An Epidemic Of Infectious Hepatitis In The Kathmandu Valley

A. Hillis, S.M. Shrestha, N.K. Saha.

An unusual outbreak of infectious hepatitis occurred among the residents of Nepal in the Kathmandu Valley between January and October, 1973 (Magh 2029 to Kartik, 2030). There was a marked increase in hospital admissions and the total incidence is estimated at 10,000 or more cases. At the peak of the epidemic in June, July and August, more than 100 cases were seen in pregnant women in whom the disease was particularly severe producing both a high fetal wastage and a high maternal mortality. In other population groups the mortality was low (less than 1% and similar to that found elsewhere) and the disease was usually self-limiting. The highest incidence was observed in young adult males, although cases appeared at all ages. Hospitals in Pokhara reported an increase in hepatitis cases at the same time as the Kathmandu epidemic, but did not experience the same problem with pregnant women. There has been no report of appreciable spread to other areas of Nepal, in spite of the fact that some students and visitors travelling from Kathmandu at the peak of the epidemic developed the illness after their arrival in other cities and villages.

Background:

Infectious hepatitis is not a new disease in Nepal. The ancient writings of Ayurveda describe the illness, and the existence of a Nepali word (kamal pitta) for the condition indicates that it has been known for a long time. In recent years, virtually all hospitals in Nepal have admitted cases of infectious hepatitis from time to time, and larger hospitals such as Bir Hospital and the Infectious Disease unit (Teku) in Kathmandu have records of a fairly constant level of such admissions for a number of years (See Fig. 1). Almost all of these cases have been in adults. True incidence is impossible to estimate from hospital data, but the high proportion of deaths recently in these hospital admissions suggests that these cases represent only a small portion of the morbidity. During the twelve months before the epidemic began, Bir Hospital alone reported 12 deaths attributed to infectious hepatitis, which by Western standards represents a high mortality rate for this disease, even when it is assumed that the population at risk is the whole Kathmandu Valley (population about 600,000). On the other hand, infectious hepatitis represents only a small fraction of the infectious disease problem in Nepal, typically accounting for only one patient in a thousand seeking treatment. For this reason, little attention has been focused on this problem in previous years. Recent events have brought the disease rather dramatically to the attention of the medical community.

Hospital Experience:

In Magh of 2029 (January - February, 1973), infectious hepatitis admissions to the Infectious Disease Unit in Kathmandu jumped from their usual level of 2 or 3 per month to 25. The next month, 64 such patients were admitted, and it became apparent that an unusual outbreak was developing. These events occurred in what is generally considered to be the healthy season, and at a time when the population was relatively free of other infectious diseases (Table 1). Most of these early cases were in young adult males, but the patients came from widely scattered areas of Kathmandu and no common source for their illness could be found when the study was conducted some months later. In the following months, other hospitals in Kathmandu, with the exception of Kanti hospital for children, also experienced unusually high rates of admission for infectious hepatitis. The Ayurvedic Hospital, which customarily admits about two hepatitis patients per month in normal years, admitted a total of 220 such cases during the epidemic, and saw more than 1800 as outpatients. Shanta Bhawan Hospital admissions for infectious hepatitis (excluding foreigners) increased from an average of

5 per year to 46 between February and November, 1973. At about the time the monsoon began in June, the number of pregnant women presenting to all hospitals with infectious hepatitis increased markedly. A special unit for their care was opened at Bir Hospital (under the direction of one of us, SMS) and 115 such women were treated. Forty-one of this group went into or were admitted in fulminant hepatic failure and 31 of these died. Fetal loss was 60%, including all abortions, stillbirths, maternal deaths before delivery, and known infant deaths before 60 days of post natal age.

In all, more than 600 cases of infectious hepatitis were admitted to civilian hospitals in Kathmandu valley during the period of the epidemic. This almost surely represents only a small fraction of the total cases treated, since hospital outpatient clinics alone treated 10 to 20 cases for each admission and many patients went to private practitioners. Of 87 cases of infectious hepatitis found on a general survey of Kathmandu, only two were admitted to one or another hospital. If it is assumed that there were at least 20 cases of the disease for each one hospitalised a minimum estimate of 12,000 cases over the epidemic period is made. (An incidence of at least 2% for the Kathmandu valley).

Other Data On The Incidence:

Because of the many problems in using hospital data as a base for estimating the incidence, various other methods were employed. A routine screening of sera of prenatal patients at the Maternity Hospital showed a marked increase in the number of women with grossly icteric sera in mid-June (Table 2). Twenty-seven patients out of 1560 individuals seen were noted to have icteric sera on at least one occasion, giving a minimum incidence in this population of 1.6%. However, since many women were seen only once, this is almost certainly an underestimate of the incidence. If the number found icteric for the first time in each month is taken as an estimate of the monthly rate of infection, then the estimate of the total incidence for the period June 18 - Sept. 19 is 4.5%.

Schools:

Several schools and colleges reported that there had been an increase in infectious hepatitis in their students, but records were often not maintained. However, attack rates at St. Xavier's School in Patan and Tribhuvan University were between 4 and 8% (Table 3)

Survey:

A survey was conducted in randomly selected areas of Kathmandu proper, giving

an attack rate of 2.4% (on the basis of 2077 people covered by interview). Several additional areas in Kathmandu and beyond were surveyed, and rates varied from .4 to 5% in individual areas. All ages were affected, with highest rates in young adults (Table 4). From the Kathmandu survey, it appeared that the epidemic had two stages: a comparatively moderate increase for the first six months, with a sudden exacerbation at about the beginning of the monsoon. This is consistent with the finding that the number of pregnant hospital admissions also increased markedly during this period. Secondary attack rates found on the survey were low (14/457). The lowest attack rates were observed in two areas of exceptionally poor hygiene, occupied primarily by sweepers, and in general there was a strong correlation between high socio-economic status and high attack rate. Although attack rates tended to be higher in recent immigrants from other areas into Kathmandu, these people accounted for only a small portion of the total Kathmandu cases.

Foreigners:

For some years, Western foreigners have experienced a high incidence of hepatitis when visiting or residing in Nepal, some of which occurs in recent arrivals who contracted the disease outside of Nepal in highly endemic areas. For this reason, the possibility that the epidemic was started by an outbreak among foreigners was considered, but no evidence to support this hypothesis was found. The incidence in foreigners has been remarkably uniform over the past two years (Fig. 2) and there is evidence that they were protected against attack during the epidemic by gamma globulin prophylaxis.

Geographic Spread:

Hospitalized patients came from all areas of the Kathmandu Valley and slightly beyond (Dhunibesi to Balephi Bazaar). Visits to a number of hospitals and health centres throughout the Kathmandu Valley verified that the disease was prevalent throughout but no focus of infection was found. Incidence rates did not exceed 5% in any area studied. Health Post records consistently showed that about one patient in a thousand came because of "Jaundice" before the epidemic, and that this proportion increased at least fourfold during the course of the epidemic.

Visits and inquiries were made of a number of areas outside of Kathmandu Valley. The Pokhara Valley had an increase in hepatitis at about the same time as Kathmandu, but this was not of the same magnitude as the latter, nor was there

the problem in pregnant women. In other areas (Chotura, Bhadrapur, Biratnagar) excess of infectious hepatitis occurred, but most patients gave history of visiting Kathmandu during the incubation period. There was no evidence of extensive spread from these cases. In view of the slow way in which hepatitis spread, this is perhaps still a possibility.

Australia Antigen:

53 out of 53 sera tested for Australia Antigen by immunodiffusion were negative, this was confirmed at Yale University Medical School, courtesy Dr. R. W. McCollum, indicating that the agent was quite unlikely to be Hepatitis B (serum hepatitis). Arbovirus screening for a number of agents was also negative, courtesy Dr. R.E. Shope, Yale Arbovirus Unit, Yale Medical School.

Conclusion:

There seems to be no doubt that a large epidemic of infectious hepatitis occurred in the Kathmandu Valley between January and October of 1973, and that young adults were particularly affected. A very high mortality (31/115) was seen in pregnant hospitalized women. In view of the fact that infectious hepatitis has been present for some years in Nepal and Kathmandu and that the disease is generally considered to give lifetime immunity, this age distribution is surprising. The distribution of cases over time is not consistent with a single source epidemic, and the low secondary attack rate and relationship between incidence and socio-economic class are evidence against a hypothesis involving a new virus or antigenic variant. Considering the heavy fecal contamination of the environment, conditions for the rapid spread of infectious hepatitis appear to be ideal at all times, and yet it seems from the age distribution that hepatitis infection in this population is often delayed until adulthood.

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Table 2

Patients with Icteric Sera Found on Routine Prenatal Screening At Maternity Hospital, Kathmandu.

Period	Total Patients Seen	Icteric for First	%
19 Mar. - 18 Apr	501	1	.2
19 Apr. - 23 May	417	3	.7
24 May - 17 June	-		
18 June - 18 July	702	10	1.4
23 July - 20 Aug.	384	7	1.8
17 Aug. - 19 Sept.	463	6	1.3

Total Vists = 2467

Total individuals seen = 1560

Number icteric on at least one occasion = 27

Estimated incidence for period June 18 to September 19 = 4.5%

Courtesy Dr. W. M. Adams, Johns Hopkins CMR

Table 3

Incidence of Infectious Hepatitis at St. Xavier's School and Tribhuvan University April, 1973. - Sept. 1973.

St. Xavier's School:	Number of Students	Reported Cases	% Affected
Secondary School, St. Xaviers	248	19	7.7
Pimary School, St. Xaviers	219	9	4.1
University Men's Hostel	114	8	7.0
(1)			(1)
All University Students	650	26	4.0

(1) Rate in University Students includes only those cases seen at the University Health Center, and is known to be an underestimate of incidence.

Table 4
Cases Found on Kathmandu Survey

Age Group	% Population by Nepal Health Survey (All Nepal)	% Population by This survey (subsample)	Total Cases		Approximate Rate * per 1000
			M	F	
0 - 4	17.5	17	4	1	9
5 - 9	12.5	12	3	2	13
10 - 14	10.5	9	6	2	28
15 - 19	10	10	7	3	29
20 - 24	9.5	12	18	5	59
25 - 29	9	11	8	2	27
30 - 34	8	7	9	1	46
35 - 39	6	5	6	1	40
40 - 44	4	4	0	1	8
45 - 49	4	2	0	0	-
50 - 54	2	3	2	0	23
55 - 59	3	2	1	1	26
60 and above	4	5	1	1	11
		Age Unknown	3		
		Total	68	20	27

* rates are to applicable to Kathmandu as a whole, but only to the areas studied.

Table I
Admission to Teku Hospital

2029	Measles	Diphth- ria	Enteric fever	Dysent- ry	Pox chik. sm.	Tetanus	Hepatitis	Gastro inthritis	Rabies	Miscellaneous
Kartik	12	22	4	21	-	2	2	172	1	2
Nov. Marga	8	19	6	7	-	4	4	84	2	3
Dec. Poush	7	6	6	7	1	5	3	67	1	5
Jan. Magh	8	4	14	13	3	1	25	37	2	4
Feb. Falgun	15	7	4	8	2-	1	64	59	-	-
Mar. Chaitra	29	4	20	11	7	-	43*	175	-	-
2030										
Baisakh	51	5	8	34	6	2	22	372	-	-
Jestha	75	-	11	79	4	-	31	520	-	-
Asadh	35	6	4	34	5	2	41	661	-	-
Sawan	14	2	6	28	-	1	2	925	-	-
Bhadra	11	2	14	13	-	2	22	588	-	-
Aswin	9	5	6	13	-	2	9	320	-	-
Kartik										
Marga										
Poush										
Magh										
Falgun										
Chaitra										
2029										
Baishakh										
Jestha										
Asadh										
Sawan										
Bhadra										
Aswin										

* Admissions policy changed from this point because of increased demand for beds.

Figure 2
INFECTIOUS HEPATITIS CASES SEEN IN FOREIGNERS
1972 - August, 1973