Texas Preventable Disease
NEWS

Vol. 46, No. 25
June 21, 1986

contents:

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MURINE TYPHUS IN TEXAS*

Murine (endemic or flea-borne) typhus is caused by *Rickettsia typhi* (*R. mooseri*). It usually is transmitted to man by the inoculation of *R. typhi*-infected feces from a rat flea, *Xenopsylla cheopis*, which defecates on the human host during the feeding process. Scratching associated with the flea bite facilitates the inoculation of infected feces into the site or into skin abrasions. Studies of cases in Texas in the 1960s have suggested that the cat flea, *Ctenocephalides felis* may also serve as a vector.[1,2]

Previous epidemiologic studies of murine typhus have been limited to a small number of patients, cases that were confirmed by the nonspecific Weil-Felix test or cases confirmed by the complement fixation test which lacks sensitivity.[2,3,4] This report summarizes the clinical manifestations and descriptive epidemiology of 200 confirmed murine typhus cases occurring in Texas from 1980 through 1984.

MATERIALS AND METHODS

Reports of possible murine typhus cases were obtained through a passive surveillance system and through requests from private physicians for murine typhus serology tests performed by the TDH Bureau of Laboratories. Murine typhus has been a reportable disease in Texas for over 40 years. Clinical and epidemiologic information was obtained from interviews with the patients and their physicians. Information gathered for each case included: age, sex, race, county of residence, symptoms experienced, location of the rash (if any), dates of hospitalization (if any), dates of antibiotic therapy, history of a flea bite, and presence of rodents in the patient's environment.

A confirmed case of murine typhus was defined as a patient having: 1) a four-fold rise in titer between acute and convalescent serum samples to typhus group antigen by indirect fluorescent antibody (IFA) or latex agglutination (LA) testing or 2) a single high titer of $\geq$1:128 by IFA or LA in a patient with a clinically compatible illness. The specificity of the IFA test for rickettsial diseases is 100% at titers $\geq$1:64.[5] The IFA and LA tests were performed by the TDH Bureau of Laboratories, the only laboratory in Texas performing these tests, using methods previously described.[6,7] All incidence determinations were based on population figures from 1980 census data.[8]

RESULTS

Three hundred fifty-seven possible cases of murine typhus were reported from 1980 through 1984. The annual number of reported possible cases ranged from 63 to 76, an average of 71 possible cases a year. Serum specimens on 219 individuals were available for testing. Two hundred patients met the case definition and are the basis of this report. Sixty-two cases were confirmed by a four-fold rise in IFA titer, and 133 cases were confirmed by a single high IFA titer $\geq$1:128. One hundred twenty-five of these 133 cases had IFA titers $\geq$1:512. Frequency distributions of symptoms, age, race, and sex were similar for cases confirmed by a four-fold rise in IFA titer and those with a single high IFA titer. A higher percentage of cases confirmed by a four-fold rise in IFA titer were hospitalized than cases with a single high IFA titer (81% vs 69%, respectively). The LA test was performed on sera from 120 cases. Eighty-seven percent of the IFA and LA results for serum samples from patients agreed. Serum samples from two

*Adapted from: Taylor JP, Betz TG, Rawlings JA. Epidemiology of Murine Typhus in Texas. JAMA 1986; 255:2173-6. Copyright 1986, American Medical Association.

patients with four-fold rises in LA titers gave normal IFA titers, and three serum samples from patients had elevated LA titers (≥1:128) but normal IFA titers (<1:128). Serum samples from ten patients were elevated (≥1:128) by the IFA test alone.

The age and racial distribution of the confirmed cases is presented in Figure 1. Ninety-eight cases were male. The age of the cases ranged from 1 to 90 years with a median of 35 years. Annual incidence increased with age and was substantially higher in Hispanics within each age group.

Figure 2 shows the geographic distribution of the cases. Fifty-nine percent of the cases resided in three counties in southern Texas -- Nueces (57 cases), Hidalgo (39 cases), and Cameron (22 cases). Average annual incidence rates were 4.2/100,000 and 2.7/100,000 in residents of Nueces and Hidalgo Counties, respectively.

Cases had onset in all months with 40% occurring in April, May, or June (Figure 3). The incidence peak occurred in June in four of the five years. This seasonal peak was more evident in residents of south Texas. Eighty-nine percent of the cases residing south of the 29th latitude (approximately 30 miles south of Bexar County) experienced onset of symptoms in April through June compared with only 27% of cases residing north of the 29th latitude. Although there appears to be an additional peak in the number of cases in September and October, this peak was not evident in the yearly data.

The frequency distribution of symptoms is presented in Table 1. All the cases experienced a fever. Over 50% had a rash, appearing an average of 5.5 days after the onset of fever. In five cases, the rash preceded the onset of fever; in 17 cases the rash occurred on the date of onset of fever. It was described as macular in 55% of the cases, maculo-papular in 35%, and papular in 10%. It was observed on the trunk (82%), legs (63%), arms (57%), and/or face (18%) and on the trunk alone in 23% of the cases with a rash. Only 4.5% of the cases experienced a rash on the palms or soles.

One hundred seventy (85%) of the cases were hospitalized. Seventy-six percent of the cases were treated with tetracycline alone, 9% received chloramphenicol alone, and 3% received both. Twelve cases were treated with antibiotics not recognized as being effective against *Rickettsia typhi*, and nine cases received no antibiotic treatment. Two women, 41 and 77 years of age, died, giving a case-fatality rate of 1.0%.

Only 51 cases (26%) recalled a flea bite before onset of symptoms. Fifty-eight cases (29%) noted rodents present in the household or surrounding environment.

Clustering of cases in single households did occur. In one family, all three members experienced an *R. typhi* infection during November 1982. In a second family, two members experienced illness in July 1983.

DISCUSSION

A total of 5,401 murine typhus cases were reported in the United States in 1944.[9] Since that time, a marked decrease in the number of reported US cases has occurred. Control programs instituted by the US Public Health Service consisting of DDT dusting, rat-proofing, and rat poisoning may have contributed to this decline. In 1979, only 70 cases were reported in the United States.[10] Fifty-nine of these cases resided in Texas. Other states reporting cases included California, Hawaii, Louisiana, Maryland, and Tennessee.[10] Although a decrease in the number of reported cases of murine typhus has occurred in the United States, murine typhus continues to be an important public health problem in Texas. Aggressive case finding and a favorable ecosystem for flea and rodent populations are possible reasons for the clustering of cases in southern Texas.

The signs and symptoms noted for the Texas cases reported here are dissimilar to those recorded in a 1969 Texas study on murine typhus.[2] Fever was noted more frequently in the current cases (100% vs 93%) as was headache (78% vs 64%), rash (58% vs 25%), and anorexia (45% vs 7%). Only 30% of the current cases had onset of symptoms during the months of July through November. Eighty-six percent and 65% of cases described in Georgia and Virginia, respectively, had onset of symptoms in these five months.[11-13] Another finding that differs from previously described studies is the age and sex distribution. Twenty-five percent of Texas cases were 60 years of age or older compared with 8% of 257 Virginia cases and 5% of 126 cases in Georgia. A higher percentage of Texas cases were female (51%) compared with those in Virginia (41%) or Georgia (34%). The differences may be due to the geographic location of the states or use of different diagnostic criteria in defining cases.

The current study provides the first report, to our knowledge, on the epidemiology of murine typhus cases confirmed by modern serologic tests and demonstrates the presence of an endemic focus in Texas. Endemic foci may exist in other states where only sporadic cases are reported. The epidemiology of murine typhus in Texas could provide a useful comparison for future studies of cases in other areas of the United States.

The adaptation of the original report was prepared by Jeffery P. Taylor, MPH, Staff Epidemiologist, Bureau of Epidemiology, TDH. References available upon request.

Figure 1.
Murine typhus average annual incidence rates
per one million population, by age and race, Texas, 1980-1984

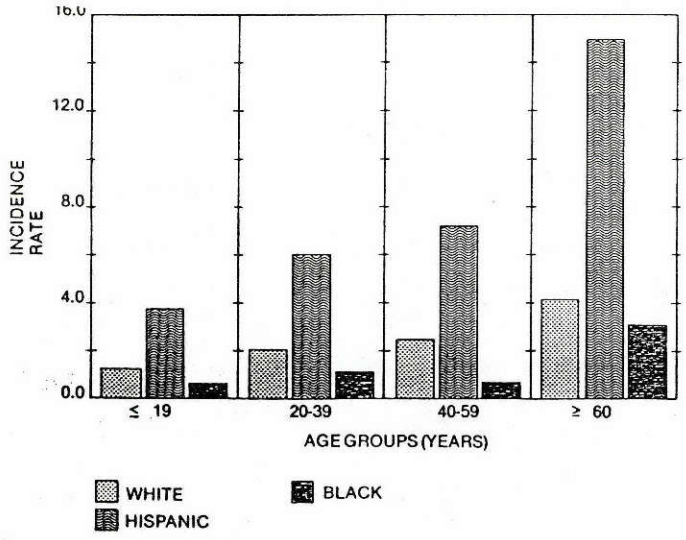

Figure 2.
County of residence of 200 murine typhus cases,
Texas, 1980-1984

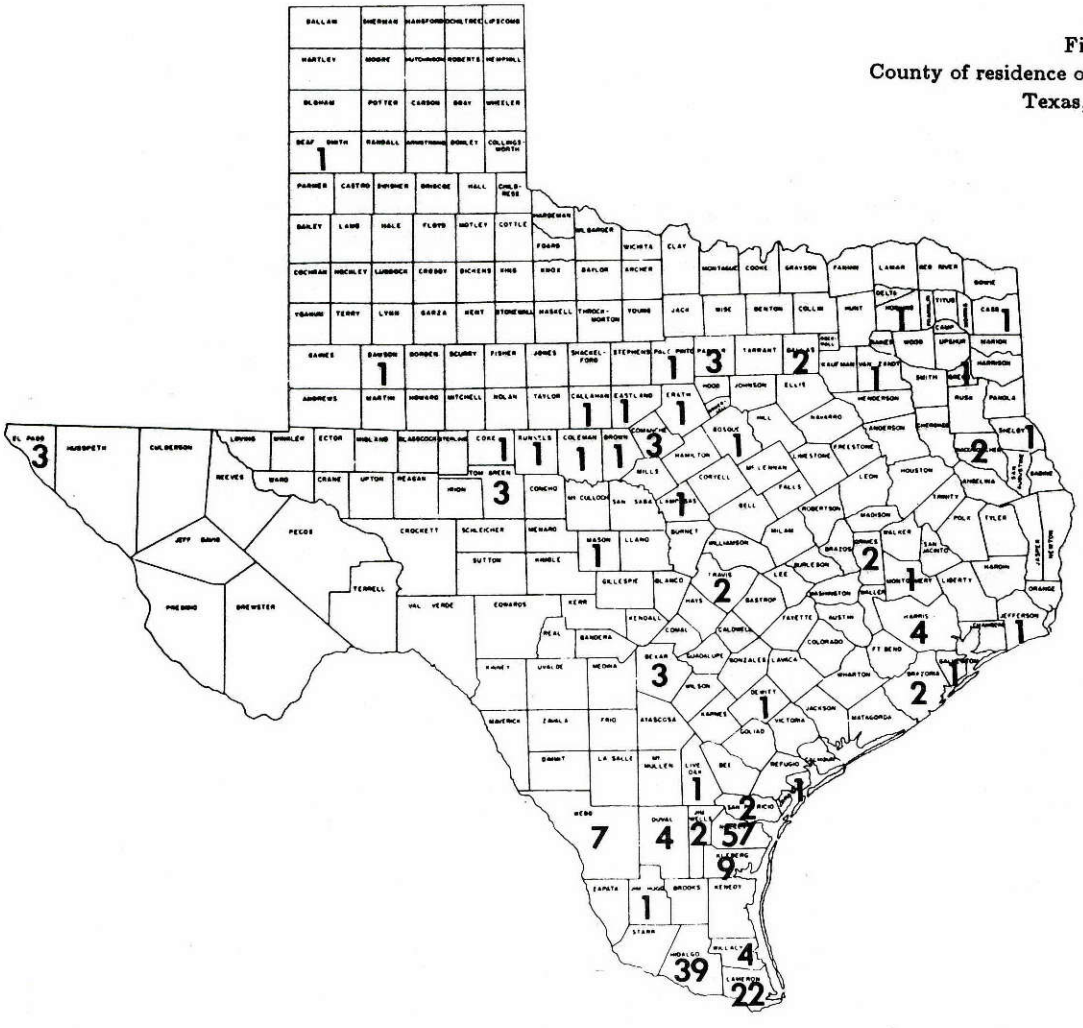

Figure 3.
Month of onset of symptoms
in 200 murine typhus cases,
Texas, 1980-1984

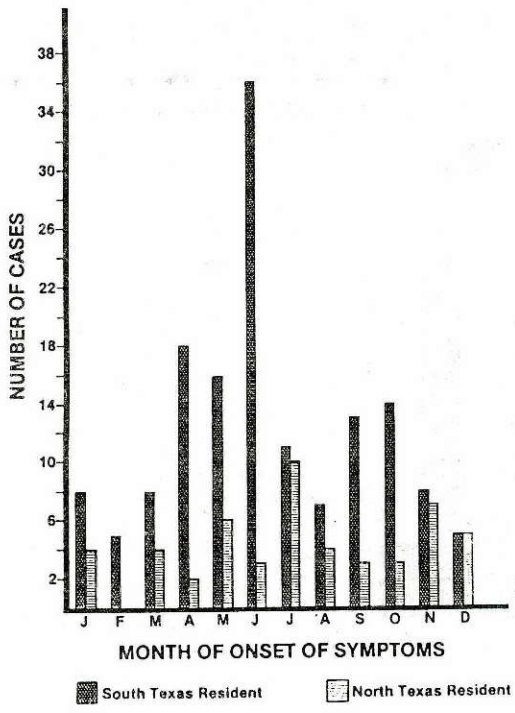

Table 1.
Frequency distribution of symptoms in
200 murine typhus cases,
Texas, 1980-1984

SYMPTOM	NUMBER (%)
Fever	200 (100.0)
Headache	154 (77.8)
Malaise	130 (65.6)
Rash	115 (58.1)
Anorexia	89 (44.9)
Nausea	88 (44.3)
Myalgia	68 (34.3)
Photophobia	20 (10.1)

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