

Epidemiology of Echovirus 30 Aseptic Meningitis

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DURING 1968, major outbreaks of aseptic meningitis associated with echovirus 30 occurred in the United States. A total of 431 cases of aseptic meningitis associated with echovirus 30 were reported to the National Communicable Disease Center (CDC) from seven of 15 States participating in a reporting system for cases of aseptic meningitis associated with echoviruses. These 431 cases included 116 cases not reported in time to be counted in the annual summary (1) and were 64 percent of the 669 reported cases of aseptic meningitis characterized by isolation of an enterovirus (table 1).

Data from an enterovirus reporting system, established at the CDC in 1961, demonstrate that 1962 was the first time echovirus 30 had been isolated by participating laboratories (table 2). In 1962 and 1965, a few cases were reported and tallied as miscellaneous. In addition, a review of the medical literature confirmed that few outbreaks of echovirus 30 associated aseptic meningitis have been recognized in this country.

Since a hitherto infrequently described event was taking place, a study of epidemiologic and clinical features of selected outbreaks seemed worthwhile. With the cooperation of health officers in Connecticut, California, Washington, Oregon, and St. Louis, Mo., data were obtained on 380 cases of aseptic meningitis associated with echovirus 30. This report presents clinical and epidemiologic data on these cases.

Method

Cases of aseptic meningitis were reported by physicians to the Connecticut, California, Washington, and Oregon State health departments through routine reporting procedures. Following recognition of cases of aseptic meningitis as being caused by echovirus 30 in Washington, an active

Table 1. Isolations of echovirus 30 associated with aseptic meningitis in 15 reporting States, 1968

City or State	Total cases of aseptic meningitis	Cases associated with an enterovirus	Cases associated with echovirus 30
California.....	1,164	424	308
Washington.....	81	74	1 65
New York City.....	272	25	20
Missouri.....	21	20	17
Oregon.....	59	32	2 12
Connecticut.....	17	16	8
Louisiana.....	157	8	1
Others ³	1,220	70	0
Total.....	2,991	4 669	4 431

¹ Includes 25 cases not in this study.

² Includes 5 cases not in this study.

³ New Jersey, Maine, Ohio, Indiana, Virginia, North Carolina, Tennessee, and Texas.

⁴ Includes 116 cases not shown in reference 1.

SOURCE: Reference 1.

Table 2. Number of enterovirus and echovirus 30 isolations, 1961-68

Year	Number of States reporting	Enterovirus isolates	Echovirus 30 isolates
1961.....	40	1,320	0
1962.....	34	620	(1)
1963.....	28	721	0
1964.....	23	459	1
1965.....	23	486	(1)
1966.....	21	308	0
1967.....	19	407	0
1968.....	2 30	749	126

¹ Available data suggest few if any reports.

² Includes isolations made at CDC.

SOURCE: Reference 1.

Table 3. Clinical features of 196 cases of aseptic meningitis associated with echovirus 30 in 1968

Symptoms	Patients asked	Percent answering yes
Headache.....	161	82
Fever.....	123	63
Nuchal rigidity.....	117	60
Vomiting.....	73	37
Nausea.....	52	27
Photophobia.....	42	21
Anorexia.....	38	19
Myalgia.....	24	12
Sore throat.....	16	8
Malaise.....	13	7
Cough.....	10	5
Coryza.....	10	5
Diarrhea.....	10	5
Upper respiratory illness.....	9	5
Abdominal pain.....	8	4
Rash.....	6	3
Conjunctivitis.....	5	3
Convulsion.....	2	1
Ataxia.....	1	1

search was conducted for additional cases in that State. The California State Department of Public Health conducted a special serologic survey of all acutely ill and convalescent patients with encephalitis or aseptic meningitis.

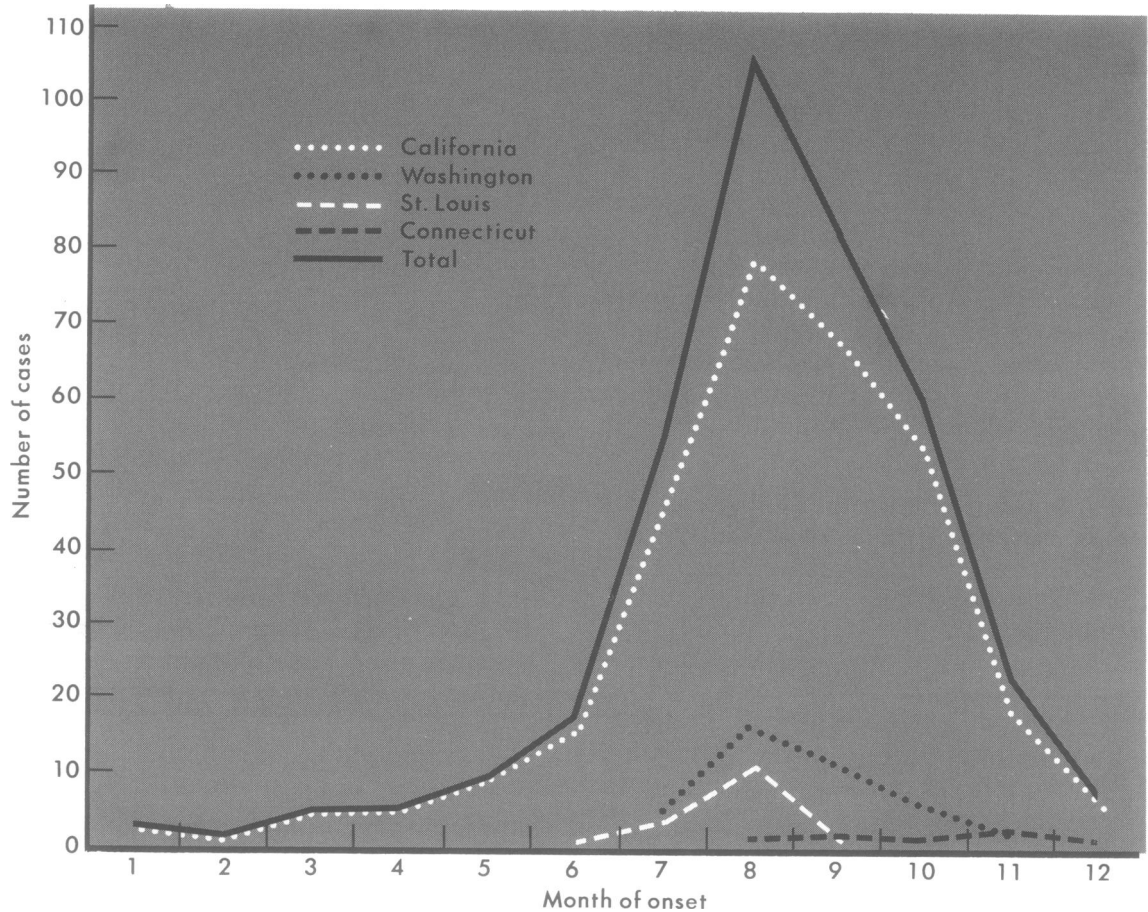
After isolations of echovirus 30 were made from residents of St. Louis, Mo., the Ecologic Investigations Program, CDC, conducted a more intensive search for cases in that city. This search yielded additional cases that would not have been detected by the usual routes of viral culture and aseptic meningitis case reporting.

Cases were accepted for this report if the clinical diagnosis was aseptic meningitis and if echovirus 30 or no other virus was isolated from a specimen or, as in certain California cases, if a fourfold or greater antibody titer rise was present.

Results

A total of 380 cases was studied: 308 were reported from California, 40 from Washington, 17 from St. Louis, Mo., eight from Connecticut, and seven from Oregon. One hundred thirty-seven patients had both viral isolation and a fourfold or greater antibody titer rise, 47 had their illnesses diagnosed by serology alone, and 196 by isolation of the organism only. Stool was the sole source of isolates in 207 cases, cerebral spinal fluid (CSF) in 37, and throat in 34. Of 390 isolates, stool accounted for 255, throat 73, and cerebrospinal fluid 62.

Figure 1. Cases of aseptic meningitis associated with echovirus 30 in 373 persons, by month of onset and residence, 1968



The date of onset of 363 cases is presented by State in figure 1. A major part of each reported outbreak occurred during the summer-early fall.

Figure 2 shows cases of aseptic meningitis associated with echovirus 30 by age group of patients. The highest occurrence was reported in the 5-9-year-old group, and 52 percent of the

Table 4. White blood cell counts of cerebrospinal fluid of 92 patients with aseptic meningitis associated with echovirus 30 in 1968

Cell count	Number	Percent
0-5.....	1	1
6-49.....	21	23
50-99.....	22	25
100-499.....	39	43
500-999.....	3	1
1,000+.....	4	7
Total.....	90	100

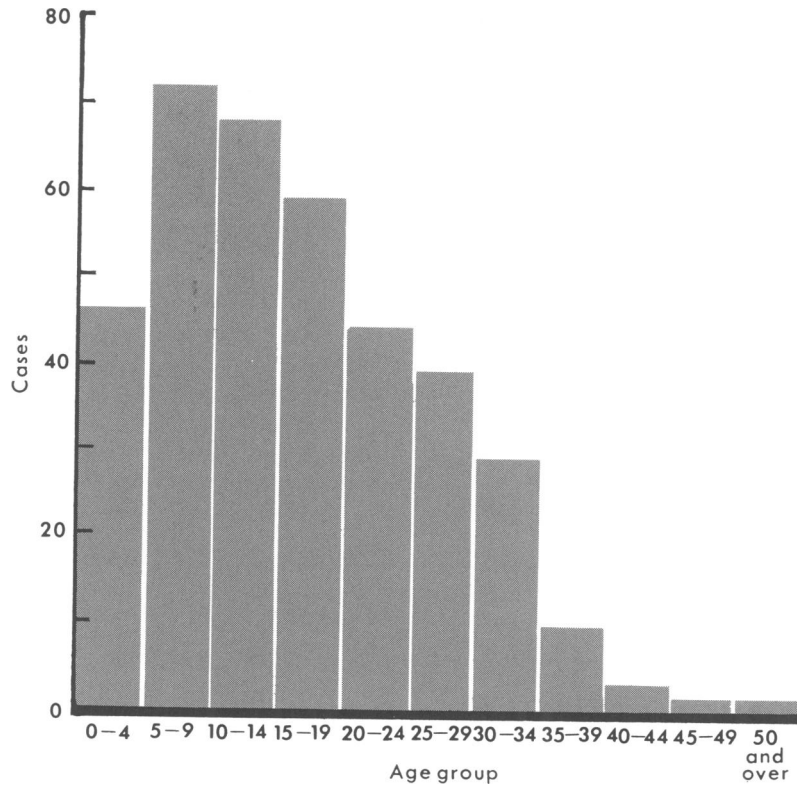
patients were between 5 and 19 years. Slightly more cases were in children under 4 years old than in persons 20-24 years.

Clinical features were reported in 196 cases and are presented by frequency in table 3. Headache, fever, and nuchal rigidity were reported in more than 60 percent of cases; photophobia was reported in 21 percent. No cases of paralysis were reported, and no study of hospital stays or days away from work was done.

CSF cell counts were available in 92 cases (table 4). The white blood cell count was less than 5 per cubic ml. in only one case. Fifty percent of white blood cell counts were 100 or less per cubic ml., and 75 percent were less than 200 per cubic ml. Four of these patients had white blood cell counts in excess of 1,000 per cubic ml.

Differential CSF cell counts were available in 84 cases. As shown in the following table, no pattern was apparent.

Figure 2. Cases of aseptic meningitis associated with echovirus 30, by age group of patients



Percent polymorphonuclears	Number	Percent
0-9.....	19	23
10-49.....	29	35
50-89.....	27	32
90-100.....	9	11

Twenty-three percent were predominantly lymphocytic (0-9 percent polymorphonuclear), while 11 percent were predominantly polymorphonuclear (90-100 percent polymorphonuclear).

Discussion

Since the first isolations of echovirus 30 in the United States were reported from California during the period 1957-61 (2) and from New York State in 1958-59 (3), two additional reports of echovirus 30 activity have been published. During an outbreak of aseptic meningitis in Minnesota in 1960, echovirus 30 was isolated from specimens yielded by 45 patients and significant rises in antibody titer were found in 10 others (4). In 1968, 11 cases were reported by the New York State Department of Health (5). These cases were randomly distributed through the State.

Both the relative paucity of reports in the literature and reports to the Enterovirus Surveillance System, CDC, before 1968 suggest that echovirus

30 was not epidemic in the United States in the early 1960's. A few recognized cases over a period of years followed by an epidemic is a pattern similar to other enteroviruses, such as coxsackie B1, B3, B4, and B5. It is in contrast to echovirus 9 and coxsackie B2 which have been associated with annual epidemics over the years 1961-68 (1).

During 1968, major epidemics of aseptic meningitis associated with echovirus 30 occurred in the United States. A study of certain epidemiologic and clinical features was possible through the pooling of information from five public health facilities. The individual outbreaks peaked during the late summer-early fall period which has characterized aseptic meningitis in the United States.

The age distribution of the patients was characterized by a large proportion of persons 5-24 years old. This distribution is similar to that observed in the 1960 Minnesota outbreak, in which 41 (71 percent) of 58 cases occurred in persons 5-24 years old (4). This age pattern in cases of aseptic meningitis is also similar to that seen in studies of other echoviruses associated with aseptic meningitis.

Clinical features of the 196 cases in which symptoms were specified included high frequency of those usually associated with aseptic meningitis: fever, headache, nuchal rigidity, and vomiting. Photophobia was observed in 21 percent; rash in only 3 percent. Nervous system symptoms included ataxia in one patient. There were no characteristic clinical features to distinguish aseptic meningitis associated with echovirus 30 from aseptic meningitis caused by other enteroviruses.

The cerebrospinal fluid cell count was less than 5 per cubic ml. in 1 percent and more than 500 in 8 percent. Polymorphonuclear leukocytes exceeded 50 percent in 43 percent of the patients and more than 90 percent in 11 percent of the patients. Distribution of the cell counts and the high percentage of polymorphonuclear leukocytes have been demonstrated in other enterovirus-associated aseptic meningitis. The characteristics

of the cellular exudate in aseptic meningitis may be indistinguishable from that in bacterial meningitis.

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Of the 669 cases of aseptic meningitis reported to the Communicable Disease Center as occurring in the 15 reporting States in 1968, 431 were associated with echovirus 30. With the cooperation of the health departments in five jurisdictions, clinical and epidemiologic data were obtained on 380 cases.

California reported 308 cases, Washington 40, St. Louis, Mo., 17, Connecticut eight, and Oregon seven. A major part of each reported outbreak occurred during the summer–early fall period.

The highest incidence was in the 5–9-year-old group, and 52 percent of the patients were 5–19

years old. More cases were in children under 4 years than in persons 20–24 years.

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Polymorphonuclear leukocytes exceeded 50 percent in 43 percent of the patients and more than 90 percent in 11 percent of the patients. The characteristics of the cellular exudate in aseptic meningitis may be indistinguishable from that in bacterial meningitis.