the result to the concerned person. Against the name of that person in the 'Household and Family Record' register., he was to put a mark " + ". He was also required to prepare a second smear of the sputum from the sputum negative symptomatics whose symptoms still persisted (Persistant symptomatic) and a second tick mark was to be put against his name. No symptomatic was considered eligible for collection of sputum more than twice i.e., in two consecutive months.

The field work of the study commenced in June, 1978 and ended in September, 1978.

### Study Population

The total population of the mid year 1978 as projected on the basis of the 'Household and Family Record' registers prepared in 1977 and population in the age group 20 years and above in the areas allocated to the selected MPWs in each PHC area, is given in Table 1.

Table I

*Estimated population allocated to MPWs*

| PHC Area       | *Number of units | Total population | Population ≥20 yrs |
|----------------|------------------|------------------|--------------------|
| Karvetinagar   | 244              | 57373            | 29260              |
| Ramasamudrani  | 271              | 58497            | 29833              |
| Thembalappally | 143              | 65445            | 33377              |
| Total          | 658              | 181315           | 92470              |

\*Sampling units for the study were as adopted by PHCs for routine work namely village, hamlets and sectors for urban areas.

The total population to be covered by selected MPWs in the 3 selected PHC areas ranged from 57,373 to 65,445. On an average, each MPW was allotted a population of 7,172 in Karvetinagar, 7,312 in Ramasamudram and 6,544 in Thambalapalli.

## Results

### *Identification of Symptomatics*

The total number of symptomatics identified by the MPWs during the study period was 453 in Karvetinagar, 362 in Ramasamudram and 246 in Thambalapalli.

In all these areas the number of symptomatics identified was the highest in the 1st month and thereafter decreased from month to month. The proportion of the eligible population identified as symptomatics varied from 0.35% to 0.65% in the 1st month and from 6.06% to 0.18% in the 4th month (Table 2). The month to month decline was expected and understandable as once the initially available symptomatics are tackled, the identification would mostly be limited to the fresh symptomatics.

Amalgamating the findings of all 3 PHCs, the symptomatics identified by all the 26 MPWs in the eligible group of population were 442

Table 1

### *Symptomatics Identified by MPWs*

| PHC Area      | Number of MPWs | Month | Eligible population $\geq 20$ yrs. | Symptomatics identified |
|---------------|----------------|-------|------------------------------------|-------------------------|
| Karvetinagar  | 8              | June  | 29260                              | 189(0.65)               |
|               |                | July  |                                    | 126(0.43)               |
|               |                | Aug   |                                    | 85(0.29)                |
|               |                | Sep   |                                    | 53(0.18)                |
|               | Total          |       | 453                                |                         |
| Ramasamudram  | 8              | June  | 29833                              | 137(0.46)               |
|               |                | July  |                                    | 110(0.37)               |
|               |                | Aug   |                                    | 95(0.32)                |
|               |                | Sep   |                                    | 20(0.07)                |
|               | Total          |       | 362                                |                         |
| Thambalapalli | 10             | June  | 33377                              | 116(0.35)               |
|               |                | July  |                                    | 80(0.24)                |
|               |                | Aug   |                                    | 31(0.09)                |
|               |                | Sep   |                                    | 19(0.06)                |
|               | Total          |       | 246                                |                         |
| Grand Total   | 26             | June  | 92470                              | 442(0.5)                |
|               |                | July  |                                    | 316(0.34)               |
|               |                | Aug   |                                    | 211(0.22)               |
|               |                | Sep   |                                    | 92(0.09)                |

Figures in brackets indicate percentage of the population  $\geq 20$  years.

(0.5% ) in the 1st month, 316 (0.34%) in the 2nd, 211 (0.22%) in the 3rd and 92 (0.09%) in the 4th month.

The MPWs registered 7.4% of the symptomatics as persistent symptomatics in the 2nd month in Karvetinagar and none thereafter. In Ramasamudram the figures were 14.7% in the 2nd, 14.4% in 3rd and 23.1% in the 4th month. None was registered in Thembalappalli. In all only 51 persistent symptomatics were registered in all the 3 PHC areas (Table not given).

#### Case Finding Among Symptomatics

During the study period of 4 months 460,

393 and 234 slides were received and examined at Karvetinagar, Ramasamudram and Thembalappalli respectively making a total of 1087. The slides found adequate for examination were 964. A slide was considered to be inadequately prepared if the smear was very thin which in turn could be due to non selection of proper material or faulty technique. Thus, 123 (11.3%) smears were found inadequate.

The proportion of sputum positive slides among adequately prepared slides examined varied from PHC to PHC and within the PHC from month to month. In all, 74 (7.7%) smears were found positive, 38 (9.1%), 12(3.2%) and 24 (14.4%) in Karvetinagar, Ramasamudram and Thembalappalli respectively (Table 3).

Table 3

#### Case finding Activity by MPWs

| PHC Area       | Month | Number of sputa collected amongst symptomatics identified | Number of slides received and examined | Number of found adequate for examination | Cases diagnosed |            |
|----------------|-------|---|--|--|-----------------|------------|
|                |       |   |  |  | No.             | % to Col.5 |
| 1              | 2     | 3   | 4                                      | 5  | 6               | 7          |
| Karvetinagar   | June  | 189   | 158                                    | 135                                      | 21              | 15.6       |
|                | July  | 136   | 146                                    | 133                                      | 10              | 7.5        |
|                | Aug   | 85  | 93                                     | 92                                       | 2               | 2.2        |
|                | Sep   | 53  | 63                                     | 59                                       | 5               | 8.5        |
|                |       |   | 463                                    | 460                                      | 419             | 38         |
| Ramasamudram   | June  | 137   | 99                                     | 98                                       | 8               | 8.2        |
|                | July  | 129   | 156                                    | 131                                      | 3               | 2.0        |
|                | Aug   | 111   | 97                                     | 92                                       | 1               | 1.1        |
|                | Sep   | 26  | 41                                     | 37                                       | 0               | —          |
|                |       |   | 403                                    | 393                                      | 378             | 12         |
| Thembalappally | June  | 116   | 71                                     | 53                                       | 11              | 20.7       |
|                | July  | 80  | 105                                    | 79                                       | 8               | 10.1       |
|                | Aug   | 31  | 38                                     | 23                                       | 2               | 8.7        |
|                | Sep   | 19  | 20                                     | 32                                       | 3               | 25.0       |
|                |       |   | 246                                    | 234                                      | 167             | 24         |
| Grand Total    |       | 1112  | 1087                                   | 964                                      | 74              | 7.7        |

The slides received from amongst the symptomatics identified for the first time and those from the persistent symptomatics is not presented separately. Since there were only 51 smears collected from persistent symptomatics subsequently from all the 3 centres combined, their inclusion would not have affected either the results or the work load of the microscopist substantially. Further, only 2 cases were detected from the slides made from the persistent symptomatics, the rest 72 being from the symptomatics attending for the first time. However, 10 of these 72 cases had already been detected by the DTP before the study commenced.

During the same period 78,109 and 94 slides were examined at Karvetinagar, Ramasamudram and Thembalapalli, respectively from amongst the symptomatics attending the centre on their own and 18 cases were detected. Whereas 64 fresh cases (excluding 10 already known to the DTP) were detected through the reference of slides by MPWs. Examinations during the corresponding months in the previous year in all the 3 centres combined were 7 slides and what is

more, not even a single case was detected (Table not given).

#### **Work Load**

##### *(a) MPW*

The identification of symptomatics by MPWs varied from PHC to PHC and within PHC from worker to worker. The average daily work load per MPW in the 1st month was 1.5 in Karvetinagar, 1.3 in Ramasamudram and 0.7 in Thembalapalli (Table 4). Thereafter it decreased progressively in all the centres.

Considering the work load of all the 26 MPWs of the 3 PHC& studied, the average work load per worker per day was 1.1 in the 1st, 0.7 in the 2nd 0.5 in the 3rd. and 0.2 in the 4th month.

##### *(b) Laboratory Technician*

The working days per month per laboratory technician varied from 24 to 27 during the study period. The work load varied from centre to centre. The daily average examinations done

Table 4

*Average work had of an MPW*

| PHC Area      | No. of MPWs | Month | Number of Days worked | Number of symptomatics identified | Symptomatics identified per worker per day |
|---------------|-------------|-------|-----------------------|-----------------------------------|--|
| Karvetinagar  | 8           | June  | 125                   | 189                               | 1.5  |
|               |             | July  | 131                   | 126                               | 1.0  |
|               |             | Aug   | 137                   | 85                                | 0.6  |
|               |             | Sep   | 115                   | 53                                | 0.5  |
| Ramasamudram  | 8           | June  | 106                   | 137                               | 1.3  |
|               |             | July  | 134                   | 110                               | 0.8  |
|               |             | Aug   | 158                   | 95                                | 0.6  |
|               |             | Sep   | 156                   | 20                                | 0.1  |
| Thembalapalli | 10          | June  | 165                   | 316                               | 0.7  |
|               |             | July  | 168                   | 80                                | 0.5  |
|               |             | Aug   | 164                   | 31                                | 0.2  |
|               |             | Sep   | 163                   | 19                                | 0.1  |
| Grand Total   | 26          | June  | 396                   | 442                               | 1.1  |
|               |             | July  | 433                   | 316                               | 0.7  |
|               |             | Aug   | 459                   | 211                               | 0.5  |
|               |             | Sep   | 434                   | 92                                | 0.2  |

in the 1st month were 6.6, 4.0 and 2.9 in Karvetinagar, Ramasamudram and Thembalapalli respectively (Table 5).

The work load was similar in the second month in Karvetinagar and somewhat higher in the other two centres. Thereafter, it decreased progressively in all the three centres. In the 4th month the average daily examinations were 2.4 in Karvetinagar, 1.5 in Ramasamudram and 0.7 in Thembalapalli.

This was the work load for the laboratory technician when 50 % MPWs were involved. Had all the MPWs in each PHC been involved, the daily work load in each PHC in each month would have been twice as high.

#### *Adequacy of Training*

The problems connected with training could be assessed in terms of procedural and technical adequacy observed during the study period. Procedural adequacy was measured by the regular flow of slides from each MPW to PHC, and technical adequacy by the proportion of smears found inadequate and the positivity rate of the adequately prepared smears. 3 of 463 slides prepared in Karvetinagar, 10 of 403 in Ramasamudram and 12 of 246 in Thembalapalli did not reach the PHC concerned. The inadequately prepared smears were 41 (8.9%) in Karvetinagar, 15 (3.8%) in Ramasamudram and 67 (28.6%) in Thembalapalli. The proportion of sputum smears found positive reflected the correctness of identification of eligible sym-

ptomatics. It varied from PHC to PHC and within each PHC from month to month ranging from 1.1 % to 25 % to the smears prepared (Table 3).

#### *Assessment of Work Performance*

In order to estimate the optimum number of symptomatic® that could be found out under working conditions and to obtain rough assessment of MPWs performance, 3 health visitors (HV) were deputed by NTI. Each one was posted in one of the selected PHC. The areas covered in 7 days by each MPW in each PHC area was randomly allocated to an HV. Population covered by each HV was therefore, approximately 1/3 rd of that allocated to the MPWs. The HVs worked only for a period of 3 months from June to August 1978. They visited MPWs area allocated to them independently within 2 to 7 days of the visit of the MPWs and on an average covered 2 to 4 villages in a day. The HVs were given transport facilities, were better trained, performed only one specific duty of identification of symptomatics and were not required to make sputum smears. Keeping in view the different methodologies adopted by MPWs and HVs, matching of the performance of identification of symptomatics was done in the areas where both MPWs and HVs worked.

The efficiency level of the MPW was calculated as: The number of symptoms identified by MPW

X100

The number of symptomatics identified by HV

TABLE 5

*Work Load for Laboratory Technician*

| PHC Area      | Month | Number of days worked | Number of slides Examined | Average daily work load |
|---------------|-------|-----------------------|---------------------------|-------------------------|
| Karvetinagar  | June  | 24                    | 158                       | 6.6                     |
|               | July  | 24                    | 146                       | 6.1                     |
|               | Aug   | 26                    | 93                        | 3.6                     |
|               | Sep   | 26                    | 63                        | 2.4                     |
| Ramasamudram  | June  | 25                    | 99                        | 4.0                     |
|               | July  | 27                    | 156                       | 5.8                     |
|               | Aug   | 26                    | 97                        | 3.7                     |
|               | Sep   | 27                    | 41                        | 1.5                     |
| Thembalapally | June  | 24                    | 71                        | 2.9                     |
|               | July  | 26                    | 105                       | 4.0                     |
|               | Aug   | 26                    | 38                        | 1.5                     |
|               | Sep   | 27                    | 20                        | 0.7                     |

Table 6

*Efficiency level of case finding by MPWs*

| PHC Area      | Eligible population | Month    | Symptomatics identified by MPWs |           | Symptomatics identified by HVs |            | Efficiency level of MPWs<br>Col 4/6 X 100 |
|---------------|---------------------|----------|---------------------------------|-----------|--------------------------------|------------|---|
|               |                     |          | No.                             | %to Col.2 | No.                            | %to Col. 2 |   |
| 1             | 2                   | 3        | 4                               | 5         | 6                              | 7          | 8   |
| Karvetinagar  | 10412               | June     | 106                             | 1.0       | 242                            | 2.3        | 43.8                                      |
|               |                     | July     | 55                              | 0.5       | 71                             | 0.7        | 77.5                                      |
|               |                     | Aug      | 40                              | 0.4       | 76                             | 0.7        | 52.6                                      |
| Ramasamudram  | 10395               | June     | 68                              | 0.6       | 145                            | 1.4        | 46.8                                      |
|               |                     | July     | 67                              | 0.6       | US                             | 1.1        | 56.8                                      |
|               |                     | Aug      | 44                              | 0.4       | 209                            | 2.0        | 21.0                                      |
| Thembalapalli | 11519               | June     | 51                              | 0.4       | 172                            | 1.5        | 29.6                                      |
|               |                     | July     | 50                              | 0.4       | 78                             | 0.7        | 64.1                                      |
|               |                     | Aug      | 22                              | 0.2       | 89                             | 0.8        | 24.7                                      |
| Grand Total   | 32326               | June-Aug | 503                             | 1.5       | 1200                           | 3.7        | 41.9                                      |

The efficiency varied from 29.6% to 46.9% in the 1st month, 56.8% to 77.5% in the 2nd month and 21.0% to 52.6% in the 3rd month—the overall efficiency being 41.9% (Table 6).

The proportion of the symptomatics identified by the HVs was nearly same during the last 2 months except in PHC Ramasamudram. This was in contrast to the finding that the proportion of symptomatics identified by MPWs declined from month to month.

The matching of the potential of registering persistent symptomatics who were found sputum negative in the previous rounds revealed that whereas HVs could register 37.1% to 51% of such symptomatics in the second month and 17.4% to 30.3% in the 3rd month, the registration of such symptomatics by MPWs was 0% to 7.4% in the second month and 0% to 14.4% in the 3rd month (Table not given). The performance of MPWs was thus further affected adversely if their ability to identify

persistent symptomatics was taken into consideration.

The proportion of the slides found positive could not be compared between HVs and MPWs as the HVs were not required to prepare the sputum smears.

### Discussion

The present day case finding activity under DTP procedures is much below expectation. Further, there is no operational feasibility of reaching those who are not reporting to the PHIs. With the introduction of MPW scheme wherein a MPW visits each house once a month in a specified population, a distinct machinery for boosting the case finding has emerged which could supplement the normal detection of cases in the DTP. For operational reasons, the eligible group in the community is considered to be the population in the age group of 20 years and above

as the yield of cases is maximum in this age group.

Analysis regarding symptomatics in 7 villages in the 5th survey in 3 taluks of Bangalore district revealed 4.1% of the population of the age group of 20 years and above to be the chest symptomatics<sup>7</sup>. In the surveys an all out effort is made even late in the evenings to cover the eligible population at all cost. Under normal conditions of work, however, fewer number was anticipated as large proportion of the population of the above age group would not be available when the health workers customarily visit the houses during the day time. The optimum number of symptomatics {expectation} that could be found out under working conditions in the field was assessed by posting HVs, in 1/3rd of the area of MPWs in each of the 3 PHCs. The HVs were given transport facility, were better trained, performed only one specific duty of identification of symptomatics and were not required to make sputum smears. By this method 1.5% to 2.3% of the eligible population was found to be symptomatic, which is 1/2 to 1/3 of the prevalence found in the survey.

Matching of identification of symptomatics between HVs and MPWs was done in the areas where both the HVs and MPWs worked. The performance of MPWs was at a level of about 40% of that of HVs (performance). The MPWs, however, were not provided with any transport facilities, performed their normal multiple duties in addition to the identification of symptomatics and also prepared the sputum smears of the eligible symptomatics. The gap between the level of 'Performance' and 'Expectation' may be attributed to the level of efficiency of the system under which MPWs identified symptomatics.

The feasibility of identification of persistent symptomatics and preparation of slides from them is a moot question. Whereas, there was a substantial potential of identifying persistent symptomatics by the HVs, very little was done by MPWs. Further, only two cases were detected amongst the 51 slides made from the persistent symptomatics. There will therefore be very little loss if the smears from the persistent symptomatics are not prepared and the MPWs limit themselves to prepare the smears from the symptomatics encountered for the first time.

On the whole 2 days training appeared to be adequate. The proportion of symptomatics identified did not seem to be unsatisfactory when reviewed in the light of the factors discussed above. The number of smears found inadequately prepared were only 11.3% and the overall positivity rate was 7.7% of the total smears

prepared. There was also not much of a problem of despatch of slides or communication of results.

It is difficult to assess the augmentation of case finding precisely. It appears that the very presence of an additional laboratory technician in PHC was a constant reminder to the PHC medical officer for referring symptomatics for sputum examination even in the routine procedure. The examination of smears and detection of cases from such patients reporting themselves to the PHC during the study period was much higher than in the normal circumstances. However, the expected augmentation of case finding can be measured by projecting the finding of this study to an average PHC catering to a population of 1,00,000 (Table 7).

TABLE 7

*Anticipated Detection of symptomatics and cases in on average PHC on Implementation of MP W scheme*

| Month  | Rate per-cent of population expected to be symptomatic* | Anticipated Numbers |                               |
|--------|---|---------------------|-------------------------------|
|        |   | Symptomatics        | Sputum positive cases (@7.7%) |
| First  | 0.5   | 250                 | 19                            |
| Second | 0.35  | 170                 | 13                            |
| Third  | 0.2   | 100                 | 8                             |
| Fourth | 0.1   | 50                  | 4                             |

*Note* : Estimated population coverage per PHC is taken as 1,00,000 and eligible population of age group 20 +s 51,000.

\*Calculated on the basis of Table 2, No. of cases presently detected per PHC under DTP is=1.

It is evident from the table that initially the PHC would be able to detect about 20 cases a month which will decline progressively month by month. Ultimately as a routine, the potential would be around 5 cases a month. A bulk of these will be fresh cases as only 10 of the total 74 cases found by the MPWs in the study were known to the programme before. The involvement of the MPWs therefore may lead to a manifold increase in the existing case finding activity under DTP.

The average work load for a MPW in a PHC in the first two months would be identification of about one symptomatic and thus preparation of one sputum smear per day. Thereafter the work will decrease and as a routine each one of them may be preparing about one slide per week. How much it will affect their other functions, was not studied but the time spent for this work would be between 20 to 25 minutes a day in the initial couple of months and subsequently about that much of time in a week.

The additional work load for a microscopist in an average PHC would be about 250 slides in the 1st month, 170 in the 2nd and 100 in the 3rd month. Ultimately as a routine it would be about 50 smears a month. Taking into account the normal routine examination of 1-2 slides a day in a PHC and considering 25 as the working days in a month, the daily work load would be examination of 11 to 12 slides in the first month, 8 to 9 slides in the second, 5 to 6 in the 3rd month and 3 to 4 slides subsequently as a routine.

The point at issue is whether the microscopist at a PHC with the commitment of examining 50 to 60 malaria slides along with the other routine laboratory work per day, will be able to take up this additional load of work or not. It would perhaps be not justified to overload him further with the additional work, howsoever small it may seem to be. His hands have got to be strengthened. The ideal situation would be to appoint an additional microscopist in each PHC. The principle of integration, however, has to be kept in view and the additional microscopist will not only examine the sputum smears but also amongst themselves, the two microscopists will equitably share the responsibility of all the laboratory work including examination of malaria slides thereby reducing the pressure on the existing microscopist and take care off the back log of the anti malaria work.

As in any other programme, the success of this procedure could only be attained if proper supervision is maintained and the flow of supplies and equipment is ensured.

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## PSYCHIATRIC MORBIDITY IN PULMONARY TUBERCULOSIS

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**Summary :** Two hundred and seventy two patients of Pulmonary Tuberculosis (with positive sputum) contacting T.B. Demonstration and Training Centre cum Chest Institute, Agra and selected through a specified sampling procedure were subjected to detailed psychiatric screening. Those suspected to be suffering from a psychiatric condition were assessed by a second psychiatrist for diagnostic reliability, highly patients were found to be suffering from a psychiatric condition in addition to pulmonary tuberculosis giving a psychiatric morbidity rate of 294.12 per thousand, which is much higher than the rates in the general population of comparable age-group as found in various studies. Psychiatric break down was more frequent among those patients who had concomitant physical illnesses, special strains and severe anxieties and were housewives than their counterparts.

The study of the association of two (or more) diseases is of great practical value regardless of whether the association has similar etiological basis, or the one is the manifestation of the other, or the one disease is pathogenic or protective to the other. The nature and prevalence of concomitant physical illness with severe mental disorders, particularly schizophrenia, have been studied and various associations reported. These reports cannot be compared because of incomparable research design and cannot stand the test of verification because of the seemingly fragile nature of these associations. No general conclusions can be drawn because of the relatively small number of cases studied. Despite these limitations, the literature does suggest the mutual influence and relationship between physical and mental illness. In spite of the near consensus about the inter-relatedness of the two, well authenticated data on how the two are inter-related are scarce. Whether this inter-relatedness is a function of socio-cultural and geographical settings assumes significance only after the nature of this inter-relatedness is properly investigated.

By and large the efforts in this direction so far have been mainly concerned with studying the nature and prevalence of physical morbidity among psychiatrically ill individuals. Studies to delineate psychiatric profile of physically ill individuals have received proportionately scant attention (Alexander, *et al.* 1968). To start with studies related to identifying psychiatric profile of physically ill persons should concentrate on a limited number of areas which are known to be vulnerable and can be studied in a systematic way. The present attempt in assessing the psychiatric status of Pulmonary Tuberculosis patients was undertaken because : (I) pulmonary tuberculosis for the laity is emotionally still a

dreaded disease with considerable social stigma, (2) of the presence at Agra of two well known centres namely T.B. Demonstration Training Centre cum Chest Institute and the Mental Hospital and the willingness of two institutes to cooperate with each other in carrying out the proposed study, (3) of the availability of trained personnel to carry out the work.

The study was undertaken with the objects to : (i) assess the psychiatric status of pulmonary tuberculosis patients with a positive sputum in order to identify clinically diagnosable psychiatric condition in them, if any; (ii) compare the prevalence and pattern of psychiatric morbidity in general population of comparable age groups as reported in T.C.M.R. sponsored Agra study of Mental Morbidity and other such studies on Indian population available in literature; (iii) find out the association, if any, of the particular bio-social variable/variables that may make the 'index' cases more prone to become psychiatrically ill.

### Material & Method

All the patients contacting T.B. Demonstration Training Centre cum Chest Institute formed the study universe. Study sample was drawn from those who:

- (a) were aged below 50 years,
- (b) contacted the facility for obtaining treatment, and
- (c) on investigation at the facility were found to have a positive sputum.

The series of patients fulfilling the above inclusion criteria underwent psychiatric assessment by two of us. Since it was not possible to investigate a consecutive series of all the

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patients fulfilling the inclusion criteria, a maximum number of three or six patients (first three, if one of us examined the patients or first six if two of us did the psychiatric examination) on the day of assessment were included in the study. This procedure was fixed in order to avoid any sampling bias and the number was limited so that there was sufficient time to do a thorough and complete psychiatric examination of the included patients.

Relevant bio-social and demographic information was obtained on a prepared schedule through the patients, the case record sheets and the relatives. In case of contradictory information, the one that appeared correct to the judgement of the interviewer was entered. The patients were screened through a psychiatric screening schedule developed on the basis of Wing's Screening P.S.E. All the patients who were suspected to be suffering from any psychiatric condition were also examined by a second investigator in order to validate the observations. Disagreements were resolved through mutual discussions and the diagnostic labels according to I.C.D. were assigned.

#### Observation & Results :

Out of 272 pulmonary tuberculosis patients with positive sputum, 80 were found to have psychiatric symptoms to a degree that it was clearly possible to assign them a diagnostic label according to I.C.D.—giving a rate of 294.12 per thousand with the following diagnostic break-up.

Table I

*Diagnostic Break-up of Positive cases*

| Diagnostic Categories | Number | Rate per thousand |
|-----------------------|--------|-------------------|
| Mental Retardation    | 3      | 11.03             |
| Paranoid reaction     | 4      | 14.71             |
| Hysteria              | 2      | 7.35              |
| Anxiety               | 18     | 66.18             |
| Depression            | 53     | 194.85            |
| All disorders         | 80     | 294.12            |

As indicated in table II, significant differences were found in respect of the following variable :

(a) *Occupation* : A significant difference between different types of occupations and psychiatric status of pulmonary tuberculosis patients was found in some occupations, suggesting that psychiatric break-down could be more frequent in certain occupations than others.

(b) *Special Strains and Anxieties* : A significantly higher rate of psychiatric morbidity was found among those who had special strains and anxieties.

(c) *Associated Physical Illness* : Significantly more patients of pulmonary tuberculosis with concomittant physical illness had psychiatric disorders.

Concomittant physical illness when further analysed by presence or absence of special strain and anxiety showed that those who had concomittant physical illnesses in addition to special strain and anxieties had the highest rate of mental morbidity (Table III).

Considering those patients who were uninfluenced by the presence of concomittant physical illness (columns 2 and 4 in the table), the data suggest a dissociation between evidence of special strain and anxiety and psychiatric health (coefficient of association between the two attributes i.e.  $Q$  being—.3273 using Yule's formula (Ray and Sharma, 1970)), although the results just fail to attain statistical significance. Similarly, considering only those patients who were uninfluenced by the presence of special strain and anxiety (columns 3 and 4 in the table), a weak negative association ( $Q = -.1598$ ) between the attributes psychiatric health and concomittant physical illness was found suggesting that those who have concomittant physical illness in addition to pulmonary tuberculosis are only a little more prone to psychiatric ill-health. While considering only those patients who had special strain and anxiety (cols. 1 and 2), it was found that those having concomittant physical illness and significantly more psychiatric morbidity ( $Q = -.4019$  between the attributes psychiatric health and concomittant physical illness). Highest degree of negative association ( $Q = .5403$ ) ( $P < .01$ ) was however found between the attributes of psychiatric health and special strain and anxiety when only those patients were considered who had concomittant physical illness (cols. 1 and 3).

Other variables like duration of tubercular illness, age, sex, marital status, caste, area of

Table 2

*Socio-Demographic & Other Characteristics of the Sample*

| Sex                              |             | Age group                   |             |                                       | Marital Status       |                       | Caste                              |                     |               |                   |          |
|----------------------------------|-------------|-----------------------------|-------------|---------------------------------------|----------------------|-----------------------|------------------------------------|---------------------|---------------|-------------------|----------|
| M                                | F           | Below 20                    | 20-40       | 41 & more                             | Married              | Singles               | High                               | Sche-<br>duled ward | Back-<br>ward | Muslims<br>Others |          |
| 195<br>(55)                      | 77<br>(25)  | 37<br>(8)                   | 190<br>(57) | 45<br>(15)                            | 213<br>(60)          | 59<br>(20)            | 58<br>(16)                         | 63<br>(15)          | 98<br>(33)    | 49<br>(14)        | 4<br>(2) |
| Residence                        |             | Education                   |             |                                       | Nature of family     |                       | Family size<br>(No. of dependents) |                     |               |                   |          |
| Rural                            | Urban       | Illi.                       | Pri.        | Sec.                                  | Nucl.                | Joint                 | S                                  | M                   | L             |                   |          |
| 216<br>(63)                      | 56<br>(17)  | 184<br>(60)                 | 75<br>(18)  | 13<br>(2)                             | 198<br>(63)          | 74<br>(17)            | 194<br>(57)                        | 74<br>(23)          | 4<br>(0)      |                   |          |
| Economic Status                  |             |                             |             | Occupation*                           |                      |                       |                                    |                     |               |                   |          |
| Weaker                           | Lower       | Middle                      | Higher      | House-<br>wife                        | Farming              | Service               | Business                           | Skilled<br>labour   | Other labour  |                   |          |
| 261<br>(78)                      | 11<br>(2)   | 0<br>(0)                    | 0<br>(0)    | 48<br>(25)                            | 66<br>(17)           | 12<br>(4)             | 18<br>(7)                          | 34<br>(8)           | 79<br>(18)    | 15<br>(1)         |          |
| Special strains and<br>anxieties |             | Associated physical illness |             | Duration of illness of pulmonary T.B. |                      |                       |                                    |                     |               |                   |          |
| Yes                              | No          | Yes                         | No          | 6 mths                                | 6 mths to<br>/1 year | 1 year to<br>/3 years | 3 years &<br>more                  |                     |               |                   |          |
| 108<br>(45)                      | 164<br>(35) | 128<br>(46)                 | 144<br>(34) | 44<br>(15)                            | 66<br>(18)           | 127<br>(35)           | 35<br>(12)                         |                     |               |                   |          |

Figures in parenthesis indicate the number of positive cases in that category.

\*  $X^2 = 15.9714$ ;  $df = 6$ ;  $P < .02$  (significant)

\*\*  $X^2 = 12.9669$ ;  $df = 1$ ;  $P < .01$  (significant)

\*\*\*  $X^2 = 3.9558$ ;  $df = 1$ ;  $P < .05$  (significant)

All other associations non-significant.

residence, education, nature of family and economic status were also studied but no significant difference between the distribution of these variables vis-a-vis psychiatric status of the subject was found.

### Discussion

Even though studies on psychiatric morbidity in general population available in literature (Dube, 1970, Sethi *et. al* 1967 & 1972, Nandi

Table 3

*Psychiatric status of Pulmonary Tuberculosis Patients by special Strain & Anxiety and Physical Illness*

|                      | Special strain and anxiety    |         |                               |         | TOTAL |
|----------------------|-------------------------------|---------|-------------------------------|---------|-------|
|                      | Yes                           |         | No                            |         |       |
|                      | Concomittant physical illness |         | Concomittant physical illness |         |       |
|                      | Yes                           | No      | Yes                           | No      |       |
|                      | Col. I                        | Col. II | Col. III                      | Col. IV |       |
| Psychiatrically well | 26                            | 37      | 56                            | 73      | 192   |
| Psychiatrically ill  | 28                            | 17      | 18                            | 17      | 80    |
| Total                | 54                            | 54      | 74                            | 90      | 272   |

*Special Strain and Anxiety :*

(a) YES : with vs without Concomittant physical illness (column I and II)

(b) NO : with vs without concomittant physical illness (column III and IV)

*Concomittant Physical Illness :*

(a) YES : with vs. without special strain and anxiety (column I and III)

(b) NO : with vs. without special strain and anxiety (col. II & IV)

*et. al* 1975, Verghese *et. al.* 1973) are not mutually comparable because of the incomparable case criteria method and sample characteristics etc., in the present study a psychiatric morbidity rate of 294.12 per thousand among adult individuals suffering from pulmonary tuberculosis constituted by the maximum proportion of depressives (194.85 per thousand) : followed by anxiety neurosis (66.18 per thousand), paranoid reactions (14.7 per thousand), mental retardation (11.03 per thousand) and hysteria (7 . 35 per thousand) is very high indeed. The fact that a very high proportion of psychia-

$$\left\{ \begin{array}{l} X^2 = 4.6096 \\ df = 1 \\ P < 0.05 \text{ (sig.)} \\ X^2 = 0.7165 \\ df = 1 \\ \text{(non-significant)} \end{array} \right.$$

$$\left\{ \begin{array}{l} X^2 = 10.2661 \\ df = 1 \\ P < .01 \text{ (sig.)} \\ X^2 = 2.9673 \\ df = 1 \\ \text{(non-significant)} \end{array} \right.$$

trically ill subjects are depressives (66.5%), is suggestive of the possibility that this psychiatric reaction of the patients could be a consequence of the tubercular illness. Several workers (Madhu and Saxena, 1977, 1978 ; Shephard *et. al.*, 1966; Leighton, 1956; Hill, 1977; Schless, 1977) have reported a higher rate of psychiatric morbidity/psychological ill health among those who suffer from physical disorder.

Thus the possible reason for the higher rate of mental morbidity among tubercular patients in this study could be the nature of the physical

illness as well as detailed and thorough psychiatric screening of the subject. There was no possibility of missing a psychiatric case and the figures of this study could be the firm core prevalence figure as commented by Leighton (1956). The possibility of over-inclusion of normal hypochondriacal and anxiety reaction of individuals towards the disease into a psychiatric condition could also be a possible reason for higher rates.

There was, however, no evidence to suggest that concomitant physical illness (in addition to tuberculosis) leads to higher psychiatric morbidity but there is evidence to suggest that those tubercular patients who had special strain and anxiety could be more prone to psychiatric morbidity. Those tubercular patients who in addition to having other concomitant physical illnesses also had special strains and anxieties had higher vulnerability to psychiatric illness than when only one of the two factors (i.e. special strain and anxiety, and concomitant physical illness) or no factor was present. The observation that tubercular patients with special strain and anxiety and/or associated physical illnesses have significantly more psychiatric morbidity than their counterparts without these seems obvious. Dube (1970) found that persons having special strains e.g. anxiety due to financial over-strain, heavy indebtedness etc. or severe anxiety on account of the disease, marriage, domestic problems etc. showed a significant relationship with the number of psychiatric cases. Possibly the presence of these factors in nearly half of tubercular patients as against their presence in less than 30% of general adult population (Dube, 1970) was responsible for a higher rate of morbidity in them.

Occupationwise mental morbidity was more frequent among housewives with tubercular illness as against tubercular patients engaged in other occupations. Since psychiatric assessment was done after the patients were found to be suffering from tuberculosis and not before, no definite conclusions can be drawn. Further, since a higher rate of psychiatric morbidity among females has been reported in most other epidemiological studies (Dube 1970, Sethi 1967, Verghese 1973, Nandi 1975) and since females usually are engaged as housewives, the observation of the higher rate of psychiatric morbidity among those tubercular patients who are engaged as housewives could be a fallacy too. However, domestic chores are often monotonous and of repetitive nature in a geographically circumscribed physical space involving considerable psychological and physical stress which when coupled with pulmonary tuberculosis could account for the difference in the rate of psychiatric morbidity between occupations.

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# PSYCHOSOCIAL STUDY OF TUBERCULOSIS PATIENTS

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**Summary :** The study describes demographic, social and psychological characteristics of 100 tubercular patients. The subjects were studied using Hamilton rating scale for depression and a semistructured proforma to record historical, socio-demographic and clinical parameters. Depression was observed in 32% of experimental subjects in comparison to 7% of controls. Test results also indicated significantly high scores on Hamilton rating scale for depression among experimental subjects.

## Introduction

The interest in the investigation of tuberculosis from a psychosocial point of view in of recent origin in Indian literature (Moudgil and Pershad, 1972; Dubey, 1975 and Mathur, 1977). Hypochondriasis, mego-centricity, emotional liability, depression, hysterical behaviour as a demonstrative indifference to oral restriction and reckless disregard of medical advice may individually or together, be found as a psychogenic reaction in a tubercular patients (Mayer-Gross, 1960). Murthy et al. (1976) showed the association of depression with tuberculosis. Purohit et al. (1978) found a correlation of depression with the duration and severity of pulmonary tuberculosis. Though there are a few psychological studies on tuberculosis patients available in India, but there is hardly any comprehensive work done so far on this problem. The aim of present study is to investigate the family background and other socio-economic factors in these patients, as well as to study the personality pattern and frequency of depression among these subjects. Since the nature of socio-cultural factors differ in different countries, so such a study is of vital importance.

## Material and Methods

The sample of this study was drawn from the out patients clinic of Tuberculosis and Chest Diseases, S.R.N. Hospital, Allahabad during the months of February, 1978 and March, 1978. The present study was restricted only to proved cases of pulmonary tuberculosis. A control group of equal number of cases undergoing treatment for longterm fever of any etiology except tuberculosis, were selected from those admitted in the same hospital, after matching age, sex and economic status. First of all attempt was made to obtain a detailed information with regard to family background and behaviour pattern. It was a semi-structured interview and most of the patients were interviewed for two to three hours to elicit complete case history.

Subsequently these subjects were adminis-

tered Hamilton Rating Scale for Depression (1960).

## Observations

General social and demographic characteristics of the experimental and control patients given in Table 1. Experimental group of patients are independent of socio-demographic variables. A clinical assessment of personality revealed that a large number of the patients (40%) and control cases (31%) had a schizoid personality followed by obsessive compulsive personality (Table 2). Table 3 reveals a significant difference in the analysis of the score of depression in two groups, the mean values of the experimental group being higher than the control group. Table 4 shows that there are significant differences in the mean scores of depression among the four groups divided in terms of duration of illness. The 't' values also differ significantly between I and II groups, II and III groups and III and IV groups. It shows a positive association between duration of illness and level of depression.

## Discussion

Our analysis and results revealed that a larger number of tuberculosis patients (32%) demonstrated the presence of depression in comparison to control cases (7%). The fact that the subjects diagnosed as cases of depression have obtained a significantly higher score on Hamilton rating scale seems to substantiate the reliability of ratings done in this enquiry. There are a few reports in the literature which have found a higher frequency of depression in patients with tuberculosis, as compared to our study, Mathur (1977) found that 44% of tubercular patients exhibited psychiatric symptoms, mainly depression and anxiety. Purohit et al. (1978) also reported significantly higher incidence of depression in these cases (54.17%), Dubey T using personality tests reported feeling of insecurity, lack of emotional control, anxiety sexual tension and depressive features in 60% of tubercular cases. In the present study it has been

Table 1  
*Soda-Demographic Characteristics*

|                                | Experi-<br>mental<br>group<br>(100<br>cases) | Control<br>group<br>(100<br>cases) |
|--------------------------------|--|------------------------------------|
| (A) Matched variable           |  |                                    |
| Sex                            |  |                                    |
| Male                           | 69   | 65                                 |
| Female                         | 31   | 35                                 |
| Age group (in years)           | 54   | 50                                 |
| Upto 30                        |  |                                    |
| 31 to 40                       | 22   | 24                                 |
| 41 to 50                       | 18   | 15                                 |
| 51 to 90                       | 6  |                                    |
| Economic status (Prasad. 1970) |  |                                    |
| (Per capita in Rs. per month)  |  |                                    |
| 30 (up to)                     | 28   | 20                                 |
| 31-69                          | 30   | 32                                 |
| 70-149                         | 33   | 40                                 |
| 150-299                        | 9  | 8                                  |
| 300 and above                  | -  | —                                  |
| (B) Other variables            |  |                                    |
| Religion                       |  |                                    |
| Hindu                          | 70   | 80                                 |
| Muslim                         | 19   | 20                                 |
| Christian                      | 2  | —                                  |
| Family type                    | 23   | 25                                 |
| Unitary                        |  |                                    |
| Joint                          | 11   | 75                                 |
| Marital status                 |  |                                    |
| Married                        | 72   | 70                                 |
| Single                         | 25   | 29                                 |
| Widow                          | 3  | 1                                  |
| Educational status             |  |                                    |
| Illiterate                     | 18   | 25                                 |
| Primary                        | 30   | 28                                 |
| High School                    | 36   |                                    |
| Intermediate                   | 10   | 316                                |
| Graduate & above               | 6  | 10                                 |
| Occupation                     |  |                                    |
| Service                        | 16   | 18                                 |
| House wife                     | 27   | 30                                 |
| Business                       | 10   | 7                                  |
| Student                        | 18   | 15                                 |
| Labour                         | 26   | 28                                 |
| Retired                        | 3  | 2                                  |

TABLE 2  
*Personality types among Tuberculosis Patients*

| Types of Personality | Experi-<br>mental<br>group | Control<br>group |
|----------------------|----------------------------|------------------|
| Schizoid             | 40                         | 31               |
| Obsessive compulsive | 6                          | 14               |
| Hysterical           | 1                          | 4                |
| Paranoid             | 1                          | 3                |
| Passive aggressive   | 5                          | 6                |
| Others               | 47                         | 42               |
| Total                | 100                        | 100              |

Table 3  
*Scores of Depression on Hamilton Rating Scale*

| Scores   | Experi-<br>mental<br>group | Control<br>group |
|----------|----------------------------|------------------|
| 0 to 10  | 42                         | 70               |
| 11 to 20 | 26                         | 23               |
| 21 to 30 | 30                         | 7                |
| above 30 | 2                          | 0                |
| Total    | 100                        | 100              |

$X^2 = 23.2, df-2, P < 0.001$

*Duration of illness and Depressive scores*

| Duration               | Number<br>of cases | Mean scores | ± S. D. |
|------------------------|--------------------|-------------|---------|
| Group I upto 1 year    | 44                 | 10.11       | ± 7-03  |
| Group II 1-2 years     | 18                 | 16.88       | ± 9.31  |
| Group III 2-5 years    | 35                 | 21.88       | ± 7-68  |
| Group IV above 5 years | 3                  | 33.00       | ± 2.47  |

found that depression is not independent of the duration of illness and depressive scores were significantly higher in subjects with longer duration of illness. Similar findings were also-observed by Purohit et al. (1978), in which they found a positive correlation between depression and duration of illness. We are also of the view that the longer duration of illness makes the person vulnerable to depression.

Certain personality patterns 'in tubercular patients have been reported in the literature. The individuals who are emotionally insecure, self drivers, frustrated and with inordinate yearnings for sympathy and affection are more prone to develop tuberculosis (Wittkower 1955). In our study, there was no significant difference in schizoid personality of control and experimental groups.

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## CASE REPORTS

### **DIFFUSE MALIGNANT MESTHELIOMA WITH DISTANT METASTASES**

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**Summary :** A 35-year old woman with diffuse malignant pleural mesothelioma with distant metastases, presenting; as a case of massive plural effusion and superior vena caval obstruction is reported. No history of exposure to carcinogenic factor was detected in this case. Aetiological factors, clinical presentation and radio-pathological diagnosis have been discussed.

#### **Introduction**

Though neoplastic involvement of the pleura occurs quite frequently in carcinoma of lung primary pleural tumours are rare. Wagner (1870) first described a primary pleural tumour and the term mesothelioma was coined by Klemperer and Rabin (1931), who classified it into Localised and Diffuse forms. Even though some workers doubted about such tumour, following the description of well documented cases of pleural mesotheliomas based on clinico-radiological, histological and necropsy findings (Clagett et al, 1952, McCaughey, 1958. Wagner, 1960, Urschel, 1965, and Lulenski et al. 1971).., it is now an established clinical entity.

There are relatively few reports of primary pleural tumours from India (Reddy, 1950. Kshirsager et al, 1971, Reddy et al, 1973) In view of the rarity of these tumours we wish to report this case.

#### **Case Report**

A 35 year old housewife was admitted in the medical wards of S.S. Hospital with complaints of diffuse right sides dull chest pain, progressive breathlessness and dry cough for five months. Clinical examination of the patient revealed right axillary lymphnode enlargement and engorgement of nonpulsatile jugular veins on both sides of the neck. The face was suffused and neither clubbing nor osteoarthropathy was present. Intercostal tenderness was present on the right side posteriorly. There were signs of pleural effusion on the right side and superior vena caval obstruction. Liver was enlarged six centimetres below the costal margin on the right side and firm in consistency. Other systems were within normal limits.

Total and differential leucocyte count and general blood picture were within normal limits.

Erythrocyte sedimentation rate was 40 mm at the end of first hour. Tuberculin test was negative (5 mm in diameter). Repeated sputum examinations for acid fast bacilli were negative. Skiagram of the chest showed massive pleural effusion on the right side. Bronchoscopy revealed no growth.

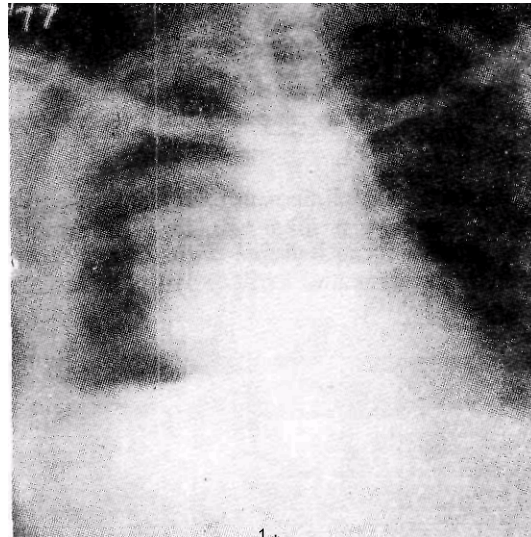


Figure I

X-ray Chest P.A. view Showing hydroneumothorax (after A.P.) and pleural thickening with extensive dense nodular opacities on the parietal pleura.

Thoracentesis was done and about 5000 ml of haemorrhagic fluid was aspirated. An immediate skiagram of the chest preceded by an artificial pneumothorax, was taken. The second X-ray showed hydropneumothorax and pleural thickening with extensive nodularity of parietal

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pleura on the right side. Cytological examination of the pleural aspirate revealed malignant cells. A needle biopsy of pleura was obtained which revealed solid nests and cords of polygonal cells and hyperchromatic nuclei within a strip of fibrous connective tissue. The tumour cells also formed tubules, irregular spaces and pseudoglandular acine.



Figure 2

Groups of malignant cells, mostly spindle shaped, seen spreading in the fibrous connective tissue (H & E Stain x 160)

Based on the clinico-radiological and pathological findings, a diagnosis of diffuse malignant pleural mesothelioma with distant metastases to the liver and axillary lymphnodes, was made.

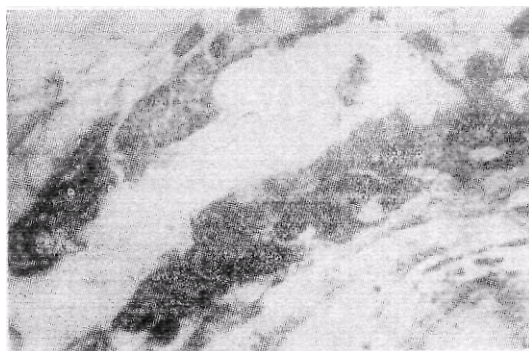


Figure 3

Malignant pleural Mesothelioma differentiating in a glandular manner. The humen contained some mucoid material (H & E Stain x 400).

The patient was treated with analgesics, antibiotics, repeated aspiration, parenteral cyclophosphomide and intrapleural instillation of cyclophosphomide and hydrocortisonc acetate. The patient improved symptomatically and was discharged with advice to come for follow up.

The patient expired after 1 month. Autopsy was done. Autopsy findings were in consonance with the previous findings.

### Discussion

The aforementioned patient is a well documented case of diffuse malignant pleural mesothelioma with distant metastases. Pleural malignant mesotheliomala are rare. The reported incidence of this condition varies from 1 in 5,000 to 1 in 100,000. The right and left pleura are affected with equal frequency. Since all the three embryonic germ layers are involved in the formation of pleura, the neoplastic mesothelial cells have the potential for great variation in hislogic pattern. Truepieural mesoiheliomata appear as broad sheets of cells often seeming to originate in the inerlobar fissures. Bui it later involves the entire pleural surface. The most characteristic significant feature is the appearance of whorls of cells like those of meningioma.

Histologically, pleural mesotheliomata are of four types-1. Tubulo-papillary. 2. Sarcomatons, 3. Undifferentiated polygonal and 4. Mixed (Croflonand Douglas, 1975). Our case belonged to the tubulo papillary type. Asbestos bodies better called ferruginous bodies frequently seen in malignant mesotheliomas were absent in this case. The exact nature of these asbestos bodies is not known. Asbestos bodies arc more frequently found in the lungs of those patients with history of exposure to asbestos (Oels et al 1971)

The spread of malignant mesotheliomas is by continuity, involving the contralateral pleura, pericardium and rarely peritoneum and by blood stream. Metastases to the mediastinal and hilar lymphnodes occur in 50 per cent of cases (Whitwell and Rawcliffe, 1971). The signs of superior vena caval obstruction seen in this case might be due to the involvement of the mediastinal lymphnodes. Spread to the distant organs, once believed to be rare, is now accepted as frequent findings (Manfredi et al, 1965, and Churg and Selikoff, 19681. The fiver and the contralateral lung are the commonest sites for blood borne metastases, but secondary deposits in the adrenals, thyroids, bones and meninges have all been reported (Semb, 1963 and Urschel and Paulson, 1965). In our case liver and lymphnodes showed metastatic involvement as revealed by autopsy and histological examination,

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## TUBERCULOSIS OF SKELETAL MUSCLE WITH COLD ABSCESS AT UNUSUAL SITE

HEM LATA GUPTA\* AND RANI DEMAN\*\*

**Summary** : A case of skeletal muscle tuberculosis with metastatic cold abscesses at unusual sites is reported.

Tuberculous disease in muscle may assume three forms (Adam et al 1962). (1) Local extension from a neighbouring focus. (2) Solitary metastatic tuberculous abscess or nodular tuberculosis. (3) Tuberculous myositis.

Tuberculosis of skeletal muscle is a very rare entity. There are infrequent reports in the literature. Because of its rarity we report here a case of the tuberculosis of skeletal muscle with cold abscess at the unusual site.

### Case Report

Female aged 18 years was admitted in this Hospital with the chief complaints of pain and swelling of the right wrist and left knee joints for five months, low grade fever and low backache for same duration. Past and family history was non contributory.

On examination she was a thin built lady, pulse was 120/min. regular good in volume. Blood pressure was 120/70 mm Hg. Temperature ranged between 90°-102°F. There was a nodule on the flexor surface of the right forearm 2cm. by 2cm., firm in consistency, mobile from side to side with no signs of inflammation. There was another cystic swelling 2cm. by 2cm; 3cm away from this nodule & 4cm. away from the right wrist joint. Right wrist joint and left knee joints were swollen, hot, tender and movements were painful. There was a cystic swelling 3cm. above the left knee joint. Kyphotic deformity was present over dorsal 10th and 11th, vertebrae. Examination of the respiratory, cardiovascular and nervous systems and abdomen did not reveal any abnormality.

### Investigations

Her haemoglobin was 11.5 gm%, total leucocyte count 5,500/cumm. with normal differential count. ESR was 55mm. in the 1st hour (Westergren). Rose, Waller test :- DAT 2. Latent fixation test-negative. Blood culture was sterile. Total plasma proteins, serum cholesterol and blood urea were within normal limits. Skiagram of the chest was normal. Skiagram of the dorsal spine showed caries and wedging of tho-

racic vertebrae. X-ray left knee joint and right wrist joint showed soft tissue swelling.

### Progress of the Case

Incision and curettage of the cold abscesses on the right forearm & left thigh was done which showed caseous material which on histopathological examination showed tubercular granulation tissue and culture was positive for AFB.

Biopsy from the nodule on the forearm was done which on histological examination showed the presence of granuloma with diffuse collection of epithelioid cells, lymphocytes and few giant cells in between the muscle fibres. Acid fast staining demonstrated the presence of tubercle bacillus.

She was put on antitubercular treatment and plaster jacket was given for tuberculosis of the spine. She is being regularly followed up every month for last 8 months. During this period her ESR has come to normal and she has gained 12 lbs of weight.

### Discussion

There are infrequent case reports of skeletal muscle tuberculosis in the literature (Haber Nass 1886 cited by Plummer et al. Loc. Rugh, 1919, Plummer et al., Loc. Cit.) Culotta (1929) cited by Plummer et al 1934) in 2244 autopsies on tubercular patients found only four cases of muscular tuberculosis. The rarity of muscular tuberculosis has been attributed to (1) good blood supply to the muscles (2) absence of reticuloendothelial tissues in skeletal muscles (3) High lactic acid content of muscles.

The muscular infection is assumed to occur during bacteremia or septicemia. The bacteria lodge in the connective tissue outside intramuscular vessels and involve the muscle fibres secondarily. The tuberculous abscess may develop secondary to tuberculosis of bone or lymph nodes. Pus formed in these sites may collect locally or it may travel for some distance along tissue planes and then become superficial.

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In this case she developed cold abscess on the right forearm and left thigh which were probably metastatic in origin as there was no radiological evidence of bony involvement of right wrist joint and left knee joint. The metastatic forms were first reported by Reverdin (1905), Delorme (1891) and Kaiser (1905). The nodule on the forearm on histopathological examination left no doubt about muscular tuberculosis. In the present case this occurred as a part of generalised tuberculosis. Haematogenous spread of tuberculous infection to skeletal muscle has been reported by Roverdin (1891) though it is very rare.

Rich et al (1929) while studying military tuberculosis in humans, as well as in animals commented that localization mainly occurs in the lungs, liver, spleen, kidneys and it is rare to find myositis.

#### Acknowledgement

We are grateful to Dr. A. Dass, Principal L.H.M.C. & Hospital, Prof. S. Sachdev, L.H.M.C. & Hospital New Delhi, for allowing us to publish this case.

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## ISONIAZID INDUCED ARTHRITIS

JALILUDDIN\*, MOHD ANEES\*, A. A. MOHSINI AND N. A. TYAGI

**Summary** : Arthritic complications due to Isoniazid usually occur after two to five months of therapy. In the present case acute arthritis and fever developed within seven days of start of treatment. All manifestations disappeared after withdrawing isoniazid. Readministration of isoniazid resulted in acute arthritis and effusion of joint in as little as six hours. Significance of the present observation is discussed.

### Introduction

Isoniazid (INH) is given as a primary antitubercular drug in the treatment of tuberculosis. The different adverse drug reactions due to INH administration include polyneuropathy, lack of mental concentration, pyrexia, erythematous skin eruptions, nausea, vomiting, jaundice, purpura and reversible bone marrow depression.

There have been a few reports dealing with the rheumatoid syndrome secondary to INH therapy (1, 2) developing within two to five months of treatment. We have seen a case where joint symptoms developed acutely. To our knowledge there is no record in the Indian literature of the development of acute arthritis induced by isoniazid within as little as seven days of drug administration. A patient is reported who developed acute arthritis and fever within seven days of INH administration. Case Report :-

Mr A.S. a 24 year male student was in a state of good health until July 1976 when he developed evening rise of temperature, loss of weight and early fatigability. He was brought to the University Health Service AMU, Aligarh for a sudden bout of hemoptysis. There was no history of taking antitubercular treatment in the past. X-ray chest showed a cavitory lesion in the right upper lobe. Sputum was positive for acid-fast bacilli. Diagnosis of Pulmonary tuberculosis was established and INH (300 mg) once a day, streptomycin 1 g and ethambutol 24mg/kg body weight per day, were given as an initial treatment.

Seven days later, the patient developed pain in right knee joint and left big toe. Next morning he had effusion of both knee joints and ankles. Small joints became swollen and tender and the signs of cavitation in right lung persisted. There was rise in temperature to 40°C. Laboratory investigations revealed a total leucocytic count of 16300/mm, differential count (polymorphs 70%, lymphocytes 30%), ESR 36 mm 1st hour.

Aspiration of right knee joint was done and fifty ml of cloudy yellow fluid was aspirated. Examination of the fluid showed 30000 leucocyte/mm (polymorph 76%, lymphocytes 21% and 3% monocytes) and 4.8 g protein per 100 ml, 60 g per 100 ml glucose. Cultures for acid-fast and pyogenic organisms were negative. Serum uric acid was within normal limits. Rheumatoid factor and Lupus erythematosus preparations were negative. All anti-tuberculosis drugs were stopped.

The joint symptoms disappeared within a week with analgesics and antihistamine therapy. On the seventh day the patient was given INH (300 mg) orally. Six hours later he developed high grade fever associated with swelling of both knee joints and small joints of hands. After the disappearance of this episode, the patient was put on streptomycin, rifampicin and ethambutol with no adverse reaction.

### Discussion

The appearance of the symptoms on the seventh day of start of INH therapy and the abrupt reappearance within as little as six hours of INH administration, strongly suggest it to be a hypersensitivity reaction. The skin antigen testing with INH in this patient was not done as it was inappropriate clinically due to the fact that antigen testing could have increased his sufferings rather than alleviating these. Appearance of arthritis and joint effusion during the course of treatment of tuberculosis with INH may be even more frequent than what may be reviewed from medical literature and not merely a curiosity. Isoniazid induced arthritis may also be kept in mind as a possibility, although rare, while treating such cases.

### Acknowledgement

Thanks are due to Mr M.I. Hashmi, Section Officer, University Health Service for permitting us to report this case.

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\*Medical Officer, University Health Service, Aligarh Muslim University, Aligarh. \*Hony. Chief Medical Officer, University Health Service, AMU, Aligarh.

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“Spin over International Workshop of the Third International Conference of the World Federation of Public Health Associations will be held at Varanasi (India) from 25th February to 2nd March 1981. The topic for the Workshop is ‘PRIMARY HEALTH CARE WORLD IMPLEMENTATION EXPERIENCES’ with the following sub-themes :

- (a) Pooling of Implementation Experiences of developing countries (i) with resources (ii) without resources and (iii) advanced/highly industrialised countries.  
(Item (iii) may or may not be kept depending upon available materials for Primary Health Care)
- (b) Pooling of Implementation Experiences for cultivation of small family norm by community participation for global control of population by the end 2000 AD.
- (c) Any other dimension of Implementation Experiences like Integrated (i) Community Deve-

For further details, kindly contact Professor S.M. Marwah, Hony. Director, FPAI—Varanasi CBD Project, Department of Preventive and Social Medicine, Institute of Medical Sciences, Banaras Hindu University, Varanasi-221 005.”

## BOOK REVIEWS

**THE SEARCH FOR A POSSIBLE HEREDITARY IMMUNOLOGICAL DEFICIENCY IN TUBERCULOSIS** : Dr. M. Block et al  
Revista Del Institute de Investigaciones Medicas;  
1979, 8, 359.

Tuberculous infection, like Ankylostomiasis and Schistosomiasis infections, has cellular immunity as the fundamental mechanism of defence. It has been demonstrated that genetic hereditary factor exists, which constitutes the 'decisive factor' in the development of pulmonary tuberculosis, usually leading to death in the pre-chemotherapy era. A negative tuberculin reaction is an indication of deficient cellular immunity. In a group of tuberculin positive cases 120 days treatment with streptomycin improved the survival rate from 19.5% to 82%. In tuberculin negatives, however, the survival rates increased from 3.1, % to 53 % only whereas the tuberculin negatives, constitute 20 to 25 % amongst children with severe forms of tuberculosis, the percentage is only 2 to 5 % in adult. It is probably because severe disease amongst immunologically deficient children leads to their elimination, thus reducing the percentage of deficiency in older age groups in the community.

Negative tuberculin reaction in severely ill patients has been explained by two phenomena: (a) they have immunological tolerance from an excess of circulating antigen, (b) they suffer from a hereditary congenital failure of cellular immunological activity. If the former is the important cause, the tuberculin reaction usually becomes positive when, after treatment, the general condition improves. In the second alternative, however, improvement does not convert the negative to a positive reaction.

It has also been noted that patients with negative tuberculin reaction also show a functional deficiency of 'T' lymphosis leading to Macrophage migration inhibition. The quantum of immuno-globulins does not seem to differ

between tuberculin negative and tuberculin positive patients.

**THE TUBERCULIN TEST IN CLINICAL PRACTICE** by Maxwell Caplin. Publishers Bail-Here Tindall, London; 1980; 84pp. Price £5.75.

S.P.P.

Although tuberculin test is being used as a diagnostic tool since the beginning of this century, there is still lot of misunderstanding and confusion about this test. The book presents in simple and concise language the basis, technique and interpretation of the three tuberculin tests commonly used viz, Mantoux, Heaf and Tine tests. The author very rightly deprecates the usual practice of reading the test as positive or negative and emphasises the necessity of recording the actual size of induration, mentioning also the strength and type of tuberculin used and the period after which the induration is measured. The rationale of low grade hypersensitivity and its significance is clearly brought out.

A chapter on Chemoprophylaxis is also included. Since the approach to Chemoprophylaxis is conditional to the epidemiological situation of tuberculosis in any country, we in this country may not agree with all the indications enumerated primarily for U.K. Reference is in particular to those with inactive lesions, diabetes, tuberculin reactors upto 35 years in age, gastrectomy, etc.

All in all, the book is very well produced, profusely illustrated, although the price is a little too high for a small book of this size, at least by Indian standards. The book will be very useful for general practitioners, under-graduate medical students and para-medical personnel engaged in carrying out tuberculin tests. It should be available in the libraries of all teaching medical institutions and Tuberculosis Chest hospitals and Clinics.

S.P.P.

## NEWS AND NOTES

### 31ST TB SEAL CAMPAIGN

The 31st TB Seal Campaign was inaugurated by Smt. Indira Gandhi, Prime Minister of India, at her residence on 2nd October, 1980. In a special message, the Prime Minister said :

“In our time there have been great advances in the held of science and medicine in particular. As a result of these advances many diseases have almost been eradicated. There are others like tuberculosis which still afflict people especially in poor countries like ours. These diseases thrive on mal-nutrition, insanitary surroundings and ignorance about their causes and prevention. I hope that the TB Seals will be a medium for carrying the message of tuberculosis all over the country and that patients will be enabled to take treatment regularly and their other needs which hamper treatment will be fulfilled. In diseases like tuberculosis psychological relief is as important as medicines. I wish to convey my good wishes for the success of the campaign and congratulate the Organisers for their efforts in Tuberculosis control”.

Shri Neelam Sanjiva Reddy, President of India, and Patron of the Association, conveyed his good wishes for the success of the campaign. Shri S. Ranganathan, ICS (Retd.), President of the Association, In a special message conveyed his warm greetings and good wishes to the Tuberculosis Association of India, its State branches, and all those who are engaged in anti-tuberculosis work. He stated that Tuberculosis, which is a great killer and a serious public health problem, calls for undivided attention of our Government, voluntary organisations, philanthropists and the people alike. He appealed to the people of India to support this campaign and help their Associations in carrying the message that tuberculosis is preventable and curable and that it must be controlled and eventually eradicated in our sacred land.

The Tuberculosis Association of India selected the pictures of five Indian fruits, namely Mangoes, Cashews, Bananas, Jackfruit and Pineapple for the Seals this year. The transparencies were received through the courtesy of Manipal Power Press and the selection was made by Shri G.B. Pai, a noted philatelist and a Trustee and Honorary Legal Adviser of the Association.

### 35TH NATIONAL CONFERENCE — BOMBAY

The 35th National Conference on Tubercu-

losis and Chest Diseases will be held in Hotel President, Cuffe Parade, Bombay-39, from the 19th to 23rd November, 1980, under the joint auspices of the Tuberculosis Association of India and the Maharashtra State Anti-TB Association. The subjects selected for discussion at this Conference are : (1) Symposium on Control of TB as a part of primary health care (Chairman: Dr. K.N. Rao & Dr. B.N.M. Barua); (2) Panel discussion on “involvement of General Practitioners in diagnosis, case-detection, treatment and prevention of TB (Moderator: Dr. R. Viswanathan); (3) Chemotherapy; (4) Drugtoxicity and interaction; (5) Epidemiology; (6) Bronchogenic Carcinoma; (7) Extra-pulmonary tuberculosis; (8) Role of Hospitals in the management of pulmonary tuberculosis; (9) Status of immunology; (10) B.C.G.; (11) Assorted papers. Those who wish to attend the Conference may kindly contact the Secretary-General, Tuberculosis Association of India, 3, Red Cross Road, New Delhi-1 10001.

### BOOKLET FOR GENERAL PRACTITIONERS

The Tuberculosis Association of India has brought out the revised edition of the booklet entitled ‘Diagnosis, Treatment and Prevention of Pulmonary Tuberculosis for General Practitioners’. The object of this booklet is to lay down broad principles of diagnosis and treatment of pulmonary TB for involving general practitioners in the national tuberculosis programme.

### STATE CONFERENCES

*Tamil Nadu* : The second Tamil Nadu State TB Conference was jointly organised by the Tamil Nadu TB Association and the Coimbatore District TB Association at the Government College of Technology, Coimbatore, on the 6th and 7th of September, 1980. The Conference was presided over by Dr. C.V. Ramakrishnan, Deputy Director, Tuberculosis Research Centre, Madras. About 300 delegates from the State and adjoining Districts and the Directors of Medical Services and Family Welfare, Public Health and Medical Education, Tamil Nadu attended the Conference.

The Hon’ble Shri P. Kolandaivelu, Minister for Local Administration, Tamil Nadu, inaugurated the Conference and the Hon’ble Dr. H.V. Hande, Health Minister, Tamil Nadu, presided over the function. Shri T.S. Sivaprakasam, J.A.S., Collector of Coimbatore District, who is also President of the District TB Association

welcomed the distinguished guests and delegates. The addresses of the Ministers were thought provoking and based on a thorough grasp of the tuberculosis problem in our country.

The Inaugural session was addressed by Shri P.N. Raman, Secretary-General, Tuberculosis Association of India. In his short address, Shri Raman, emphasised how best TB Associations can and should assist government in the implementation of the National TB Programme. Dr. S.P. Pamra, Honorary Technical Adviser, Tuberculosis Association of India, delivered the Guest Lecture on 'Differential Diagnosis of Pulmonary Tuberculosis'. Dr. Ernest J. David, Director of Medical Services and Family Welfare, Tamil Nadu, proposed the Vote of Thanks.

Prof. K.V. Krishnaswami, Director, Institute of TB and Chest Diseases, Madras, inaugurated the Scientific Sessions. The session on District TB Programme stressed the importance of case finding and case holding, the changes in the training programme, the need for decentralisation of training and the role of Multi-purpose workers in improving case finding and case holding under the programme. Papers were presented on the results of a Prevalence Survey in Kashmir Valley, the value of repeat examination of sputum by microscopy, the Prevalence of Pulmonary tuberculosis among the BCG vaccinated and non-vaccinated children, Relapses under service programme, etc. Thoracic Surgeon, G.K.N.M. Hospital, presented the changes in Bronchi on account of fibrosis and scarring in Pulmonary Tuberculosis and the surgical treatment of tuberculosis.

In the session on Treatment of Tuberculosis, results of operational studies on motivating in preventing default, Short course chemotherapy and its present trend, and Management of Treatment failures under Short Course Chemotherapy were discussed. The symposium on Bronchogenic Carcinoma was the highlight of the Conference and various aspects, viz. Epidemiology and Aetiology, Clinical aspects, Pathology, Radiodiagnosis, Surgery, Radiotherapy, Chemotherapy and B.C.G. in malignancies were dealt with. The concluding session was conducted in collaboration with the District Branch of the Indian Medical Association. A panel of 8 specialists answered queries from the floor.

The Conference was followed by a meeting of Secretaries of District TB Associations, and lastly by a meeting of District Medical Officers and District TB Officers on the 8th September. These meetings, which were presided over by Dr. Ernest J. David, Director, Medical and

Family Welfare Services, Tamil Nadu, reviewed the implementation of the District TB Control Programme and thrashed out the various problems involved.

*Punjab* : The Punjab Tuberculosis Association organised a Conference to launch their Tuberculosis Control Project in all the Districts of the State on 17th May, 1980. Shri Jaisukhlal Hathi, the Governor of Punjab, inaugurated the Project at the Tuberculosis Centre, Patiala.

*Gujarat* : The 8th Gujarat State TB Workers' Conference was held in Ahmedabad on the 16th March, 1980, at Shri Bhaikaka Hall under the auspices of the Tuberculosis Relief Organisation. The Conference was inaugurated by Sheth Jaikrishna Harivallabhdas, one of the Industrialists of the city. About 350 delegates including para-medical staff and social workers, attended the Conference. The Chief Guest was Dr. G.D. Gothi who delivered the Guest Lecture and also Chaired the session on 'Drug Regimens in the Management of Pulmonary TB'. The session on 'Short papers' was Chaired by Dr. H.N. Patel. Dr. Sumant M. Shah, a leading Physician of Ahmedabad, chaired the session on 'Bronchial Asthma' and Dr. R.B. Patel, Director, TB Training and Demonstration Centre, Ahmedabad, chaired the session on assorted papers.

*Andhra Pradesh* : The Andhra Pradesh TB Association will be organising the 9th Andhra Pradesh TB & Chest Diseases workers conference in December this year. The three Orations instituted by the State Association, namely the Dr. P.V. Benjamin Oration, Wander-T.A.A.P. Oration and Dr. Kanval Chander Memorial Oration, will be delivered during this Conference.

*Uttar Pradesh* : The Uttar Pradesh TB Association will be holding its third State TB Workers Conference in Varanasi from the 14th to 16th December, 1980. The subjects chosen for discussion include 'Chemotherapy and management of resistant cases in Tuberculosis'; 'B.C.G.'; 'Childhood Tuberculosis'; 'Respiratory Diseases including Allergy Diseases'; 'Drug Toxicity of Anti-Tuberculosis Drugs'; 'Role of Para-medical personnel in Tuberculosis Control'; 'Corpul-monale—its management with special reference to Tuberculosis'; 'Involvement of General Practitioners in diagnosis, control and treatment of Tuberculosis' and 'Measure to improve District Tuberculosis Programme'.

*Madhya Pradesh* : The Madhya Pradesh Association is contemplating to organise a Conference of State TB & Chest Diseases Workers in December 1980.

**REFRESHER COURSES**

*Andhra Pradesh* : The TB Association of Ranga Reddy District (Andhra Pradesh) organised an intensive TB Refresher Course on 5th September at State TB Centre, Irrumnuma, Hyderabad. Inaugurating the course, Dr. S.P. Pamra, Honorary Technical Adviser, Tuberculosis Association of India, stressed the need for organising such one day courses in District headquarters towns for the benefit of local medical practitioners who cannot afford to attend courses of longer duration in distant places. Presiding over the function, Shri H.K. Babu, Collector & President of Ranga Reddy TB Association, promised to organise refresher courses at Vikrabad, Tendur and other places. About 100 doctors attended the course.

The inaugural session was followed by a Session chaired by Dr. S.P. Pamra who spoke on 'Differential diagnosis of TB' and also delivered a guest lecture on 'Recent Trends In Chemotherapy'. Others who participated in the session included Dr. I. Ranga Rao, Medical Officer, TB Clinic, Dabeerpura, Dr. S. Vasudeva Rao, District TB Control Officer, Ranga Reddy and Dr. Y.R. Reddy, Prof. of Paediatrics, Osmania Medical College, Hyderabad.

*Madhya Pradesh* : The Alumni Association of the Medical College, Indore, organised a Refresher Course in Tuberculosis for the benefit of the General Medical Practitioners at Indore. The course was held for 5 days from 20th August, 1980. Dr. S.P. Pamra, Honorary Technical Adviser, Tuberculosis Association of India, inaugurated the Course and spoke on 'Differential Diagnosis of Pulmonary Tuberculosis', 'Present status of Chemotherapy of Tuberculosis' and 'Case-finding in Pulmonary Tuberculosis'.

**SYMPOSIUM ON TUBERCULOSIS**

*Maharashtra* : A symposium on 'Recent Advances in TB' was held at J.J. Group of Hospitals, Bombay, from 15th to 17th August, 1980, under the joint auspices of TB & Chest Diseases Department of the Hospital (Prof. K.C. Mohanty) and M/s. Yash Pharma Laboratories Pvt. Ltd., Bombay, for the benefit of post-graduate students of the Grant Medical and other Colleges. The inaugural session was presided over by the Director of Health Services Maharashtra, who was also the Chief Guest. The symposium covered practically all aspects of diagnosis, prevention and treatment of tuberculosis and was very well attended.

*Bihar* : The Bihar TB Association organised a Seminar-cum-Shibir on TB at Amroha in the District of Rohtas from 11th to 13th October, 1980. The Seminar was inaugurated by the Governor of Bihar on the 11th October. Dr. S.P. Pamra, Hon. Tech. Advr., T.A.I., who was the Chief Guest, inaugurated the Scientific Session and delivered two lectures to the participants on 'Differential diagnosis' and 'Short term chemotherapy of pulmonary tuberculosis'.

**TB CAMPS**

*Andhra Pradesh* : The Andhra Pradesh TB Association organised a mass TB Camp at Primary Health Centre, Pendunhi in Visakhapatnam District, in cooperation with the local TB Hospital and District TB Control Officer on 28th and 29th August, 1980. Dr. M. Venkata Rao, Director of Health and Family Welfare, inaugurated the Camp. 202 persons attended the same. The Association also organised a health check-up Camp for the benefit of Rickshaw-pullers during the inauguration of 31st TB Seal Campaign.

# The Indian Journal of Tuberculosis

## ABSTRACTS

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### HLA-AI and Coal workers' Pneumoconiosis

*E.R. Heise et al Amer. Rev. Resp. Dis.*; 1979, 119, 903.

It has been suggested that undefined host factors are important in the development of complicated coalworkers' pneumoconiosis and that at least one of these factors may involve immune responsiveness. Studies of various coal miner populations have produced evidence supporting this concept, including reports of marked variation in the prevalence of antinuclear antibody and rheumatoid factor, an implied role for lung reactive antibody in the pathogenesis of disease and an apparent increased susceptibility in certain persons to the development of progressive massive fibrosis.

Tandem review of these data followed by information linking several human diseases of obscure cause with the genetic constitution of the major histocompatibility complex had prompted us to explore the possibility of an association between histocompatibility (HLA) antigen frequencies and coalworkers' pneumoconiosis.

To test the possibility of such an association, a sample of coal miners from Pennsylvania and West Virginia were studied during a 3-year period. In each of 4 geographic regions, 358 subjects were matched for age and years in mining, and were then divided into 3 groups consisting of (1) miners with progressive massive fibrosis, (2) miners with simple coalworkers' pneumoconiosis, and (3) miners with no radiographic evidence of coalworkers' pneumoconiosis (control group). The frequency of HLA-AI in a combined grouping of miners with simple and complicated coalworkers' pneumoconiosis (21.6 per cent) was significantly lower than that in the control group (31.3 per cent;  $P = 0.045$ ) or a reference group (32 per cent) of white Americans ( $P = 0.006$ ). This apparent significant disparity between groups should be viewed with caution. When probabilities were corrected for the number of antigens tested the difference was no longer significant for the deficiency for the HLA-AI specificity. Nevertheless, overly

conservative interpretation of preliminary data can preclude the recognition of frequency differences that, although weak, are potentially real and would therefore require individual scrutiny to establish or reject in an independent study.

**S.P.P.**

### Lung Abscess

*P.B. Das J. Ind. Med. Asso.*; 1979, 72, 206.

Thirty two cases of lung abscess diagnosed in Safdarjung Hospital New Delhi in 1975 and 1976 have been reviewed. 75 % of the cases were in the third and fourth decades of life. Two cases were below the age of 10 years. Two thirds of the cases were on the right side and one was bilateral. The posterior segment of the upper lobe and the superior segment of the lower lobe were the most involved segments. The offending micro-organism was staphylococcus in 24, streptococcus in 8, Klebsiella in 2. All cases came from the weaker sections of society. None of the patients was alcoholic. Most of them had varying degrees of gingivodental sepsis. Foul smelling sputum was seen only in a few cases. Only two patients had mild to moderate haemoptysis. The onset was insidious in a large number of cases. Twenty six patients were treated conservatively with antibiotics and repeated endoscopic suction. Among the six surgically treated cases, 5 had resection and 1 had deroofting of the abscess with closure of bronchial opening. The results were satisfactory in all 32 cases.

**S.P.P.**

### Levamisole—A Cautionary Note

*Editorial, The Lancet*, 1979, *ii*, 291.

Immunostimulation seems an attractive way to treat patients in whom some component of the immune system is depressed. The exact mechanism whereby lymphocyte stimulation is enhanced is not clear, though it has been hypothesized that Levamisole acts by removing ferritin from the cell membrane where it has been acting as a "blocking substance" interfering

with antigen recognition. Serious side effects of Levamisole e.g. leucopenis agranulocytosis, thrombocytopenis, neurosensory disturbances, rashes etc. have been encountered. Though some encouraging results were reported earlier in the treatment of lung cancer and a few other conditions, the results are by no means consistent and convincing. Until more is known about the normal checks and balances between various cellular components of the immune system, such therapeutic opportunism may be misplaced. In ascariasis and similar conditions, with single dose or short-term treatment, Levamisole does not seem to carry the same risk of unwanted effects, perhaps because it kills the parasite before it disturbs the cellular mechanism of the host.

S.P.P.

**A new endocrine—like function of lungs : generation of prostacyclin.**

*R.J. Gryglewski et al Materia Medica Poland, 1978, 10, 247.*

Evidence is presented that the lungs of anaesthetized cats, as well as the perfused isolated lungs of guinea pigs and rats, continuously and spontaneously generate a vasodilator and an antiplatelet substance with biological properties of prostacyclin (Prostaglandins). This newly discovered endocrine-like function of lungs is postulated to play an important role in natural resistance of the organism against intrarterial thrombosis.

S.P.P.

**Metronidazole in the treatment of Anaerobic infections.**

*Charles V. Sanders et al Amer. Rev, Resp. Dis.; 1979, 120, 337.*

Thirteen adults who had anaerobic pleuropulmonary infections, including 11 with lung abscess, one with necrotizing pneumonia and one with thoracic emphysema were treated with metronidazole in oral dosages of 1.5 to 2 g. daily. Five patients (four with lung abscess and one with necrotizing pneumonia) were cured. The lung abscesses of 5 patients did not respond. For 3 patients (one with epigastric distress who refused metronidazole, one with undrained empyema and one who died while receiving metronidazole) therapy could not be evaluated. Side effects included leukopenia (2 patients) leukopenia and neutropenia (one) neutropenia (one), dark urine (two), bitter taste (two), and epigastric distress (one). In the light of these findings, metronidazole is not uniformly effective in the treatment of anaerobic pleuropulmonary infections.

S.P.P.

**Allergic Bronchopulmonary Aspergillosis-Like Syndrome Consequent to Aspergilloma.**

*Micheal E. Ein et al. Amcr Rev. Resp. Dis.; 1979, 119, 811.*

The case histories of two patients are presented who showed evidence in favour of allergic bronchopulmonary aspergillosis (ABA) developing consequent to aspergilloma. Though several cases of aspergilloma developing in lungs permanently damaged by longstanding ABA have been reported, the reverse is extremely rare and probably not reported earlier. Both patients had no antecedent history of asthma or ABA to cause pulmonary fibrosis and bronchiectasis. In both cases pulmonary tuberculosis had led to the development of cavities in which the aspergilloma subsequently appeared. Both possessed hyper-sensitivity of type I and type III. Sputum and bronchial aspirates were positive for *A. fumigatus*. Both the patients were given corticosteroids therapy and showed subjective and objective improvement.

S.P.P.

**Assesment of Tine Tuberculin Test.**

*D.J.M. Sinclair and R.N. Johnston; Brit. Med. Jour. 19th May 70.*

Mantoux (10 tuberculin units) and tine tuberculin tests were performed in 190 subjects and results recorded at 48, 72 and 96 hours.

In all 1010 readings were recorded. Of these 555 (55%) were mantoux test positive and 525 (52%) tine test positive. Though the tine test is marginally less sensitive, its advantages are simplicity, easy technique and it is easily performed.”

H.B.D.

**A Comparison of Biopsy Results using Rigid and Fibreoptic Bronchoscopes.**

*Jonather Webb and S.W. Clarke. Brit. J. Dis. Chest, 1980, 74, 81.*

A comparison of the results of bronchial biopsy in the histological diagnosis of lung cancer obtained via the fibreoptic bronchoscope and the rigid bronchoscope has been made.

Positive biopsy rates of 72% with fibreoptic bronchoscope and 51 % with the rigid bronchoscope were obtained (P 0.001). This difference was not due to selection of patients. The negative biopsy rates in the presence of proven tumour were 9% with the fibreoptic bronchoscope and 16% with the rigid bronchoscope.

H.B.D.