ST. LOUIS ENCEPHALOMYELITIS IN HERMOSILLO, SONORA, MEXICO

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This paper analyzes an epidemic of St. Louis encephalitis that occurred in 1974 in northwestern Mexico, an area where SLE virus activity had previously been reported. To help prevent or effectively limit future outbreaks, the authors recommend adopting several epidemiologic surveillance measures in the affected region.

Introduction

The State of Sonora experienced a significant outbreak of human arboviral disease in 1974. During the first half of the year seven deaths attributed to neurological disorders occurred among children 4 months to 14 years of age residing in various parts of the state.

At about the same time (January-August 1974) St. Louis encephalitis virus was isolated from mosquitoes collected in desert valleys of southern California in the United States, and a case of human disease diagnosed as possible St. Louis encephalitis occurred in the State of Texas (1). Tests of humans, equines, birds, and mosquitoes in the U.S. states of Arizona and California (2) detected no eastern equine encephalitis (EEE) activity and very little western equine encephalitis (WEE) activity.

It rained in central Sonora around the City of Hermosillo during July 1974; and although there was no rain in this area from 1 August until 24 September, temperatures were unusually high and considerable increases were noted in local mosquito populations.

Between 1 August and 21 September 1974 a total of 51 hospital cases which showed a clinical picture compatible with encephalomyelitis occurred in Sonora. The first of these cases developed among residents of the City of Hermosillo and probably also among residents of La Costa—a region some distance to the west, toward the Gulf of California (see Figure 1).

On 19 September 1974 several of the authors began a visit to Hermosillo and other affected areas of northwestern Mexico aimed at confirming the cause of this outbreak, which was presumed to be of arboviral origin. The object of this article is to present findings connected with that work.
Background Information

Description of the Area

The Municipality of Hermosillo, situated in central Sonora, has a population of approximately 273,000. Most of the people (some 205,000) are concentrated in the City of Hermosillo, the municipal seat. The region, which makes extensive use of irrigation, can generally be described as hot and dry (see Figure 1). Water for the irrigation system comes mainly from the Abelardo Rodriguez Dam located east of the city; additional water is provided by wells dug into the 100 km stretch of land between Hermosillo and the Bay of Kino in the Gulf of California. The lands of the city are basically flat, the main exception being recently settled areas on the outskirts where there are slight elevations. To the south, the city is bounded by a dry river bed (whose diverted waters supply the dam’s reservoir) and by two irrigation canals that begin at the dam. Besides carrying water for nearby farmlands, the canals also contain some city sewage—especially during periods when water from other sources is in short supply.

Throughout the municipality poultry raising (mostly of chickens and turkeys) is a highly developed enterprise, one whose prosperity is demonstrated by the presence of roughly two million birds. By comparison, other types of livestock—such as horses, cattle, and swine—are very scarce.
Serologic Background (1960-1967)

A group of blood samples collected in 1960 from 174 residents of Sonora showed a high rate of positive response when tested by hemagglutination inhibition (HI) for antibodies against St. Louis encephalitis (SLE). The samples, collected in the course of a serologic survey and examined at Hermosillo (3), yielded relatively few or no positive HI responses with several other arboviral antigens. In all, 24 sera (13.7 per cent) only yielded positive results with SLE antigen; none reacted positively with EEE; one per cent gave a positive response with WEE; and 3 and 4 per cent, respectively, yielded a positive response with dengue I and dengue II. It is interesting to note that some of the 24 sera positive for SLE antibodies were obtained from subjects as young as 14 years of age. Neutralization tests conducted with two of these 24 sera confirmed the positive HI results. Also, neutralization tests conducted with sera from 55 horses of the region showed that 20 per cent reacted positively with WEE and 11 per cent with SLE, but none showed a positive response with either EEE or Venezuelan equine encephalitis (VEE) (4).

Surprising results were also obtained from a serologic survey conducted in early 1967 (5). Serum samples were collected from 133 in-patients at a home for the mentally ill located in a Hermosillo suburb. The subjects, 63 per cent of whom were natives of the State of Sonora, had resided at the home for periods ranging from one month to roughly three years. The sera obtained from them were tested by hemagglutination inhibition with SLE, WEE, EEE, Bunyamwera, ilheus, and yellow fever antigens. Fifty per cent gave a positive response with SLE, only 3 per cent reacted positively with WEE, and none showed a positive response with any of the other antigens. In addition, out of 27 patients whose sera were subjected to a neutralization test for SLE antibody, 52 per cent showed a positive response.

Clinical Observations (1967-1971)

In July 1967 three patients examined in Hermosillo showed clinical pictures compatible with viral encephalitis. Serum samples from two of these patients revealed SLE antibody titers of $\geq 1:40$.

On 6 November 1967 a six-year-old child died at the state hospital in Hermosillo, after experiencing symptoms of neurological illness for 38 days. The histopathologic diagnosis was viral encephalitis.

In August 1970 seven children in Hermosillo ranging in age from 10 months to 4 years showed symptoms of encephalomyelitis and two died.

In August 1971 a Sonora woman 27 years of age became ill with a disease diagnosed as viral encephalitis. A resident of Bacadehuachi, a village of east-central Sonora about 100 km west of the Chihuahua state line, she was hospitalized in Hermosillo. The following month (September) a nine-month-old infant living in Hermosillo developed a disease of the central nervous system that led to coma and was diagnosed as viral encephalitis.

The Encephalitis Epidemic of 1972

During the first two weeks of August 1972, temperatures in the shade ranging between 24° and 42.8°C were registered in southern Sonora and northern Sinaloa; rainfall totalling 64.2 cm was recorded for the period, a figure exceeding the average annual rainfall in this region.

Between 21 August and 19 September 1972, seven municipalities in southern Sonora experienced an outbreak of disease affecting persons of all ages and involving 4,476 reported cases (6). The symptoms

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*In these 1960 tests a HI titer equaling or exceeding 1:20 was considered positive, and a titer of 1:10 was considered equivocal.*
consisted of fever (in 94.8 per cent of the cases), headache (84.5 per cent), lethargy (50 per cent), tremors (6 per cent), convulsions (4 per cent), neck pains, and nausea. Incidence varied from place to place, the highest (7 per cent of the population) being reported in the village of Huatabampo. Overall, the rate of mortality was 2.2 deaths per 1,000 cases.

In addition, thirteen southern Sonora municipalities (including the seven with human cases) experienced outbreaks of encephalomyelitis among equine animals that involved an estimated 90 per cent mortality and caused 1,167 deaths.

HI testing of 33 human serum samples, taken at the acute stage of the disease from residents of two affected towns (Huatabampo and Navojoa), showed 26 to be positive for VEE antibodies. This fact, together with the events just described, led to the conclusion that the region had experienced an outbreak of VEE.

At the time of this outbreak, municipalities in a part of northern Sinaloa adjoining Sonora were experiencing a similar outbreak that affected both equines and humans (7). An outbreak of this kind had also occurred in Sinaloa the previous year.

Hospital and Vital Statistics

Between 1969 and 1973 a total of 57 patients with symptoms of meningoencephalitis were hospitalized in Hermosillo. Three of these patients died. In all, there were clinical grounds for arriving at a diagnosis of probable viral encephalitis in 26 cases.

With regard to registered deaths, between 1968 and 1971 no Sonora death certificates cited viral encephalitis as a possible cause. However, six 1972 Sonora certificates singled out this disease as the cause of death.

Materials and Methods

When the forementioned investigation began in mid-September 1974, a number of measures (including aerial spraying of mosquito breeding grounds with malathion) were already being taken to bring the situation under control. Data collection activities begun in connection with this investigation were as follows:

1) A review was made of the clinical histories of patients recently admitted to the state hospital in Hermosillo with illness diagnosed as encephalomyelitis or meningencephalitis.

2) The geographic origins of suspected encephalitis cases occurring during the outbreak were pinpointed on a map.

3) On the basis of the date when each case had begun to show symptoms, a time-chart of the outbreak was drawn up.

4) Unreported cases were actively sought in several affected areas. As a part of this search, house-by-house visits were made in a rural community near Hermosillo that had apparently been the hardest hit.

5) Two kinds of small-scale inquiries were conducted. On the one hand, six Hermosillo pediatricians were contacted by telephone to find out whether an unusual amount of attention was being devoted to cases of neurological disease. On the other, an investigation was made of absentee records at six Hermosillo primary schools—four in affected areas and two in areas that were apparently not affected.

6) Finally, an extensive survey was carried out for purposes of monitoring arbovirus activity. This involved collecting samples of material for virus isolation attempts currently in progress and obtaining sera to test for VEE and SLE antibodies. Hemagglutination inhibition tests were performed with both VEE and SLE at the Arbovirus Laboratory of the National Diagnostic and Reference Center, Mexican Institute of Health and Tropical Diseases; also, neutralization (N) and complement fixation (CF) tests for SLE antibodies were conducted at two separate laboratories in the United States.
The search for arbovirus involved a variety of sources—including mosquitoes, ticks, and domestic poultry—but was primarily focused on human subjects. Samples of human blood were obtained from suspected encephalitis cases, from contacts of patients, and from apparently healthy persons in areas where no cases of neurological disease had been reported. In all, samples were obtained from 276 apparently healthy persons (including contacts) and from 23 patients. In the case of eight patients it was possible to obtain paired serum samples, one taken during the acute phase of the disease and the other during convalescence.

Results

Epidemiologic Findings

As previously mentioned, 51 hospital cases of suspected encephalitis occurred in the Municipality of Hermosillo between 1 August and 21 September 1974. Over half of the patients came from the City of Hermosillo, most of them being people with low living standards from the city's poorer sections. In general, cases were widely dispersed about the city, but were clearly absent from some of the wealthiest sections (see Figure 2). Parts of the city where significant numbers of cases arose included the settlements of Palo Verde and Villa de Seris to the south (seven cases) and those of Choval, Olivares, and Balderrama to the northwest (seven cases).

The cases outside the city were also widely scattered, occurring in 13 lightly populated settlements, villages, and ranches located near Hermosillo or west of the city toward Kino Bay (see Figure 1). Two of the places worst affected were La Manga, a small community about 8 km west of Hermosillo where there were five hospital cases and three deaths, and the area of La Costa, a region farther west where there were six hospital cases.

The times at which the cases occurred suggest a period of sustained transmission lasting some eight weeks, with a relatively high level of activity in early September—the period when five of the ten fatal cases occurred. Overall, the rate of mortality was approximately 20 per cent among hospitalized patients for whom intensive care units were not available (see Figure 3).

The registered rate of clinical morbidity was approximately 19 cases per 100,000 inhabitants; the actual rate of cases with moderate symptoms, however, may well have been much higher. This latter conclusion has been inferred from a house-to-house survey of the 772 inhabitants of the community of La Manga. Besides the five La Manga hospital cases previously mentioned, the survey found nine other persons with symptoms—including fever, headache, nausea, and vomiting—that suggest a neurological origin. Laboratory testing of the 276 sera from apparently healthy Hermosillo subjects, which is currently underway, should provide a basis for better evaluation of the epidemic at the subclinical level.

More than half of the 51 hospital-treated patients were males, the ratio of male patients to female patients being 1.3 to 1 (see Table 1). This male predominance was especially marked among the 35 patients (69 per cent of the total) who were under 16 years of age. Table 1 also shows how the 51 hospital cases were distributed among infants, among two-year age groups in the one to ten-year range, among five-year age groups in the 11 to 40-year range, and among ten-year age groups over 40. As may be seen, the distribution of cases was fairly uniform up to about age 10. Thereafter the number of cases diminished rapidly, so that cases among the older five-year and ten-year age groups were relatively scarce.

Another noteworthy point is that individual families did not experience multiple cases, the patients being isolated in this respect.

Attendance records at four primary schools
FIGURE 2—A map of the City of Hermosillo. Each dot shows the place of residence of a person hospitalized with encephalitis in 1974.
in the areas most affected did not show any unusually high level of absences between 2 and 23 September 1974. Nor did the six pediatricians interviewed report any increase in the amount of medical attention given to patients with neurological symptoms. However, the pediatricians did report an increase in the number of consultations prompted by mosquito bites in August and September 1974.

TABLE 1—Hospital cases of encephalitis in the Municipality of Hermosillo, by age and sex, 1974.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Cumulative total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>0-1</td>
<td>0</td>
<td>—</td>
<td>3</td>
<td>13.7</td>
</tr>
<tr>
<td>1-2</td>
<td>5</td>
<td>17.2</td>
<td>3</td>
<td>13.7</td>
</tr>
<tr>
<td>3-4</td>
<td>3</td>
<td>10.3</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>5-6</td>
<td>4</td>
<td>13.8</td>
<td>3</td>
<td>13.7</td>
</tr>
<tr>
<td>7-8</td>
<td>4</td>
<td>13.8</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>9-10</td>
<td>1</td>
<td>3.5</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>11-15</td>
<td>4</td>
<td>13.8</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>16-20</td>
<td>1</td>
<td>3.5</td>
<td>2</td>
<td>9.1</td>
</tr>
<tr>
<td>21-25</td>
<td>2</td>
<td>6.9</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>26-30</td>
<td>0</td>
<td>—</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>31-35</td>
<td>3</td>
<td>10.2</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>36-40</td>
<td>0</td>
<td>—</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>41-50</td>
<td>0</td>
<td>—</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>51-60</td>
<td>1</td>
<td>3.5</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>61-70</td>
<td>0</td>
<td>—</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>&gt;71</td>
<td>0</td>
<td>—</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>3.5</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100.0</td>
<td>22</td>
<td>99.9</td>
</tr>
</tbody>
</table>
No epizootics among wild or domesticated animals were observed, either before or during the outbreak in the human population.

**Clinical Findings**

A severe and complex clinical picture was observed in most of the hospital cases, the dominant features being fever, vomiting, lethargy, stiff neck, and increased cells and proteins in the cerebrospinal fluid (see Table 2). Tracheotomies were performed on five patients. The length of hospitalization ranged from one to 33 days and averaged 10 days. The illness lasted anywhere from three to 42 days, its average duration being 15 days. In this regard, it was very significant to find one patient with neurological symptoms of 30 days' duration who presented a picture of relapse, and whose serologic reaction to SLE viral antigen was over 1:640; this serum also showed a titer of 1:160 for VEE, the strongest response to VEE shown by any of the 15 sera yielding positive reactions (see Table 3).

**Laboratory Findings**

Sera from all 23 patients tested yielded a positive HI response to SLE antigen, but only 65 per cent responded positively to VEE antigen (see Table 3). Moreover, 17 of these sera (74 per cent) yielded titers equalling or exceeding 1:40 with SLE, while only three (13 per cent) reacted this strongly with VEE. However, the most revealing findings, were obtained with the paired serum samples, which showed a significantly increased HI response to SLE antigen without exhibiting a comparably increased response to VEE (see Table 4).

A fairly close correlation was also observed between the HI findings obtained with 12 of these sera in Mexico and findings obtained by complement fixation and neutralization tests with the same sera at two laboratories.

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**TABLE 2—Symptomology of 45 of the patients hospitalized with encephalitis in Hermosillo, Sonora (1974).**

<table>
<thead>
<tr>
<th>Sign or symptom</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
</tr>
<tr>
<td>Fever</td>
<td>39</td>
</tr>
<tr>
<td>Vomiting</td>
<td>31</td>
</tr>
<tr>
<td>Stiff neck</td>
<td>30</td>
</tr>
<tr>
<td>Lethargy</td>
<td>29</td>
</tr>
<tr>
<td>Babinsky's sign</td>
<td>27</td>
</tr>
<tr>
<td>Kernig's sign</td>
<td>25</td>
</tr>
<tr>
<td>Increased deep reflexes</td>
<td>24</td>
</tr>
<tr>
<td>Headache</td>
<td>19</td>
</tr>
<tr>
<td>Poor coordination</td>
<td>17</td>
</tr>
<tr>
<td>Tremors</td>
<td>15</td>
</tr>
<tr>
<td>Anorexia</td>
<td>13</td>
</tr>
<tr>
<td>Weakness or exhaustion</td>
<td>13</td>
</tr>
<tr>
<td>Diminished deep reflexes</td>
<td>11</td>
</tr>
<tr>
<td>Nystagmus</td>
<td>10</td>
</tr>
</tbody>
</table>

**Laboratory data:**

- Increased cells in cerebrospinal fluid: 36 (80.0)
- Pandy's test positive: 29 (64.4)
- Leukocytosis: 13 (28.9)

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**TABLE 3—Hemagglutination inhibition observed in 23 sera from suspected viral encephalitis cases in Hermosillo, Sonora (1974).**

<table>
<thead>
<tr>
<th>Antigen</th>
<th>No. of sera tested</th>
<th>No. of positive sera&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEE</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>SLE</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Titers of positive sera</th>
<th>≤1:20</th>
<th>≥1:40</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>VEE</td>
<td>12</td>
<td>52</td>
</tr>
<tr>
<td>SLE</td>
<td>6</td>
<td>26</td>
</tr>
</tbody>
</table>

<sup>a</sup>A titer of 1:10 or over was considered positive.
TABLE 4—Hemagglutination inhibition observed in paired serum samples from patients with probable cases of viral encephalitis in Hermosillo, Sonora (1974).a

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Antigens</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLE</td>
</tr>
<tr>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>&gt;640</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

aA titer of 1:10 or over was considered positive.

in the United States (see Table 5). The complement fixation tests were conducted at the Department of Health Services in Phoenix, Arizona, and the neutralization tests were carried out at the Arbovirus Division of the U.S. Center for Disease Control at Fort Collins, Colorado. The neutralization tests did not demonstrate an increased SLE response in the paired serum samples, but the complement fixation tests did show an increased response. Overall, in some eight cases the results of these tests provided sufficient evidence to confirm the presence of SLE virus.

On the other hand, sera taken from 27 eight-week-old chickens on a farm near Hermosillo produced no positive HI responses when tested with VEE and SLE antigens, all the resulting titers being less than 1:10.

Discussion

Events of the last 25 years have provided strong evidence of activity by various arboviruses in both animals and man in northwestern Mexico (3). Viral pathogenicity involving dengue, VEE (6), and SLE has been especially prominent. With regard to the latter, there have been growing indications of SLE activity. Some of these have aroused suspicion on clinical grounds, while others—mentioned earlier—have been serologically confirmed (5). It should be added that these findings have been tied in with histopathologic discovery of viral encephalitis lesions, and also with isolation of SLE virus from material obtained in parts of California (U.S.A.) ecologically similar to much of Sonora (1,2). It is thus surprising that these indications of arbovirus circulation and of underlying environmental relationships have gone almost unnoticed—and that therefore these signs were not sufficiently exploited as warning signals for prevention of possible explosive epidemics such as the one which prompted this report. In retrospect, it might even be maintained that the outbreak under investigation could have been prevented, or at least that its control could have been planned from the beginning.

The record clearly shows that local doctors were familiar with clinical pictures of seasonal encephalitis (occurring from July to
November), in which there was an especially
great chance of viral etiology, at least to the
extent that bacterial causes could be elim-
ninated. This picture could therefore have
indicated that low-level endemic viral
encephalitis existed in the area prior to the
outbreak studied.

The clinical data obtained from patients
during the recent outbreak conform to a
pattern of diffuse attack, centering on the
brain, produced by a neurotropic agent.
Furthermore, the HI, CF, and N tests con-
ducted at different laboratories—showing
high SLE antibody titers in single serum
samples and increasing titers in paired
samples—confirmed the presence of SLE
virus and indicated significant circulation of
this virus in Sonora during 1974. The tests
also revealed prompt appearance of anti-
bodies, especially in children, following
disease onset—high SLE antibody titers
being obtained with sera taken from patients
after a developmental period of five to
10 days.

The relatively high disease incidence ob-
served among children under 10, as compared
to the rest of the population, could indicate
decreased susceptibility among older persons.
This would be consistent with the assump-
tion that SLE virus had been circulating
endemically in the area.

One possible explanation as to why more
cases occurred in males than in females is
that males may have tended to be more
frequently exposed to the vector transmitting
the disease.

It has not been possible to determine the
role that poultry or other wild or domestic
animals may have played in this epidemic.
As previously noted, sera from chickens that
were eight weeks old when the outbreak
ended yielded only negative results.

The case-fatality rate (about 20 per cent)
must be regarded as extremely high, es-
specially since all of the patients in question
received hospital care. Furthermore, it must
be assumed that delayed sequelae are likely
to occur in patients who recovered. If, in
addition, one considers the seriousness of the
clinical symptoms—evaluated in terms of
complications requiring tracheotomy, the
incidence of relapses, the long duration of
the illness, and the prolonged periods of
hospitalization required, it must be concluded
that this type of epidemic entails excessive
economic and social costs.

It is significant that sera from patients
in this outbreak showed a positive HI
response to VEE antigen, even though the
rate of positive response and the serum
titers obtained were relatively low. Such re-
sults could have been caused by non-specific
responses, or could have been due to low-
level exposure in areas recently experiencing
VEE transmission. Whatever the case, these
findings require further attention.

In conclusion, it would seem advisable to
establish a minimum system for epidemiologic
surveillance of arboviruses in this area, since
this is the first known instance in which the
country has experienced an SLE epidemic
(8-11). Of course, the feasibility of doing
so must be weighed in terms of both the
costs involved and other existing priorities.

In any case, since it is essential to prevent
this disease from inflicting massive damage,
it would seem desirable to carry out several
measures each year during the July-October
period. These would include capturing
mosquitoes for arbovirus isolation, identifying
and analyzing the frequency of encephalitis
cases, and obtaining paired serum samples
from all clinically suspect cases for purposes
of testing the antibody response to SLE and
other arboviruses. Evaluation of all these
factors could provide a key, first for deciding
when to conduct insecticide spraying
programs to reduce mosquito populations,
and second (once relevant mosquito and
human behavior patterns are understood)
for recommending that the community take
steps to reduce its exposure to mosquitoes.
SUMMARY

This report, which describes an epidemic of St. Louis encephalitis in northwestern Mexico, was prompted by the apparent infrequency of previous Mexican outbreaks of this disease.

The site of the epidemic was the Municipality of Hermosillo in the State of Sonora. This municipality, with a population of about 273,000, is situated in a hot flat area which is naturally dry but which is also well-irrigated. Here, over an eight-week period, 51 persons became ill and were hospitalized with symptoms including fever, vomiting, stiff neck, lethargy, and increased cell/protein levels in their cerebrospinal fluid.

Sera from 12 of these patients were tested for SLE antibodies by hemagglutination inhibition, complement fixation, and neutralization. The results of these tests were positive and showed a fairly high degree of correlation. In addition, paired serum samples showed a significant rise in SLE antibody titers.

Over half of the cases occurred in the City of Hermosillo, the municipal seat; the remainder occurred in 13 outlying areas, most of them quite nearby. Virtually all of the city dwellers affected were residents of low-income districts.

The rate of hospital cases was roughly 19 per 100,000 inhabitants, and the case-fatality rate among these cases was approximately 20 per cent. The ratio of male to female patients was 1.3 to 1; sixty-nine per cent of the patients were under 16 years of age.

At present there is no available evidence linking local animal or bird populations to the epidemic. No epizootics have been detected, and the possible role of the area’s large domestic poultry population remains unclear.

With regard to timing, the epidemic took place between 1 August and 21 September 1974. This interval, when temperatures were unusually high, followed a brief period of rainfall that prompted a considerable increase in the local mosquito population.

It is likely that there had been significant circulation of SLE virus in this area for some time. In view of this, and in view of the need to effectively limit future epidemics, the authors recommend instituting a number of minimum epidemiologic surveillance measures in this region.

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