

Tuberculosis Control Measures in Civilised Communities and their Application to Underdeveloped Areas in Africa

BY

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PART I

INTRODUCTION

Vasco da Gama is said to have noted phthisis on the East Coast of Africa in 1497, but there is no evidence to show that the tribes of the interior were affected until recently, when observations by individual doctors lead us to believe that respiratory tuberculosis in African races is of short duration with rapid spread and a high death rate with an increased incidence reported after 1914 and further aggravation in the 1939-45 period of war. Tuberculin tests, sputum examinations and X-rays are used as in Europe, but hospital records show wide variations since treatment may have been discontinued at any stage of the disease. Routine *post mortem* studies are impracticable in the face of opposition from tribal customs.

During the last 60 years European government has led to social intercourse between tribes, and the new African urban populations derived from tribal areas experience changes as revolutionary as those experienced in eighteenth and nineteenth century England when rural dwellers moved to industrial towns. The majority of Africans, however, remain in rural areas and continue to owe allegiance to family, to clan and to tribal chief.

The scope of the World Health Organisation's activities includes a wide range of services whose aim is to improve general levels of health throughout the world and, through the strengthening of national health services, to conduct world-wide activities in connection with diseases such as tuberculosis. Widespread interest is being shown in the "underdeveloped areas" so that Africans experience ever closer association with civilised communities through education and the provision of improved medical and welfare services, while hopes for improvement at this stage depend on the application of lessons

learned in other countries in a manner most suited to tribal ways of life, yet comprehensive enough to embrace a period of social change associated with population growth.

ASPECTS OF IMPORTANCE IN THE PRESENT SITUATION IN AFRICA

The serious position arising from disease in Africa and the wider social problems of to-day received publicity in "The Case for the Appointment of a Royal Commission on Health and Population in His Majesty's Dependencies in Africa," published in East Africa (1948). Professor T. H. Davey, of Liverpool (1951), in addressing the Uganda and Kenya branches of the British Medical Association, expressed views which are basically identical with those expressed in the memorandum, in that only by raising the standard of living of Africans well above subsistence level can the rate of population increase be reduced to manageable limits, and that to bring this about Africans of wide general education must be found to teach their people. Professor Davey states that three generations are required to raise a population such as that in East Africa to the point where the economic pressure of a raised standard of living may be expected adequately to stem the tide of its natural increase.

Preventive medicine represents an advance on the old system of public health, inasmuch as it goes beyond the bare consideration of housing, sewerage, etc., yet the basic requirements for the healthy life of African communities are generally lacking since accommodation in urban and rural areas is bound up with the African's earning power. A majority of Africans in rural areas live at subsistence levels, although improvement is seen among workers in government, municipal and commercial undertakings, while European settlers are conscious of the need for good housing and feeding among employed Africans.

In South Africa it was at first thought that man living in primitive conditions and placed in contact with civilisation proceeded to develop tuberculosis of a rapidly fatal form, a conception which was reconsidered later. Some healthy Africans showed greater sensitivity to tuberculin tests and were found to develop tuberculosis more readily than the non-tubercularised. The strain of heavy work allied to marked hypersensitivity may even result in a tendency to "breakdown." Natives in South Africa are now believed to show considerable resistance to tuberculosis, but attention remains focussed on

problems of "racial susceptibility" or "hereditary factors."

Racial aspects may have been overstressed in the past, as more recent work shows that tuberculosis of coloured persons may not differ from that in white races. Races believed to have low resistance to tuberculosis very often develop the same benign first infection as the infants and children thought to be resistant. Myers (1950) states that in white races tuberculosis quite often begins in an advanced way, "... without a symptom or the slightest apparent impairment in health of the individual the disease may exist and progress to the moderately or even far advanced stage. Together with the very insidious onsets in some cases and the acute onsets with far advanced disease from the beginning in others, the early case which was thought to be so typical was found only rarely." It is believed that such forms are found among negroes.

In North America during the earlier years of building sanatoria for the tuberculous almost no provision was made for Negroes in States where they constitute a large population, and many Negroes who developed a fatal tuberculosis or lived as chronic infectious cases remained in their homes or communities with no provision to prevent them from infecting others. During infancy and childhood it has been found that Indians, Negroes and Mexicans control the first infection type of disease in much the same manner as the white child, but the incidence of tuberculin reactors is usually much higher among the coloured children, while adults tend to develop "malignant" forms of tuberculosis with high death rates. It is significant that the incidence of tuberculin reactors is usually much higher in races where the poor social conditions increase opportunities for massive infection and reinfection.

Until recently the majority of cases of respiratory tuberculosis diagnosed at African hospitals throughout East and Central Africa were diagnosed clinically and by sputum study without the aid of radiography, although this facility is being increased to cover cases from all parts of the territories. Sputum study is used to confirm the diagnosis.

At the main centres of urban population patients are treated under conditions approximating to those in civilised communities, and experiments in treatment continue at main hospitals. There is no co-ordinated campaign, however, to reduce the incidence of the disease

throughout rural areas, except in so far as notification is made from African hospitals. It is usual for such "isolation" treatment to be under the supervision of a general duty medical officer in charge of an African hospital. Unfortunately Africans are often unwilling to remain for prolonged periods of treatment, returning to their homes in towns or to Native areas or reserves, where the possibility of infecting others is aggravated by the low standards of nutrition and housing. Officers in charge of such cases usually become discouraged and abandon control measures. Defects in a system of notification are apparent when it is impossible to carry out programmes of isolation, after-care and contact tracing from the information supplied. Attempts at after-care and contact tracing are carried on at African hospitals and through health officers (sanitary inspectors) at the main stations, but adequately trained African staff in sufficient numbers is seldom available. In theory it should be easy to trace patients through a Native authority, chiefs or headmen, but in practice it proves difficult to follow up improved cases which have discharged themselves from hospitals, wishing to return to their homes in rural areas.

Edey made a contribution to knowledge of the course of the disease in Africans by following up cases of tuberculosis notified between 1943 and 1944 at Sekondi, in the Gold Coast. Of 204 cases followed up for two years, 87.7 per cent. were dead; and of 25 still alive, only 12 showed definite evidence of clinical improvement. Most of these cases occurred among labourers or the unemployed, although artisans were represented. Over one-third came from tribes outside of the Gold Coast. Conditions of overcrowding and poor ventilation were the rule and nutrition was poor.

There is no organised procedure for rehabilitation or resettlement of tuberculosis sufferers in most areas, although rural areas should be well suited to resettlement provided that adequate health visitor services became available with community help to the patient. In 1904, Sir Robert Philip stated that, "A plan of supervised home relief must play a chief part in such schemes," and Lyle Cummins has showed the importance of rest and adequate nutrition in South African kraal life where the incidence of the disease was low, although the people had become infected.

In addition to Cummins' observations in South Africa, Clark (1951) observed that respiratory

tuberculosis was not on the increase in the Fort Hall reserve of Kenya, where the numbers of cases had remained fairly constant during the last six years, but he showed that 70 per cent. of cases followed up for from one to two years after discharge from hospital were known to have died. Life outside the reserve, especially town life, renders this tribe more liable to contract tuberculosis of the lung, but work and residence on European farms had no such effect. A most important factor in preventing an increase in numbers of sufferers in this area of Kenya appears to have been the system of contact tracing and follow-up of actively infectious cases. Ex-soldiers survived longer and this was attributed to early diagnosis in the army, although the numbers followed up were too small to be statistically significant.

The methods used in civilised countries are now reviewed in an endeavour to select measures likely to be of value if applied to the aspects of the control problem outlined above.

PREVENTIVE MEASURES IN CIVILISED COMMUNITIES

An examination of control measures in the United Kingdom leads one back to the pioneer work of Sir Robert Philip, who opened the first dispensary in 1887. In 1909 the first dispensary in London was opened at Paddington and was followed quickly by others in all parts of the country. Legislation for treatment and after-care progressed through the National Insurance Act in 1911, which provided for sanatorium treatment and care of the insured worker. In 1921 tuberculosis officers were provided for, and by 1921 county councils had to arrange for treatment of all cases.

Notification remained ineffective until 1924, when a simple form was enforced, and a quarterly statement compiled from the medical officer's register had to be sent to the county medical officer of health. The statement gave numbers of cases remaining at the end of the quarter and the number of removals (name and address and reason for moving). The year 1925 saw further administrative powers granted under the Public Health Act so that it became possible for a court of summary jurisdiction to order the removal of tuberculosis sufferers to a suitable hospital or sanatorium, provided that accommodation was available in the institution and the patient's living accommodation was unsuitable. This power is rarely used, however, on account of the danger of concealment.

The above legislation and efficient functioning of tuberculosis dispensaries and sanatoria, combined with a rapid advance in surgical and medical treatment, have led to isolation and treatment of active infective cases. After-care and contact tracing with steady functioning of tuberculosis health visitors (public health nurses with special training in tuberculosis and welfare work) have done much to reduce infection. Allowances from the State enable the family to live while the wage earner is in hospital, during the period of rehabilitation or when at a village settlement.

It is hoped that a stage will be reached when the undetected sufferer may be diagnosed clinically through mass surveys on X-rays. Surveys have proved popular wherever undetected cases are suspected in civilised populations, yet the danger of concealment remains so long as they are conducted on a voluntary basis. All information is collected which concerns tuberculosis as it pertains to the individual and the community, since fragmentary information gained through investigation of small groups is considered to be of little value and justified only in places where finances are low. The use of the tuberculin test in ascertaining the extent of tuberculosis in a population is the foundation for work among children and young adults in civilised communities. As high a percentage as possible are tested. Surveys now considered of little value when conducted by themselves include sputum studies, general inspections, physical examinations and records of body weight.

Mass radiography is applied to the detection of early lesions on an ever-increasing scale in young persons or workers. Attendance at radiography sessions is voluntary, and in spite of confidential notification measures and removal of the effects of loss of occupation through allowances, workers with active disease are known to conceal their lesions and to refuse X-ray. Fluoroscopy or screening on a large scale is claimed by some to be more effective in detecting minimal lesions, although highly skilled personnel are required for the work and no permanent record of lesions is preserved.

In the past, fewer early cases came to hospital and sanatoria were filled with advanced cases. To-day early detection, wider indications for radical thoracic surgery, and ambulatory treatment with streptomycin, P.A.S. and I.N.H. have improved the prognosis and possibly the infectivity of the disease.

Social and economic improvement in the United Kingdom in association with case detection and notification and treatment by isolation reduced the average number of deaths from 51,566 in 1871-75 to 20,927 in 1941-45. The average annual fatality per 100 new cases dropped from 60.2 in 1916-20 to 43.4 in 1941-45 (war years), and, by using the comparative mortality index in 1947 at all ages, was less than one-fifth of the rate for 1871. This improvement has been paralleled and continues in most western countries, but certain findings suggest that more intensive research is required into local and national epidemiological conditions, since the primary infection and the case incidence associated with it are apparently more severe in one area or country than in another (Verney, 1955). Pinner (1947) emphasises the danger after primary infection in the U.S.A. Forstad (1944), Hedval (1946) and Malmross (1947) suggest that in Scandinavia the primary infection is non-progressive. However, the Prophit survey (1937) showed that tuberculosis is three times more common after primary infection than in the tuberculosis positives.

A measure receiving wide publicity is vaccination with B.C.G., which some writers dismiss as offering no radically new ideas or new methods for fighting tuberculosis, while those in favour are enthusiastic and claim a reduction in incidence or death rates in vaccinated groups and advocate vaccination of all newborn infants and non-reactors to the tuberculin test. It is claimed that pulmonary tuberculosis in adolescence or in young adults which develops in connection with recent primary infection is prevented by B.C.G. vaccination. Lesions such as erythema nodosum, enlargement of hilum shadows, pleurisy and small infiltrates seen on X-ray appear to occur less frequently among the vaccinated at the time of or soon after sensitisation to the tubercle bacillus. Opponents of B.C.G. vaccination state that these lesions are non-infectious, so the seriousness of the tuberculosis problem as a whole remains unaffected. Favourable findings are questioned on the grounds of inadequate control groups in series published.

Although there is no guarantee that B.C.G. vaccination will have an effect upon the overall human disease incidence, it is hoped that the reduction in death rate will be greater where heavy infection, poor living conditions or "high racial susceptibility" produce a normally high tuberculosis rate in the non-vaccinated. In support of this, favourable results from using B.C.G. vaccination are reported in North Ameri-

can Indians where large numbers have been vaccinated with "control" groups non-vaccinated. Protection is claimed for vaccinated Scandinavian and Canadian nurses in contact with the disease and among Scandinavian children vaccinated at birth with careful revaccination while at school in order to maintain tuberculin sensitivity.

Wilson (1947) gave real disadvantages to B.C.G. administration as follows:—

- (a) It is a live vaccine that demands great care in preparation to avoid contaminants and must be used within one week.
- (b) The virulence of B.C.G. is not fixed.
- (c) Injections have to be made intracutaneously with considerable care in order to avoid serious ulceration.
- (d) Infants of tuberculous mothers must be separated at birth until B.C.G. vaccination has produced tuberculin sensitivity or, if taken away after exposure, they must be separated for at least six weeks before inoculation.
- (e) Infants separated and kept in residential nurseries may be exposed to serious risk of cross infection and die.
- (f) It is desirable to revaccinate at intervals in order to ensure the continuance of immunity.

The objections in (a), (b) and (c) have been partly overcome or are likely to be overcome in the future. Early detection of lesions in workers leads to consideration of the place of rehabilitation and resettlement. It is impossible to be sure that a tuberculous person has completely recovered from the infection and there are no means of assessing his capacity for work except by trial and error. It is difficult to visualise employment of the tuberculous with the non-tuberculous on account of the possibility of active infection arising among contacts. There is a school of thought, however, which believes that the active disease is determined mainly by the degree of inherent or native resistance, other important factors being the age at which the primary infection occurs and the magnitude of the primary infection. If this infection is overcome it is believed that small reinfections tend to raise general resistance to the disease.

Schemes for the rehabilitation and employment of patients will continue to be affected by fears of infecting healthy workers until the two opposing theories regarding causation of active disease become reconciled in the light of accurate

knowledge. Some chest physicians consider rehabilitation to be part of treatment, and there is no doubt that it should be directed towards the attainment of skills which ultimately make the worker self-supporting.

Untutored over-optimism is prevalent as a result of communications in the lay press regarding antimicrobial management of all forms of tuberculosis and from the successful application

of surgery to tuberculous lesions, but much remains to be done to combat resistance to P.A.S., streptomycin and I.N.H. One can foresee changes in concepts, adjustments in view and revolutions in managements for some time to come.

(To be continued)

(References to be given at conclusion of Part II)

