Tuberculosis Among American Indians of the Contiguous United States

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Synopsis

Paleopathologic findings provide strong evidence for the existence of tuberculosis in Andean populations of pre-Columbian America. Indirect evidence is available also to suggest its possible endemicity among some American Indian tribes who lived within the present-day contiguous United States before the arrival of Europeans. The available data suggest that tuberculosis became a major health problem in some tribes with increased population density and cultural changes after increased contact with European civilization, paralleling the deterioration in living conditions after relocation of the tribes to reservations.

By 1900, tuberculosis had become one of the most serious health problems among North American Indians. Tuberculosis control was hampered by the lack of a specific treatment, and only the advent of specific chemotherapy in an ambulatory setting brought a breakthrough. Mortality, morbidity, and risk of infection have all sharply decreased over the past three decades. However, tuberculosis incidence rates among American Indians remain well above rates in the white population. An intensified effort to identify those with tuberculosis and those at risk of tuberculosis as well as to develop compliance-enhancing strategies with treatment regimens will be necessary to eliminate tuberculosis from Indian reservations.

The Advisory Committee for the Elimination of Tuberculosis in the United States has called for a fresh assault on the tubercle bacillus (1). The Indian Health Service, represented on the Committee, has developed specific guidelines for the elimination of tuberculosis from Indian reservations (2). The purpose of this review is to add some background information on the history of tuberculosis among Indian tribes of the contiguous United States. The history of the disease among Alaskan Natives has been described elsewhere in detail and was excluded from this review (3–5).

Epidemiology

Tuberculosis in pre-Columbian America. Tuberculosis in human beings has existed for at least 6,000 years (6). Acid-fast bacilli (AFB) have been documented in an Egyptian mummy with signs of spinal and pulmonary tuberculosis (7). Tuberculosis is
also mentioned in the Rig-Veda (ca 1500 BC) and in marriage codices in ancient India (8). However, the existence of tuberculosis in the Americas before the arrival of Europeans has been questioned (9). Many infectious diseases, such as smallpox, poliomyelitis, and measles, do not persist in small communities, because the causative organism spreads so efficiently that it rapidly kills or immunizes a high proportion of the population, and the virus cannot continue to propagate itself (10). In contrast, tuberculosis may remain endemic at low levels in small populations by virtue of the peculiarities of its natural history. The degree to which this pattern could exist without an extrinsic reservoir is, however, uncertain (11).

The findings in an autopsy of a mummified child who had lived about 700 AD in Peru are virtually pathognomonic of tuberculosis (12). Pleural and subpleural structures in the lungs, kidneys, and liver were compatible with miliary tubercles, and Ziehl-Neelsen staining revealed numerous AFB. The pericardium and heart contained structures that were histologically compatible with tubercles, and the lumbar vertebrae 1, 2, and 3 exhibited changes consistent with tuberculosis of the spine. Another report has provided additional evidence of AFB positive, cavitary pulmonary tuberculosis in Andean populations as early as 260 AD (13). There is little room for doubt that tuberculosis existed among Andean populations in pre-Columbian times. The evidence for its pre-Columbian existence among Indian tribes who lived within the boundaries of the present-day contiguous United States, on the other hand, is much weaker.

Images of severely deformed hunchbacks as clay figurines and effigy water bottles have been recovered from prehistoric sites in Arkansas, Tennessee, Mississippi, and Missouri (14). It is believed that these items depict persons afflicted with tuberculosis of the spine (8,14). Pictographs recovered in the Southwest show hunchbacked figures lying down playing the flute (14). Skeletal remains recovered from sites in Tennessee and New York showed evidence compatible with tuberculosis of the spine (15).

Data from skeletons in mortuary sites in the lower Illinois River valley region were compiled for periods ranging from the Middle Woodland (150 BC to 400 AD) through the Mississippian Period, which began about 1050 AD (11). The Middle Woodland groups lived as hunters and gatherers, but they were also cultivators, living in base camps within the major river valleys. Population density was low, and no indication for extensive popula-

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were highest. He noted increases on certain reservations. For Cheyenne River, SD, he found, for example:

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<tr>
<th>Calendar year</th>
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Geare reported on tuberculosis among the Southern Ute and among the Apaches in Arizona and New Mexico in the beginning of this century (18). On one reservation among a population of about 3,000, more than 36 percent of 255 deaths occurring between 1901 and 1903 were due to different forms of tuberculosis. He found that tuberculosis also was common among Zuni and Papago Indians.

Aronson (19) followed for an average of 10 years 975 Indian children who were tuberculin negative when first tested in 1935–37 (children from Alaska were excluded here). At the end of the observation period, 313 (32.1 percent) were tuberculin positive, for an average annual risk of infection of 3.8 percent.

In the early 1930s, the annual incidence of tuberculosis in an Apache community of 2,700, living on the San Carlos Reservation, was 1 percent (58 cases in 2 years) (20). By the seventh grade, 100 percent of the children were tuberculin positive.

From 1870 to 1936 the Navajo population increased from 8,000 to 50,000 (21). A study of 4,826 admissions to Sage Memorial Hospital in Ganado, AZ, in the early 1930s ranked tuberculosis fourth after influenza, trachoma, and tonsillitis; it accounted for 3.0 percent of all admissions (21). By the end of the 1950s the Navajo numbered 85,000. In 1950, tuberculosis was one of the leading causes of death on the Navajo Reservation (22). There was only one hospital with 100 beds for the entire tribe, and case finding programs had to be abandoned because patients could not be cared for. Estimates of active tuberculosis ranged from 2 to 3 percent, and 50 to 60 percent of 6- to 10-year-old children were tuberculin positive, for an average annual risk of infection of about 9 percent.

In 1952, the year that isoniazid was discovered, a government program contracted with off-reservation sanatoriums to care for patients with infectious pulmonary tuberculosis (22). Arrangements were made with Cornell University to provide staff for the hospital at Fort Defiance, AZ. With the widespread use of effective antituberculosis drugs and appropriate staffing, tuberculosis mortality had dropped 40 percent by 1957. By 1959, the prevalence of tuberculous infection among the 6- to 10-year-olds had fallen to 20 percent, for an annual risk of infection of about 2.6 percent (22).

In 1972, a tuberculin skin test survey among Navajos in the Red Rock area showed a prevalence of 3.7 percent tuberculin reactors among children ages 5 to 9 years, an annual risk of infection of about 0.5 percent (23). This level represents an estimated average decline in the annual risk of infection of 12 percent per year from 1959 to 1972.

Between 1955 and 1981, the tuberculosis incidence rate among American Indians (excluding Alaskan Natives) had dropped from 563.2 per 100,000 to 50.9 per 100,000 Indian population, an average annual decline of 8.8 percent ("Tuberculosis Morbidity," unpublished table from the Vital Events Branch, OPS, DRC, Indian Health Service, Nov. 4, 1982). In 1985, 397 cases of tuberculosis among American Indians and Alaskan Natives were reported, for a case rate of 25.0 per 100,000 population, still 4.4 times higher than the rate of 5.7 per 100,000 among whites (24). Tuberculosis case rates among American Indians in many reservation States were considerably higher than the rates among other races in these States.

Treatment of Tuberculosis

The prechemotherapy era. Disability, particularly of young people, attributable to chronic diseases, was believed by most Indian tribes to be incited by some adverse natural or supernatural power. The help of medicine women and men who were believed to have supernatural powers was sought to counteract the powers that caused the disease (18, 19). The Navajos called tuberculosis a "fading away of the heart." They thought that it was caused by improperly performed wind chants or contact with an object, such as a tree struck by lightning (22). It was not considered contagious.

In 1896, James R. Walker was assigned as agency physician to the Pine Ridge Reservation, SD (25). He noted that the prevailing disease among the Oglala Sioux was tuberculosis and "... that the greatest difficulty in the management of the disease on an Indian Reservation is the lack of control of cases, arising principally from the antagonism of the Indian medicine men." He realized the pivotal role of medicine men in the society and
sought their friendship to learn about concepts and beliefs concerning the etiology and traditional methods of treating tuberculosis. He introduced then current measures of control on the reservation, such as the safe disposal of waste and sputum, and general sanitary measures. From 1897 to 1903, the annual incidence of tuberculosis declined by 49 percent, and the mortality from tuberculosis by 44 percent. He also proposed the construction of a sanitary camp on the reservation to remove the infectious from the general community, but guaranteeing that patients could stay close to their kin and cultural environment (26). Unfortunately, his plans bore no fruits (25).

The chemotherapy era. Mass chemotherapy became a historically unprecedented weapon in tuberculosis control in the early fifties (27). A study comparing treatment of tuberculosis in sanatoriums with ambulatory chemotherapy in Madras, south India, demonstrated the efficacy and feasibility of ambulatory chemotherapy (28). In the United States, the change from sanatorium treatment to ambulatory chemotherapy was gradual over more than two decades. The first step was a shift from sanatorium toward general hospital treatment. The use of general hospitals in the treatment of tuberculosis was endorsed by a committee of the American College of Chest Physicians in 1972 (29). In 1971, 28 States reported that general hospitals were being used for the care of tuberculosis patients (30). In 1973, only 17 States reported using specialized tuberculosis hospitals exclusively (31). In 1981, 15 of these 17 States reported some use of general hospitals (32). Over the same period (1972 to 1981), treatment of tuberculosis also gradually shifted from hospital to ambulatory care sites (33). The feasibility and apparent success of ambulatory chemotherapy in Alaska (34) may have accelerated the introduction of ambulatory chemotherapy by the Indian Health Service on reservations in the contiguous United States. Between 1969 and 1972 an ambulatory therapy program with drugs given twice weekly was initiated among White Mountain Apache Indians (35). Patients were hospitalized for 5 to 56 weeks and then allowed to complete their 2-year course of treatment at home.

Tuberculosis control in the 1980s on Indian reservations. For the majority of patients, ambulatory, short-course chemotherapy has become the treatment of choice on Indian reservations, as elsewhere in the United States (2, 36). As in other populations, noncompliance remains the most serious problem. In addition to the difficulty all patients have in comprehending the need to prolong chemotherapy beyond the achievement of physical well-being, mistrust of “white man’s” medicine among American Indians remains to some extent and stems from traditional beliefs about disease etiology and treatment of disease (“Tuberculosis on the Pine Ridge Reservation. Directed Study in Nursing,” by L. Means, of the Aberdeen Area Indian Health Service, written personal communication, May 1986). Because treating a tuberculosis patient is not synonymous with administration of chemotherapy, the patients’ beliefs and cultural background must also be considered in the design of treatment programs (37).

Outlook

With the decline of the risk of infection, tuberculosis among American Indians increasingly emanates from the pool of persons with latent tuberculous infection, acquired years earlier. The identification of groups at high risk of tuberculosis among those infected becomes increasingly important. The elimination of tuberculosis among American Indians will require the integration of traditional medicine into treatment programs in ensuring the patient’s compliance; the use of health care workers from within the tribe; a continued high suspicion of tuberculosis; an intensified use of existing tools of control, particularly of preventive therapy for those at risk of developing active tuberculosis; and the use of directly observed short-course therapy for those patients who have difficulties in complying with self-administered therapy (2). The elimination of tuberculosis, a disease that is considered curable and preventable by the medical community, poses a challenge to
health care providers (1,38). A concerted effort and
the cooperation of all concerned with the health of
Indian people can turn the dream of eliminating
tuberculosis from Indian reservations into reality.

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