

Viral Hepatitis in a Community

FRANK L. MORTON, MD, MPH

VIRAL hepatitis is a complex and constantly changing communicable disease. New victims, new contacts, new methods of transmission, and even new control procedures are being reported with increased frequency (1). The situation is further complicated by difficulty in demonstrating or growing the virus and in establishing the presence of antigen or antibody (2).

Current thinking divides the disease into an A form with short incubation period and transmission mostly by the fecal-oral route (formerly infectious hepatitis) and a B form with a long incubation period and transmission mostly by the percutaneous route (formerly serum hepatitis). Each form of the disease can be spread person to person or from a common source.

The two forms of hepatitis cannot be distinguished clinically. Recent studies have intensified the difficulties of diagnosis and of determination of routes of transmission by demonstrating that at least on certain occasions hepatitis B may be spread by the fecal-oral route. Krugman and co-workers have produced hepatitis B in children at Willowbrook School by a serum-oral route

(3). Conversely, the recent report of Garibaldi and co-workers (4) of the dissemination of hepatitis B to five household contacts by a patient who had had hemodialysis did not appear to be conclusive. Because parenteral transmission could not be demonstrated, the authors postulated that the disease must have been spread by another route.

To a local health department the differentiation between the two forms of hepatitis is of considerable importance. If a case is diagnosed and reported as hepatitis B, the disease is regarded as having little potential for natural dissemination. When a diagnosis of hepatitis A is made, however, the department is alerted, and the staff must assume substantial responsibility for uncovering the source (if possible) and controlling the spread of the disease. Accordingly, a well-staffed department usually arranges to send a team to survey the premises, to obtain epidemiologic information, and to develop an appropriate course of action. A sanitarian and public health nurse are customarily dispatched, singly or jointly, to perform these tasks. It is in the interest of effective use of personnel to establish accurate diagnoses and to prevent these professionals from being assigned to activities or visiting households where little of genuine value can be accomplished.

This report concerns a retrospective survey of 289 cases of viral hepatitis reported by physicians in Oakland County, Mich., from July 1 to December 31, 1971. Comparisons were made of demo-

Dr. Morton is associate medical director, Western Electric Company, College Point, N.Y. At the time of this study he was deputy director, Oakland County Department of Health, Pontiac, Mich. Tearsheet requests to F. L. Morton, MD, 30 Greenridge Ave., White Plains, N.Y. 10605.

graphic, epidemiologic, and community factors in reported cases of hepatitis A and hepatitis B to determine whether or not disease profiles could be drawn. In effect, in this report, we put to a test the null hypothesis that no significant difference exists in the population groups from which both forms of the disease are drawn. Other derived benefits of a study of this kind may appear in the development of significant correlates and of estimates of parenteral use of drugs. Finally, analysis of 289 cases should prove more valuable as a source of generalizations or extrapolations than case reports based on limited outbreaks in which small numbers are involved.

Procedure

For all cases diagnosed as viral hepatitis, a viral hepatitis case record is initiated (a modified version of Center for Disease Control form No. 68, R-1038) and distributed to the area public health nurse and sanitarian. In the Oakland County Health Department, the nurse visits routinely all patients reported to have hepatitis while the sanitarian generally inspects the premises of only those patients reported to have hepatitis A. The nurse attempts to uncover epidemiologic data which would help to identify the origin of infection and route of transmission. She also advises the head of the household as to the nature of the infection, prognosis, clinical course, and precautions.

Arrangements are made for ISG (immune serum globulin) to be given to contacts of patients with hepatitis A. The sanitarian inspects the water supply, the condition of the plumbing, and the effectiveness of the sewage disposal system and collects a water sample for examination. At the conclusion of the visits, reports are completed, and new cases are marked on a large

county map. Answers to specific questions in the protocol are obtained by telephone from physicians, hospitals, clinics, and community contacts and members of the household.

For study purposes, the diagnosis of the attending physician was generally accepted. Reported cases were thus divided into (a) hepatitis A, or (b) verified or very probable hepatitis B. This classification permitted us to dichotomize the results and to perform comparative analysis by chi-square tests. We recognize that accepting the physicians' stated diagnoses may result in inconsistent or inaccurate reporting, because physicians are occasionally too busy or too unconcerned about hepatitis in general to strive for precision in diagnosis. At other times, they appear reluctant to become involved with drug problems or with drug abusers, who make up the bulk of present-day victims of hepatitis B.

Our public health nurses have frequently observed that a diagnosis has been changed from hepatitis B to hepatitis A to keep parents or others in ignorance of a youngster's use of parenteral drugs. In such cases, we choose the hepatitis B classification. These aspects of the diagnostic problem are discussed in more detail later in this paper.

Results of the Study

An analysis of the age distribution of the patients with hepatitis in both groups is given in table 1. Table 2 provides a summation of other statistical comparisons.

There are obvious differences in the numbers given in the various categories, because information could not be obtained on all items of information in each case.

In both forms of the disease, the highest incidence was recorded in the age groups from 15

Table 1. Age distribution of reported cases of viral hepatitis, Oakland County, Mich., July-December 1971

Age group (years)	Total		Hepatitis A		Hepatitis B	
	Number	Percent	Number	Percent	Number	Percent
Under 5.....	1	0.3	1	0.5	0
5-14.....	11	3.8	11	5.2	0
15-24.....	207	71.6	145	68.7	62	79.5
25-34.....	41	14.2	33	15.6	8	10.2
35-44.....	13	4.5	11	5.2	2	2.5
45-64.....	12	4.2	7	3.3	5	6.4
65 and over.....	4	1.4	3	1.4	1	1.2
Total.....	289	100.0	211	99.9	78	99.8

through 34 years. Although there was no significant difference in this variable, the changing pattern of hepatitis B was shown by the large number of young persons involved. As recently as 5 years ago, this disease was mostly diagnosed in older persons as a post-transfusion complication.

Males predominate in both groups, more notably among persons with hepatitis B. Because only 3.1 percent of the county's population is black, nonwhites obviously have disproportionately high rates of both forms of hepatitis.

The "resident type" variable was introduced as a socioeconomic indicator. In this category a patient was defined as transient if he was not in regular or continuous residence in one household. The term was applied largely to persons in institutions, military personnel, and college students or to persons who change residence frequently (communal or group residence) or to persons such as salesmen who leave their residences for repeated but short periods. One of four patients with hepatitis A could be described as a transient, although only one of three patients with hepatitis B met this criterion.

Analysis of occupations revealed genuinely significant statistical correlations. Patients with hepatitis B were twice as likely to be unemployed ($P < .001$) and about half as likely to be students or in white collar occupations ($P < .05$) as those with hepatitis A.

Patients in both groups were attended by physicians, an observation that could have been predicted because most of the cases were reported by physicians. Hospitalization was more frequent in the hepatitis B category; 75 percent of these patients received treatment in a hospital.

One of every two hepatitis patients in our study was able to recall some contact with a person who had jaundice in the 2- to 3-month period preceding the onset of illness. Noteworthy was the large number of persons with hepatitis B who had had such prior contacts.

During the period under study, the hepatitis-associated test (or Australia antigen test) was apparently not used by county physicians to distinguish the two forms of hepatitis. The reasons for failure to use a simple diagnostic tool of such value are not known. In 1972, however, the hepatitis-associated antigen test was being increasingly accepted and used by physicians and hospitals in Oakland County.

There is a highly significant difference in the

incidence of transfusions ($P < .01$), and, as expected, many more of the patients with hepatitis B had had blood transfusions. Some of the eight patients diagnosed as having hepatitis A more probably had hepatitis B resulting from transfusions.

The results of the use of parenteral drugs are interesting. Our nurses were taught to ask straightforward questions about drug habits. As they

Table 2. Tabulation of reported cases of viral hepatitis, Oakland County, Mich., July-December 1971

Variable	Hepatitis A		Hepatitis B	
	Number	Percent	Number	Percent
Sex:				
Male.....	118	55.9	63	80.7
Female.....	93	44.1	15	19.3
Color:				
White.....	184	88.8	70	92.1
Nonwhite.....	23	11.2	6	7.9
Resident type:				
Transient.....	50	23.6	25	33.3
Permanent.....	161	76.4	50	66.7
Occupation:				
Student ¹	74	38.3	15	21.4
Blue collar.....	44	22.7	16	22.8
White collar ¹	37	19.1	8	11.4
Unemployed ²	37	19.1	29	41.4
Retired.....	1	.5	2	2.8
Physician attendance:				
Yes.....	211	100.0	76	97.4
No.....	0		2	2.6
Hospitalization:				
Yes.....	91	43.7	59	75.6
No.....	117	56.3	19	24.4
Known contacts:				
Yes.....	94	45.6	39	52.0
No.....	112	54.4	36	48.0
Diagnosis by hepatitis associated antigen:				
Yes.....	3	1.5	0	
No.....	201	98.5	76	100.0
Previous transfusions:				
Yes ³	8	4.0	9	12.0
No.....	194	96.0	66	88.0
Illicit drug injections:				
Yes ²	27	13.2	63	85.1
No.....	179	86.8	11	14.9
Users:				
Heroin.....	17	62.9	45	71.4
Other drugs.....	10	37.1	18	28.6
Other household cases:				
Yes.....	17	8.4	4	5.5
No.....	187	91.6	69	94.5
Gamma globulin issued:				
Yes.....	188	91.7	27	36.0
No.....	17	8.3	48	64.0
Water supply:				
Public.....	155	78.2	62	86.1
Private.....	43	21.8	10	13.9
Sewage disposal:				
Public.....	143	73.7	58	80.5
Private.....	51	26.3	14	19.5

¹ $P < .05$.

² $P < .001$.

³ $P < .01$.

developed confidence in this area and improved their communication skills, they generally could obtain complete and candid replies on drug behavior. We did not attempt to distinguish among experimenters, drug abusers, or the addicted. The item "illicit drug injections" was answered positively if the patient admitted to using parenteral drugs more than one time. That 13.2 percent of the patients with hepatitis A had been using drugs was startling. Even if the statistics were invalidly enlarged by inclusion of some hepatitis B patients, the total may be balanced by the persistent unwillingness of some patients to admit to any use of drugs.

In any event, there is indication in this study of a higher level of drug use than has been previously disclosed in surveys of drug usage (5-7). Heroin was the drug of choice of users in both groups. Few users appear to have resorted to amphetamines or barbituates, or both.

Surprisingly, few patients could recall other members of the household having hepatitis. One can only speculate whether the identification of anicteric persons would have raised this number, or whether there has been a genuine increase in person-to-person (rather than common-source) spread.

Nearly all the household contacts of patients with hepatitis A received immune serum globulin, although only 36 percent of the contacts of patients with hepatitis B were so treated.

The environmental variables suggested that there was greater likelihood that hepatitis A was caused by contamination of private water supplies by ineffective sewage disposal systems. The data were not statistically significant and were not indicative of causal relationships. That hepatitis A commonly occurs in rural areas is well known.

Comments

A number of useful deductions can be derived from this analysis.

1. The null hypothesis that there was no significant difference in the population groups was supported by the general similarity in variables of a demographic, behavioral, and community character. Differences existed in age distribution, in type of residence and occupation, and in infections from previous transfusions, but they cannot be regarded as definitive. The analysis of the variables of known contacts, other household cases, and drug behavior indicated greater group

similarities. In effect, although some suggestion of difference emerged, it appeared that a high degree of overlapping existed and that patients could easily have been transferred from one category to the other. Distinctive disease profiles cannot be delineated.

2. County physicians seem to have given adequate medical care to both groups of patients. Large numbers were treated and hospitalized, and many contacts (of both types) received immune serum globulin. The physicians were less effective, however, in the realm of diagnosis. They appeared to have relied almost exclusively on clinical judgments and to have failed to use hepatitis-associated antigen tests or to report or diagnose accurately. Although some were unaware of recent developments in testing and treating patients with communicable diseases, others seemed to be unwilling to make a diagnosis of hepatitis B—in some apparent fear of the consequences or ramifications of a labeling process that could mark the patient as a drug user. Perhaps physicians in turn were influenced by the pervasive legislation and current thought that continue to view drug abusers primarily as deviants and law breakers.

Notwithstanding these considerations, if we are not to witness a replication of the rampant spread of venereal disease, aggravated by deliberate under-reporting and misreporting, practicing physicians will have to assume a more responsible attitude toward the hepatitis disease complex. This plea cannot be too fervently uttered.

3. Heroin usage, whether for experimentation, sharing, or dependency is alarmingly high. Our data can reveal only the "tip of the iceberg," since many cases of hepatitis are not reported and many drug abusers do not become infected.

4. The known correlation between infectious hepatitis and contamination of private water supplies by ineffective sewage disposal systems is confirmed. It emphasizes the need for continuing environmental surveillance to identify probable causative factors and prevent the spread of disease.

REFERENCES

- (1) Prince, A. M., et al: Immunologic distinction between infectious and serum hepatitis. *N Engl J Med* 282: 987-991 (1970).
- (2) Bell, J. A.: Viruses and water quality. [Editorial.] *JAMA* 219: 1628, Mar. 20, 1972.
- (3) Krugman, S., Giles, J. P., and Hammond, J.: Infectious hepatitis: evidence for two distinctive, clinical epidemiological, and immunological types of infection. *JAMA* 200: 365-373, May 1, 1967.

- (4) Garibaldi, R. A., et al.: Nonparenteral serum hepatitis. Report of an outbreak. *JAMA* 220: 963-966, May 15, 1972.
- (5) Cowan, R., and Roth, R.: Drug usage: will the pyramid become top heavy? *In Occasional papers, Oakland Schools*, edited by R. Watson, 3: 1-8, March 1971.
- (6) Morton, F. L.: A county health department's role in drug programs. *HSMHA Health Rep* 86: 1069-1076, December 1971.
- (7) Pell, S: Biostatistics in occupational medicine. *In Modern occupational medicine*, edited by A. J. Fleming and C. A. D'Alonzo. Lea & Febiger, Philadelphia, Pa., 1960, pp. 521-553.

MORTON, FRANK L. (Western Electric Co.): *Viral hepatitis in a community. A retrospective survey. Health Services Reports, Vol. 88, March 1973, pp. 236-240.*

The demography of Oakland County, Mich., is generally similar to that of other suburban communities which border large cities. A retrospective study of 289 cases of viral hepatitis reported by physicians in the county for the period July-December 1971 shows the importance (and difficulty) of accurately diagnosing hepatitis and the key roles that health department nurses and sanitarians play in reporting host and environmental factors in disease transmission.

Based on the diagnosis reported by the physician, the patients in the study were divided into groups according to whether they had had hepatitis A or hepatitis B. A statistical analysis (chi-square) was made of demo-

graphic, community, and epidemiologic variables to determine the existence of significant differences in the groups (null hypothesis) and, perhaps, to uncover prevalent behavior or practice patterns.

The shortcomings of retrospective studies are well known. Many personal or health records were inaccurate or inadequate, and some were misclassified or biased. Although this study is not free of these criticisms, the comparative analysis yielded a number of useful conclusions.

The analysis showed there was no real or basic difference between the members of population groups who became ill with hepatitis A or hepatitis B. Local physicians regarded, classified, and treated them nearly interchange-

ably. Diagnosis was most often made, however, on clinical grounds with widespread failure to use hepatitis-associated antigen tests. The added discovery of an unexpectedly high use of heroin among persons ill with hepatitis A only intensifies the need for accurate diagnoses and reporting.

We have few enough tools to help us study the victims of hepatitis or to protect those exposed to the A form of the disease. Certainly at this juncture, when the spread of this disease is compounded by the errant behavior of a subculture, there is no excuse for lack of interest or failure to use a simple diagnostic test. Now is the time for the practicing physician to be in the vanguard. The time has come to stand up and be counted.