Trachoma in an American Indian Village

STANLEY O. FOSTER, M.D.

A SPECIFIC pattern of age prevalence, disease intensity, and disabling sequelae in each endemic area is characteristic of trachoma epidemiology. The development of effective control programs depends upon elucidation of the trachoma pattern in each area. This paper describes the methods and results of a demographic survey of Blackwater, Ariz., a small American Indian village.

Blackwater, located 50 miles southeast of Phoenix, is comprised of 82 households scattered over 10 square miles of desert. The majority of the houses are the "sandwich type," consisting of dried mud supported by a loose board framework. The average 1,000 square feet of floorspace is divided into 2 or 3 rooms that serve as inside living and sleeping quarters for 1 to 11 Pima Indians. The mean occupancy is 5.3 people per household. Since 1962, each house has had at least one faucet delivering safe water outside or inside the house. Approximately one-third of the houses have bathrooms and, in about 10 percent, satisfactory fly control is practiced.

The chief source of income for the 434 Pima inhabitants of Blackwater is agriculture, with seasonal cotton cultivation the major source of employment. Medical care for the community is supplied by the Public Health Service Indian Hospital in Sacaton and a Public Health Service nurse.

Trachoma was first documented among the Pimas in 1912, when 31 percent of the children in the Pima Day School were diagnosed as having active infection (*1*). In subsequent Pima surveys, the prevalence rates were 20.8 per 100 in 1928 and 16.8 per 100 in 1938 (*2*). Following a massive campaign of treatment with sulfanilamide during the late thirties and early forties, the reported prevalence rate of active trachoma fell to 2.4 percent (*3*). Shortage of personnel during World War II prevented post campaign surveillance, and it was not until 1956 that trachoma surveys were reinstituted.

In 1956, 25 of 29 first graders in Blackwater School were found to have active trachoma (*2*). Since then, a school treatment program, consisting of the topical administration of a 1 percent oil emulsion of tetracycline in diagnosed cases in school children, has not significantly altered the prevalence rate. The drug was instilled into each eye three times a day for 1 school week a month for 6 consecutive months as recommended by the World Health Organization Expert Committee on Trachoma (*4*). In a survey conducted during the fall of 1962, 71 percent of the Blackwater first graders had active disease.

Methods

During the spring of 1963, an effort was made to examine all occupants of all households in Blackwater. In a house-to-house survey, each person was examined with a hand illuminator and 2× magnifying loupe and was assessed with respect to trachoma according to the criteria presented in the Trachoma Manual and Atlas (*5*) of the Division of Indian Health, Public Health Service.

The biomicroscopic findings on survey participants who were also seen at the Sacaton

While an epidemic intelligence officer with the Communicable Disease Center, Dr. Foster was assigned to the Public Health Service Indian Hospital, Phoenix, Ariz., and the Francis I. Proctor Foundation for Research in Ophthalmology, University of California, San Francisco. He is now with the department of medicine, San Francisco Medical Center.

hospital were obtained. This group consisted of 15 students with active trachoma examined by Dr. Phillips Thygeson, author of the Trachoma Manual (*5*), and 109 adults who voluntarily participated in a vision screening program of the department of ophthalmology of the Public Health Service Indian Hospital at Phoenix.

In order to determine the presence or absence of a relationship between the prevalence of trachoma and the environment, a health rating was established by combining the observations of a physician, a Public Health Service nurse, and a sanitarian aide on the personal hygiene, utilization of health services, and environmental sanitation for each household. The ratings of good, fair, and poor are relative for the population under study.

Results

Of the total population of 434 persons, 404 (93.1 percent) were examined for trachoma. Of these 404 persons, 44 (10.9 percent) had clinical signs of active infection. An additional 131 or 32.4 percent, had inactive (healed) disease. The total trachoma prevalence rate was thus 43.3 percent. The age prevalence pattern for active and inactive trachoma is presented graphically in the chart. Age-specific rates for children under 20 with active trachoma (table 1) indicate a maximum prevalence rate of 36 percent in the age group 8–9 years.

In children under 16, the prevalence rate of active trachoma for the 98 boys (25.5 percent) was significantly higher than for the 122 girls (14.0 percent) at the 0.05 level of significance (Yates corrected $x^2=3.99$, $0.04 < P < 0.05$). The excess trachoma in boys was limited to the young school age group and appeared to be associated with close contact in wrestling.

Table 1. Prevalence of active trachoma in persons under 20 years of age, Blackwater, Ariz., spring 1963

Age (years)	Number of persons	Number of cases	Percent
0–1	28	0	0.0
2–3	29	6	20.7
4–5	30	5	16.7
6–7	36	10	27.8
8–9	25	9	36.0
10–11	27	5	18.5
12–13	28	5	17.9
14–15	17	2	11.8
16–17	15	1	6.7
18–19	7	0	.0

Table 2. Distribution of active trachoma in children under 16, by household, Blackwater, Ariz., spring 1963

Number of children in household	Number of cases per household					
	0	1	2	3	4	5
1	7	2				
2	6	2				
3	9	2	1	1		
4	1	1	1		1	
5	3		1	1		
6	6	2		1		
7	1	1	1			1
8		2			1	
9	1					

NOTE: Two cases occurred in the over 16 age group and are not included in the table.

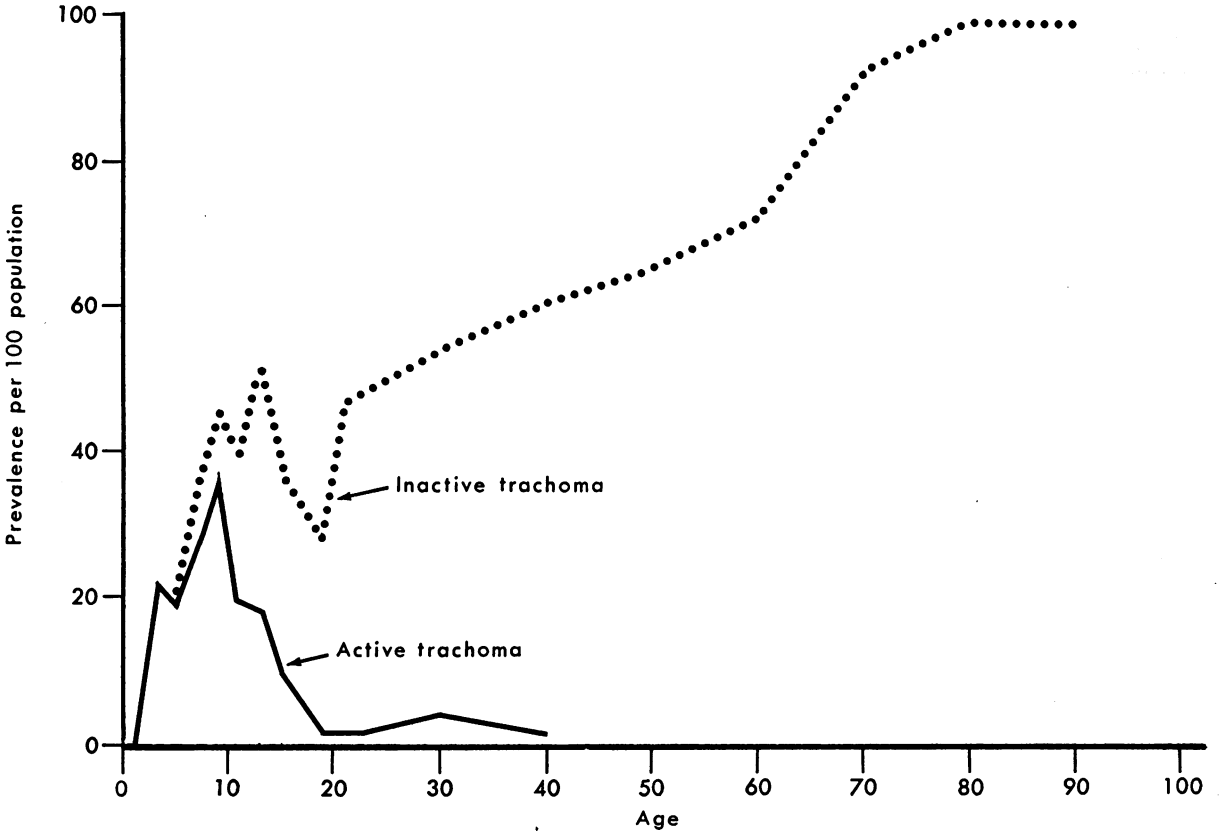
Active trachoma was found in 24 households, located in all areas of the Blackwater community. Multiple cases, noted in 10 families, accounted for 30 of the 44 community cases. The maximum number of cases diagnosed in a household, five, was in a family of nine, seven of whom were children. The distribution of active cases by household in the under 16 age group is presented in table 2.

The biomicroscopic findings in 15 children with active trachoma are summarized here according to the World Health Organization's system of trachoma classification (*4*).

Findings	*Slight* +	*Moderate* ++	*Severe* +++
Follicular hypertrophy	5	9	1
Papillary hypertrophy	3	12	0
Cicatrization	2	1	0
Pannus	7	8	0
Corneal infiltrates	7	5	0

One hundred and nine adults were seen in the vision screening program and were examined with the biomicroscope. Sixty-six, or 60.6 percent, had inactive (healed) trachoma. The distribution of these cases by age groups is shown below.

Age prevalence pattern for active and inactive trachoma, Blackwater, Ariz., spring 1963



Age (years)	*Number of persons*	*Number of cases*	*Percent*
30–39	27	11	40.7
40–49	26	14	53.8
50–59	24	17	70.8
60–69	32	24	75.0
Total	109	66	60.6

Eleven of the 66 adults with inactive trachoma had pannus of 5 mm. or more. This involvement of the central cornea produced a decrease in visual acuity in seven persons. Trachoma was etiologically related to one of three cases of severe visual impairment.

Households with a poor health rating (table 3) had a higher rate of both active and inactive trachoma than households with good and fair health ratings. There was little difference, however, in the prevalence of active trachoma in the homes given a good rating compared with those given a fair rating.

Table 3. Percent of trachoma cases by household health rating, Blackwater, Ariz., spring 1963

Rating	Total trachoma	Active cases	Inactive cases
Good	51.7	9.5	42.2
Fair	46.5	7.6	38.9
Poor	62.8	17.7	45.1

Discussion and Summary

In Blackwater, Ariz., active trachoma is predominantly a disease of childhood. There is a significant reservoir of infection in preschool children. This is probably the reason why school-oriented treatment programs have not controlled the disease.

The data show a clustering of disease activity within specific family groups. Associated with the close household contacts inevitable in a crowded environment, they support the concept

that intrafamilial spread is the predominant mode of transmission. Until laboratory confirmation of transmission routes is available, however, the commonly held theories of transmission—use of common towels, the sleeping of several children in one bed, contacts with flies as vectors, or transfer of the virus as a fellow traveler with acute bacterial eye infections—must remain hypothetical.

Four hundred and four Pima Indians living in Blackwater, Ariz., were examined for trachoma in a house-to-house survey. Active trachoma was diagnosed in 44 persons, a prevalence rate of 10.9 percent. An additional one-third of the population showed signs of previous infection with trachoma. The maximum age-specific prevalence rate of active trachoma, 36 percent, occurred in 8- and 9-year-olds.

The visual disability in the adult population and the quantitative biomicroscopic evidence of potentially disabling disease in the children indicate that trachoma is a significant problem for the Pima Indians of the Blackwater community.

Followup

Following this survey a home treatment program of active cases was instituted, using the drug schedule described for school therapy. From April through September 1963, monthly visits were made to each household with cases of active infection to deliver the medicine and to instruct the mother in the proper method of drug administration.

Twelve months after the completion of therapy, biomicroscopic examination of the 26 first-grade children attending the Blackwater School by Dr. Douglas Powers, Phoenix area ophthalmologist, revealed 5 cases of active trachoma, a prevalence of 19 percent. This decline in the first-grade prevalence rate from the 71 percent of 1962 suggests that progress is being made in control of active trachoma in the Blackwater community.

REFERENCES

(1) U.S. Senate: Contagious and infectious diseases among Indians. U.S. Senate Document 1038. 62d Cong., 3d Sess., 1912, pp. 62–63.

(2) Thygeson, P., and Dawson, C.: Ophthalmological problems of the American Indians. Trans Pacif Coast Otoophthal Soc 49–62 (1959).

(3) Forester, W. G., and McGibony, J. R.: Trachoma. Amer J Ophthal 27: 1107–1117 (1944).

(4) World Health Organization Expert Committee on Trachoma: Third report. Technical Report Series No. 234. Geneva, 1962.

(5) Thygeson, P.: Trachoma manual and atlas. PHS Publication No. 541. U.S. Government Printing Office, Washington, D.C. Revised 1960.

Artificial Sweeteners

A review of recent studies on artificial sweeteners shows that they are safe as presently used.

The review was made by the Food and Drug Administration because of recent questions regarding the safety of artificial sweeteners, specifically sodium cyclamate. Scientific studies of the extended use of artificial sweeteners in various amounts will continue and will be evaluated in accordance with current use.

The Food and Nutrition Board of the National Academy of Sciences—National Research Council in 1955 recommended that artificial sweeteners be used in special-purpose foods for those who must restrict their intake of sugar and total food energy. The council's study, however, cited evidence that cyclamates may produce a mild laxative effect at intakes of 5 grams or more per day and suggested the need for additional studies of the safety of cyclamates when used at the higher levels.

Within the past year, the Food and Drug Administration has received new experimental data on the safety of cyclamates, including animal studies, tests involving ingestion by children, and other data. The Bureau of Medicine and Division of Toxicological Evaluation have reviewed these studies and concluded that there is no evidence that cyclamates at present use levels are a hazard to health.