

INFECTIVE HEPATITIS AMONG CIVILIANS IN PALESTINE*

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(With 8 Figures in the Text)

INTRODUCTION

The recent outbreaks of infective hepatitis among troops in Palestine and the Near East have been discussed by many authors. Little is known, however, about the manner in which this disease affects immigrant and indigenous populations of this part of the world, and the present report is designed to fill the gap with respect to the civilian population of Palestine.

REPORTED INFECTIVE HEPATITIS
AMONG MILITARY FORCES

Van Rooyen & Gordon (1942) concluded from experience in Egypt that the reservoir of the infection is man, that the disease is disseminated by droplet infection, and that the rapidity of spread through a district suggests that a virus is the pathogenic agent. The first detailed report of a large-scale outbreak of the disease among British troops in Palestine was presented by Cameron (1943). Though some cases had been observed among military personnel in Palestine in 1938 and 1939, the disease did not assume epidemic proportions till 1940, when 342 cases were reported. In 1941, 126 cases were reported. The rate of incidence among troops is unfortunately unknown.

Havens (1944), in reporting on infective hepatitis among troops stationed in the Near East and Mediterranean countries, noted that monthly admissions of men with this disease to a military hospital reached a peak between December 1942 and March 1943, and another even higher peak between August 1943 and January 1944. Kirk (1945) described an epidemic among New Zealand troops which began in August 1942, 35-40 days after they had reached the Alamein line and subsided within a similar period following their withdrawal from the area. The site occupied by these troops had recently been recaptured from the enemy and was heavily contaminated with faeces, but among troops on ground which the enemy had not occupied, hepatitis rarely occurred. Kirk (1945) concluded that the disease was prevalent among the

enemy troops and that the infective agent was being spread by dust and flies from human excreta. Presence of the disease among Axis troops in the Libyan desert was reported by Hellmann (1943). Among these, Germans were more severely affected than Italians. Most of the cases occurred in September and October. A similar seasonal trend has been reported by Dixon (1944) in Malta, where the rate in 1939 among British troops was 14 per 1000 and among Maltese troops 0.24 per 1000.

REPORTED INFECTIVE HEPATITIS
AMONG CIVILIANS

Yenikomshian & Dennis (1938) reported an outbreak of 37 cases of infective hepatitis at Hamet in the Lebanese Republic in a population of 800 persons, an incidence of 4.6%. The outbreak began in September 1935 and lasted through December, spreading from Hamet to several neighbouring villages. Although many of the infected families had from 8 to 12 members, there were never more than 3 cases in the same household.

Leffkovitz (1943) used the morbidity statistics of the Jewish Workers' Sick Fund for the period 1938-43 for his report of the occurrence of this disease among civilians in Palestine. The incidence of all liver diseases rose from 2.4 in 1938 to 4.1% in 1942, and during the epidemic period from 1 July 1942 to 31 March 1943, 3887 cases of hepatitis were reported, giving a rate of 2.1% of the population benefited by the fund. The frequency of cases rose sharply in September 1942, reached a peak in January 1943, and declined to a minimum in April 1943. During 1941 and the first 3 months of 1943 incidence was somewhat higher among rural than among urban groups, but in 1942 the urban population was more severely affected. Leffkovitz (1943) concluded that recent immigrants, children excepted, were more likely to become infected and that children developed the disease more frequently when crowded into child centres. He observed instances where entire families were affected.

Kligler, Btsh and Koch (1944) confirmed the observation made by Leffkovitz (1943) that the

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incidence of the disease was higher among immigrants than in the indigenous population. The authors described two epidemics in 1940 and 1941 among new arrivals in a detention camp in Palestine who had come from parts of Central Europe where the disease was not endemic. In their opinion the privations suffered during the journey thither may have contributed to the high incidence. Attention was directed to the probable role of overcrowding, particularly in winter months, in the dissemination of the disease. There was no evidence that the infection was spread either in food or by insects.

Btsh (1944), who reported on infective hepatitis among members of the Palestine police, was impressed by the relatively high frequency of the disease among British and Jewish members of the force as compared with the Arab members. Cases of the disease were frequently found in a guard detachment of a prison labour camp whose inmates, all adult Arabs, were not affected. Btsh (1944) found a similar situation at the Government Hospital of Haifa. The percentage of hepatitis cases among hospital admissions was 2·8 for British, 1·4 for Jewish and 0·21 for Arab patients. Hellmann (1943) also noted that in 1943 in Libya no cases apparently occurred among Arabs, and Dixon (1944) reported that in Malta, though many cases were reported among the troops, no epidemic developed among civilians.

Loebel (1945) described a small outbreak in Gan Yavneh which occurred between October 1940 and January 1941. There were 47 cases, among which only 4 were in adults who were immigrants from Germany. The affected children had been born in Palestine and were for the most part between 2 and 6 years of age. The illness in children lasted from 10 to 14 days, that in adults from 4 to 6 weeks. The rate of incidence was 10% for the whole population but 33% for children.

An outbreak described by Ebel (1944) occurred in Emek Hefer, a rural district in the coastal plain, between October 1942 and February 1943. There were 127 cases among 1590 persons, a rate of 8·0%. Eleven of 15 women pregnant at the time of the outbreak acquired the infection. Only 4 carried their pregnancy normally to term, 5 suffered from abortion and 2 from disturbed pregnancies which came to term after 7 or 8 months. Most of the cases were among persons who had been in the country less than 2 years; among Jews born in Palestine the cases were few and sporadic.

Kligler & Bachi (1945) have described the status of the people of Palestine as follows: 'The urban population, though largely western in origin and habits, dwells in close proximity and contact with the eastern people and under conditions of community sanitation nearer to that prevailing in the East. The rural Arab population lives under very

primitive sanitary conditions. Added to the backward sanitary environment there is an unusually active movement of population from village to town and town to village as well as periodic waves of large immigration of a non-immune population from Europe into Palestine.' The heterogeneous character of the population has been intensified during the war by the presence in Palestine of Allied troops from nearly all parts of the British Empire and the United States, and by the influx of refugees from Poland, Greece, Yugoslavia and other countries. Conditions were, therefore, highly favourable for an outbreak of infective hepatitis: a country in which the disease is endemic, sanitary conditions with respect to food, flies and housing wholly uncontrolled, and with frequent arrivals of susceptible persons from regions where the disease is not prevalent. In such circumstances one may expect a study of morbidity data for the country as a whole to yield valuable information on the epidemiology of this disease.

SOURCE AND RELIABILITY OF THE STATISTICAL DATA

Since the Government Health Department does not require the reporting of cases of infective hepatitis, official statistics showing incidence are not available. Consequently, our data were obtained from other sources, the variety of which reflects the disparate character of the population.

The Arabs and Jews comprise the two main subdivisions of the Palestine population. At the end of 1945 the Arabs included more than 1,000,000 sedentary Moslems, about 70,000 Bedouins and approximately 100,000 Christians. Most of the Arab Moslems are peasants living under conditions which are primitive but somewhat better than those prevailing in other Middle Eastern countries. Persons suffering from the infective hepatitis in the Arab rural sector neither receive medical treatment nor are hospitalized, so the task of collecting valid statistical data on prevalence of this or of other diseases is almost an impossible one. The Christian Arabs are mainly town dwellers and are socially more advanced, so that information regarding them is more readily available.

There were about 580,000 Jews in Palestine at the end of 1945, the majority of whom had migrated to the country during the preceding 25 years. For the most part they are highly cultured and have a well-developed standard of living. They make full use of medical and hospital facilities. About 40% are members of the Sick Fund of the General Federation of Jewish Labour.* The majority of the urban workers, all persons from the collective

* Referred to in this paper as Workers' Sick Fund (W.S.F.).

settlements and a considerable proportion of the Jewish agricultural population belong to this group. The fund provides workers and their families with medical care at home, in out-patient clinics and in hospitals. The Rural Sick Benefit Fund* and other smaller sick funds provide service for thousands of farmers and town dwellers. The remainder of the Jewish population receives medical care from private physicians, who are numerous in Palestine, and in public and private hospitals. Among the Jewish hospitals those founded in Jerusalem, Tel-Aviv, Haifa and Tiberias by the Hadassah Medical Organization (H.M.O.) are of outstanding importance.

In addition to the Arabs and Jews, communities of Armenians, Greeks, Britons and other Christian non-Arabs number some tens of thousands. Their living standards are higher than those of the Arabs, and they avail themselves of hospitals and other medical facilities, mainly Government and missionary hospitals and clinics. There is also the rural Druze community of more than 10,000 persons with a living standard similar to that of the Arabs.

The only data available for the non-Jewish population are those collected by the Government Department of Statistics† pertaining to infective hepatitis patients hospitalized in 1944. For the Jewish population there are Government data on patients hospitalized in 1944 and also data for patients admitted to the H.M.O. hospitals during the years 1924-44.‡ Although these do not include all cases of hepatitis occurring in the Jewish sector, inasmuch as only persons with relatively severe symptoms are likely to be hospitalized, they may be used for the information they afford as to the annual and monthly distribution of cases as well as to such factors as place of residence, birthplace, age and sex.

Incidence of infective hepatitis among Jews was examined for each of four population groups for which statistical records were practically complete, (a) the W.S.F., (b) the R.S.B.F., (c) about 44,000 school children for whom the Hadassah and Tel-Aviv municipality provided school hygiene services and among whom cases of infectious diseases were systematically registered by nurses, and (d) about 20,000 infants and children under 5 years of age who were supervised by Hadassah Health Welfare Centres in all parts of the country. The W.S.F. data are detailed by place and month and cover the

years 1941-4; those of the R.S.B.F. cover the period 1943-4; data for school children are detailed by month and community and cover the school years 1942-3-1944-5, and those for Health Welfare Centres pertain to the period 1942-4.

Since these data pertain to specific groups rather than to the population as a whole, certain questions arise regarding the proper interpretation of the results of their analysis. While some conception of incidence is furnished by the morbidity reports of the Jewish sick funds, these cannot be considered as representative of the Jewish population as a whole, since rural and urban working-class people constitute a larger proportion of the insured group than they do of the population at large. Furthermore, observations on cases of infective hepatitis in the hospital may not be applicable to patients outside the hospital. An illustration of this is the fact that persons born in Palestine, particularly Arabs, do not seek hospital care as frequently as do the recent arrivals. These questions will be discussed with specific reference to the data later. The findings of the analysis must be examined, therefore, in the light of the definite limitations to their applicability.

INCIDENCE OF INFECTIVE HEPATITIS AMONG CIVILIANS BY POPULATION GROUPS

Table 1 shows the number of persons benefited by each of the two sick funds, together with the number of cases of infective hepatitis occurring among these persons and the frequency rates for the years covered by the available data. Urban and rural areas are distinguished.

If one may assume that the rates derived from the sickness records of these insured persons are roughly applicable to the entire Jewish population, incidence of infective hepatitis during the past few years has been approximately 10 per 1000 persons. In 1943 the rate among persons covered by both funds was 13.4 per 1000 and in 1944 it was 8.3 per 1000, with a rate for both years of 10.7. The Jewish population in Palestine in 1944 was estimated at 550,000, hence there may have been some 4600 cases that year, with only 118 patients hospitalized, 30 in H.M.O. hospitals and 88 in others.§ Only about 2.6%, therefore, of the total patients were actually hospitalized, and the proportion in hospitals, of the total population, was approximately 2.1 per 10,000. Workers' Sick Fund data in Table 1 indicate a higher incidence of the disease in rural than in urban settlements during the years 1941-4.

Table 2 contains the data for infants, pre-school

§ This was the only year in which complete data on hospitalization were available for the entire country.

* Referred to in this paper as R.S.B.F.

† Thanks are expressed to this Department for placing these data at our disposal.

‡ Data from H.M.O. hospitals were collected from sickness records for 1924-44. Most of the cases were diagnosed as infective jaundice or catarrhal jaundice and only a few as jaundice without further discrimination. All cases where any apparent cause for jaundice was added were excluded, such as: pneumonia, malaria, paratyphoid, tumour, cholelithiasis and cholecystitis.

Infective hepatitis among civilians in Palestine

and school children for the years 1942-4 obtained from the Health Welfare and School Hygiene services. Incidence was apparently lower in these groups: that recorded for school children was 8.1 per 1000 as compared with 11.8 per 1000 for the corresponding period among persons covered by the W.S.F., a difference of 3.7 per 1000, which was significant. Incidence among infants plus children in Health Welfare Centres was 4.2 per 1000. It is possible, however, that reporting was less complete here.

Among Christians, 103 hepatitis patients were hospitalized from the following groups:

(a) Of Christians born in Palestine or in the Near East who were predominantly Arabs, Armenians and Greeks, there were 20 hospitalized patients, or about 2 per 10,000 inhabitants.

(b) There were 19 hospitalized patients among civilians born in Europe or America, most of whom were government officials.

(c) Among British constables there were 64

Table 1. *Palestine: incidence of infective hepatitis among members of the sick funds*

Sick fund and year	Membership of the fund				Cases of infective hepatitis				Cases per 1000 population			
	Rural settle-ments				Rural settle-ments				Rural settle-ments			
	Towns	A	B	Total	Towns	A	B	Total	Towns	A	B	Total
Workers' Sick Fund (W.S.F.):												
1941	108,837	16,639	29,899	155,375	541	230	419	1190	5.0	13.8	14.0	7.7
1942	117,782	16,748	31,220	165,750	1407	357	607	2371	11.9	21.3	19.4	14.3
1943	128,080	17,425	32,339	177,844	1352	368	626	2346	10.6	21.1	19.4	13.2
1944	137,769	19,516	36,142	193,427	974	286	369	1629	7.1	14.7	10.2	8.4
Average	123,117	17,582	32,400	173,099	1069	310	505	1884	8.7	17.6	15.6	10.9
Rural Sick Benefit Fund (R.S.B.F.):												
1943	—	—	—	11,300	—	—	—	181	—	—	—	16.0
1944	—	—	—	15,600	—	—	—	106	—	—	—	6.8
Average				13,450				144				10.7

A = communal settlements; B = other rural settlements.

Table 2. *Palestine: incidence of infective hepatitis among infants and children under supervision of the Hadassah Medical Organization (H.M.O.) and Tel-Aviv Municipality*

Age and institution	Year	Total under observation	Infective hepatitis	
			No. of cases	Per 1000 under observation
Health Welfare Centres:				
(a) Infants aged 0-1	1942	5,110	10	2.0
	1943	5,971	4	0.7
	1944	7,383	22	3.0
(b) Children aged 1-4	1942	12,183	67	5.5
	1943	12,257	38	3.1
	1944	12,385	93	7.5
School children	1942	42,710	422	9.9
	1943	44,099	431	9.8
	1944	44,802	211	4.7

For non-Jews the only available data pertain to cases hospitalized in 1944. Among Moslems these numbered 109, or about 1 case per 10,000 population, but inasmuch as Moslems came to hospitals only half as frequently as did Jews,* the incidence of cases worthy of such care was probably about 2 per 10,000, a ratio similar to that among Jews.

* In 1943, according to Government statistics, the number of patients (exclusive of maternity cases) admitted to hospitals was: 58 per 1000 Jews, 51 per 1000 Christians, 25 per 1000 Moslems.

hospitalized patients, and since these persons constituted a considerable proportion of all hepatitis patients in this group their number may be used as a basis for determining incidence among all Christians. From the total strength of this group a rate of 14 cases per 1000 is obtained.

In summary it may be said that incidence of infective hepatitis was approximately 100 per 10,000 persons in the various population groups and that hospitalized patients comprised about 2 per 10,000 inhabitants.

CASE FATALITY IN HOSPITALIZED PATIENTS

Jews. Nine deaths were reported among persons with infective hepatitis admitted to H.M.O. hospitals in the years 1924-44, exclusive of those among pregnant women. This gives a fatality rate of approximately 1.4 per 100 hospitalized cases. Seven of the 9 deaths were among children from 3 months to 8 years of age, and the case fatality rate for children under 15 was 4.5%. Of the two adults who died, one was a man 92 years old and the other a woman of 52. The case fatality rate for adults was less than 4 per 1000 hospitalized cases.

During the years 1924-44, 71 pregnant women were admitted to H.M.O. hospitals with liver diseases. The diagnoses included infective hepatitis, infective jaundice, acute hepatitis due to infection, acute atrophy of the liver in pregnancy, etc. Seven of these patients died, giving a case fatality rate of about 10%, which is in accord with a report by Soferman (1945) of a case fatality of 13.5% among pregnant women in the Municipal Hospital in Tel-Aviv.

Non-Jews. The Government Department of Statistics reported 4 deaths from infective hepatitis in 1944 among 109 hospitalized adult Moslems, a rate of 3.7%, but this high proportion may well be due to less frequent attendance at hospitals by Moslems affected with the disease. There were 2 deaths among the 20 native-born hospitalized Christians but none among the 64 British constables or the 19 foreign-born Christians.

Since patients admitted to hospitals probably were more severe cases of the disease than those not hospitalized, the proportion of deaths among them was doubtless higher. It is difficult, therefore, to generalize from hospital experience to the population as a whole. All one may say is that fatality was evidently low but the disease may pursue a severe and even fatal course among children and in pregnant women.

The question of fatality is further complicated by the fact that recently 20 sporadic cases of jaundice caused by bovine leptospirae have appeared, of which 5 were fatal. The disease occurred mainly among persons in contact with cattle or their products. Bernkopf, Olitzki & Stuczynski (1947) have demonstrated that such cases can be differentiated from epidemic hepatitis by positive agglutination tests with bovine leptospirae.

TIME CHANGES IN INCIDENCE

The overall rate of 100 cases per 10,000 population is a rough estimate and cannot be applied indiscriminately. It is apparent from the rates in Tables 1 and 2 that incidence varied from year to year. Table 3 contains a record of the total admissions to

H.M.O. hospitals by year, 1924-44, the number of cases of infective hepatitis and, for comparison, the number of cases of other liver diseases (cholecystitis, cholangitis, etc.) among patients admitted to these hospitals.

Unfortunately the ratios in Table 3 do not necessarily follow the trend of incidence of infective hepatitis in the Jewish population at large. The small proportion of persons with this disease admitted to hospitals (2.6%) has been noted. The likelihood that such persons were the more severe cases has also been mentioned, and it is possible that the proportion of cases of greater severity that required hospital care did not remain constant from year to year. Hospitalization facilities changed during the period under review. Table 3 also contains the ratio of hospital admissions to the total Jewish population for each year, and these figures dropped from 6.5 in 1924 to 2.6 in 1944, indicating that an increasing proportion of the population did not receive medical care in these institutions.

It is apparent that 1927 was a peak year among hospital admissions for both infective hepatitis and for other liver diseases, each with rates of more than 8 per 1000 patients. For some reason hepatitis cases dropped to approximately half their usual number in the years 1924, 1929, 1933 and 1938, but otherwise the ratios to total admissions pursued a mildly fluctuating course. Those for other liver diseases, however, rose sharply again in 1934 to 15 per 1000 patients and remained high during the remainder of the period. The data from H.M.O. hospitals do not show a greater incidence of hepatitis in 1942 and 1943, such as is indicated in Table 1 for the W.S.F. data.

REGIONAL DISTRIBUTION OF THE DISEASE

Information on the occurrence of infective hepatitis in different parts of Palestine is limited to the W.S.F. data for the years 1941-4, and the geographical distribution of the disease has been studied for each year by analysing the data for the Government administrative subdistricts exclusive of towns (Table 4 and Figs. 1-4). One object has been to see whether or not changes in morbidity may have been due to superimpositions of local waves such as have been described for measles in Palestine by Kligler & Olitzki (1933).

In 1941 the frequency of hepatitis in the 9 subdistricts, as shown in Table 4 and Fig. 1, ranged from 36.2 per 1000 in Tulkarm (6) and 26.8 in Safad (1) to 2.5 in Baisan (3) and 0.6 in Jerusalem (9). During 1942 incidence rose in all but one of the subdistricts and was higher in Safad (1), Haifa (5), Tulkarm (6) and Jaffa (7) than elsewhere (Fig. 2). In 1943 Safad (1) and Tiberias (2), both in the

Galilean region, were most severely affected (Fig. 3), with Tulkarm (6) occupying third position, and incidence in all subdistricts again generally high (Table 4). In 1944 the rate was still high in Safad (1) but relatively low elsewhere (Fig. 4).*

The trend of the rates for each subdistrict during this 4-year interval is shown in Fig. 5. It is apparent

that incidence rose sharply to an epidemic peak in 1942 in the coastal districts of Haifa (5), Tulkarm (6) and Jaffa (7). The epidemic reached its peak in the Galilean subdistricts of Safad (1) and Tiberias (2) in 1943, a year later, but incidence was high in Safad throughout the period. The districts least affected were the plain of Baisan (3) and those in the

Table 3. *Palestine: trend of infective hepatitis and of other liver diseases among patients in Hadassah Medical Organization Hospitals, 1924-44*

Year	Total patients admitted†	Per cent Jewish population	Infective hepatitis		Other liver diseases	
			No. of cases	Per 1000 admissions	No. of cases	Per 1000 admissions
1924	6,169	6.50	13	2.11	20	3.24
1925	6,762	5.56	27	3.99	36	5.32
1926	6,257	4.19	31	4.95	43	6.87
1927	6,345	4.24	52	8.20	55	8.67
1928	6,157	4.06	28	4.55	49	7.96
1929	6,207	3.97	19	3.06	26	4.19
1930	6,161	3.74	35	5.68	29	4.71
1931	5,879	3.42	29	4.93	24	4.08
1932	6,423	3.53	28	4.36	37	5.76
1933	6,559	3.11	16	2.44	22	3.35
1934	7,394	2.89	27	3.65	65	8.79
1935	8,678	2.70	23	2.65	71	8.18
1936	9,755	2.63	38	3.90	110	11.3
1937	9,783	2.52	46	4.70	123	12.6
1938	10,101	2.51	14	1.39	150	14.9
1939	11,184	2.60	60	5.36	153	13.7
1940	12,559	2.75	35	2.79	167	13.3
1941	13,425	2.86	57	4.25	167	12.4
1942	14,154	2.96	52	3.67	200	14.1
1943	13,941	2.83	49	3.52	186	13.3
1944	13,470	2.61	30	2.23	163	12.1
Average		3.44		3.92		8.99

† Exclusive of cases in the Obstetrical Department and Nursery.

Table 4. *Palestine: infective hepatitis cases per 1000 members of the Workers' Sick Fund in villages of each government administrative subdistrict‡*

No.	Administrative subdistrict	1941	1942	1943	1944	Average 1941-4
1	Safad	26.8	22.0	41.6	35.9	31.6
2	Tiberias	12.7	15.0	29.7	18.5	19.0
3	Baisan	2.5	7.5	6.9	4.9	5.5
4	Nazareth	20.3	16.1	12.2	14.9	15.9
5	Haifa	18.9	25.7	22.8	11.1	19.6
6	Tulkarm	36.2	42.0	25.2	6.2	27.4
7	Jaffa	10.0	20.5	19.0	9.5	14.8
8	Ramleh	2.8	12.0	17.1	11.9	11.0
9	Jerusalem	0.6	1.8	1.9	0.2	1.1

‡ The figures refer mainly to the plains (coastal plain, Jezreel and Baisan plains, and the upper Jordan Valley) in which are concentrated the Jewish rural settlements controlled by W.S.F.

* In Figs. 1-4 only those parts of the subdistricts are shown that are actually inhabited by a considerable number of Jews.

mountains to the south, Ramleh (8) and Jerusalem (9), for which the average rates for the period were 5.5, 11.0 and 1.1 per 1000 respectively (Table 4). It is apparent, then, that the country has recently experienced an outbreak of the disease which in some subdistricts attained almost explosive proportions. Coastal districts were the first to be affected, with the peak of the epidemic reaching the interior a year later. By 1944 incidence was receding in all but one of the subdistricts.

The data obtained from the Government Department of Statistics are too few to permit an analysis of the regional distribution of infective hepatitis in the non-Jewish parts of the country, but they suggest that no districts escaped the infection. Moslems and Christians admitted in 1944 to hospitals serving the various towns and neighbouring villages numbered: Jerusalem 43, Haifa 27, Jaffa 54, Upper and Lower Galilee 30, Samaria 24, Gaza 12, Bethlehem, Hebron and Beersheba 14.

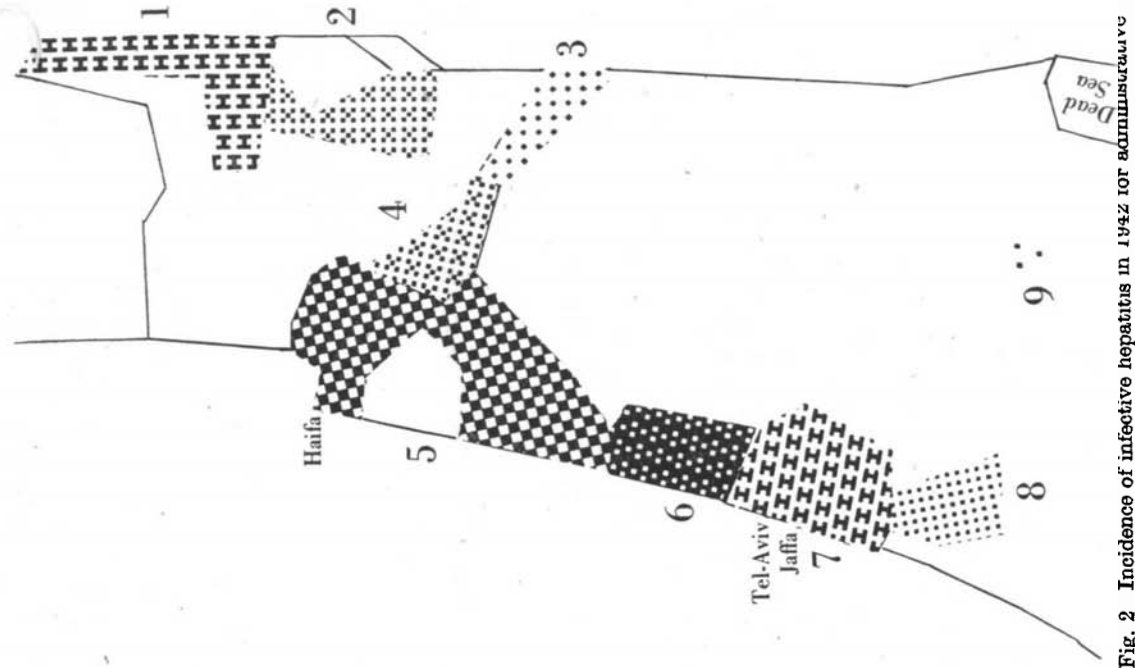
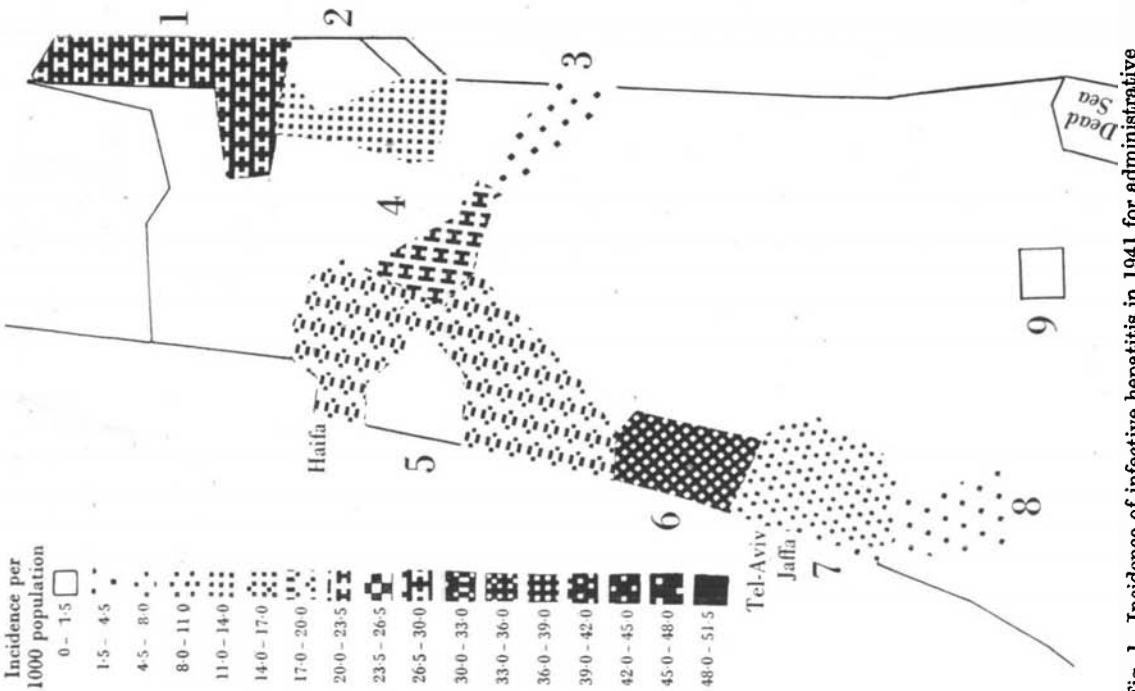


Fig. 2 Incidence of infective hepatitis in 1942 for administrative subdistricts excluding towns (W.S.F. records).



Incidence per 1000 population

- 0-1.5
- 1.5-4.5
- 4.5-8.0
- 8.0-11.0
- 11.0-14.0
- 14.0-17.0
- 17.0-20.0
- 20.0-23.5
- 23.5-26.5
- 26.5-30.0
- 30.0-33.0
- 33.0-36.0
- 36.0-39.0
- 39.0-42.0
- 42.0-45.0
- 45.0-48.0
- 48.0-51.5

Fig. 1. Incidence of infective hepatitis in 1941 for administrative subdistricts excluding towns (W.S.F. records).

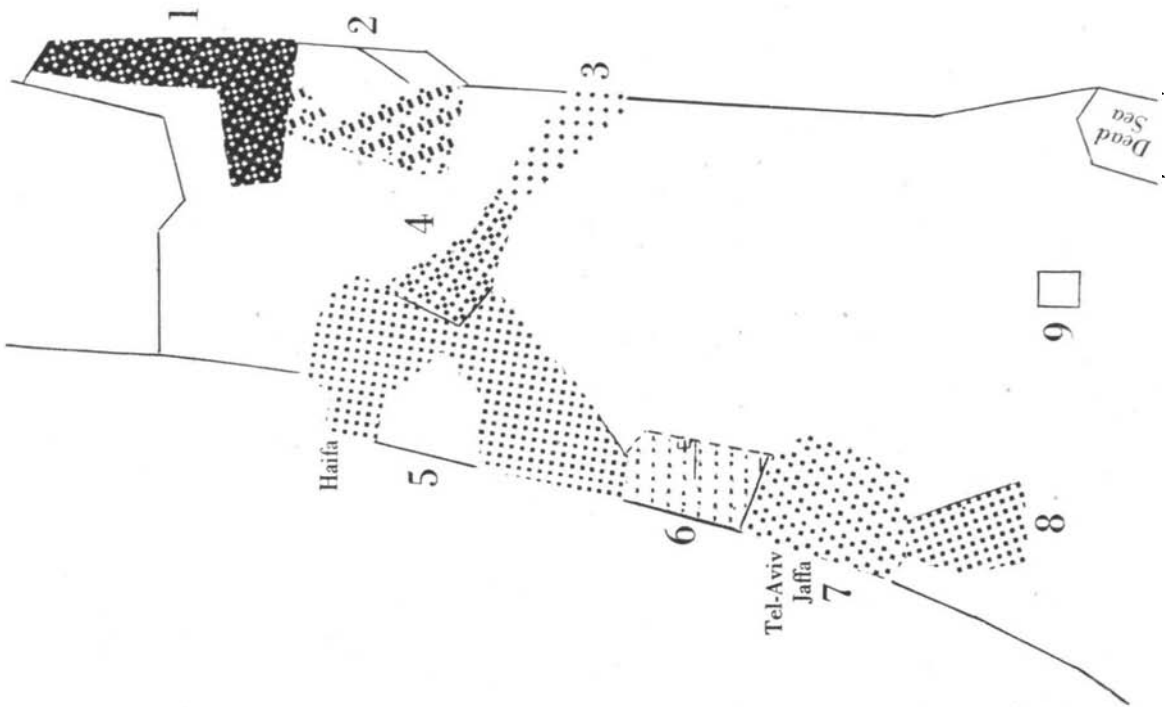


Fig. 4. Incidence of infective hepatitis in 1944 for administrative subdistricts excluding towns (W.S.F. records).

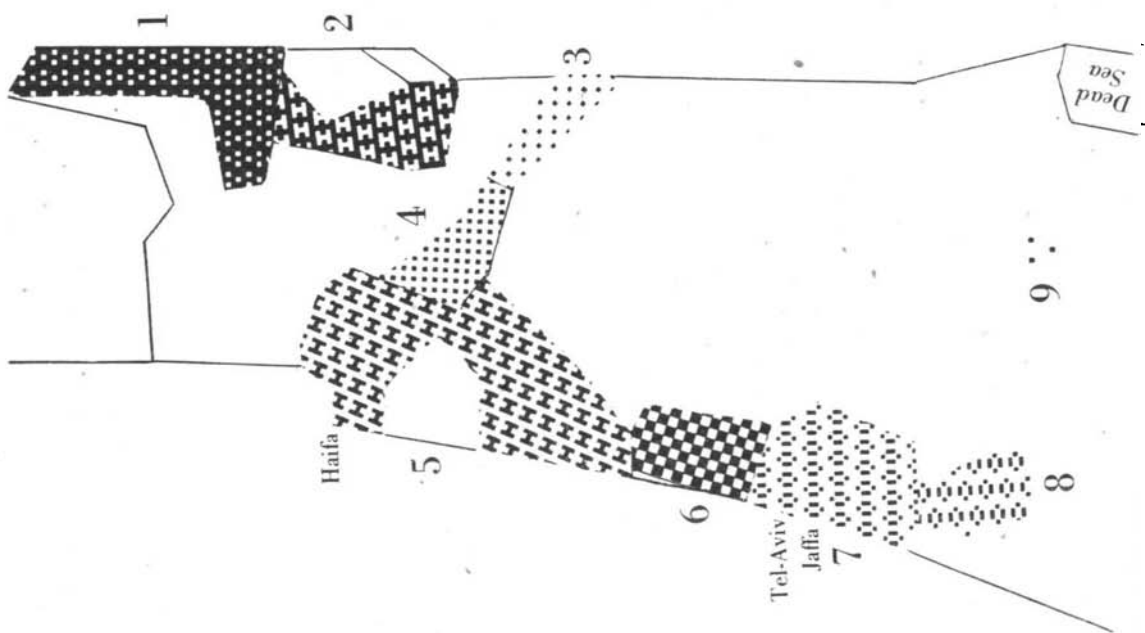


Fig. 3. Incidence of infective hepatitis in 1943 for administrative subdistricts excluding towns (W.S.F. records).

MONTHLY DISTRIBUTION OF
HEPATITIS CASES

Since the monthly frequency of infectious diseases in Palestine is more or less determined by the mode of transmission, the seasonal distribution of infective hepatitis cases assumes special interest. Kligler & Olitzki (1933) found that among intestinal diseases,

number of cases admitted each month of a given year was divided by the total for the year and the proportions thus obtained for corresponding months over the 20-year period were averaged. Then, each of the 12 averages was multiplied by 1200. Table 5 contains the indices obtained in this manner for cases of infective hepatitis and of all other liver diseases for various groups of patients admitted to

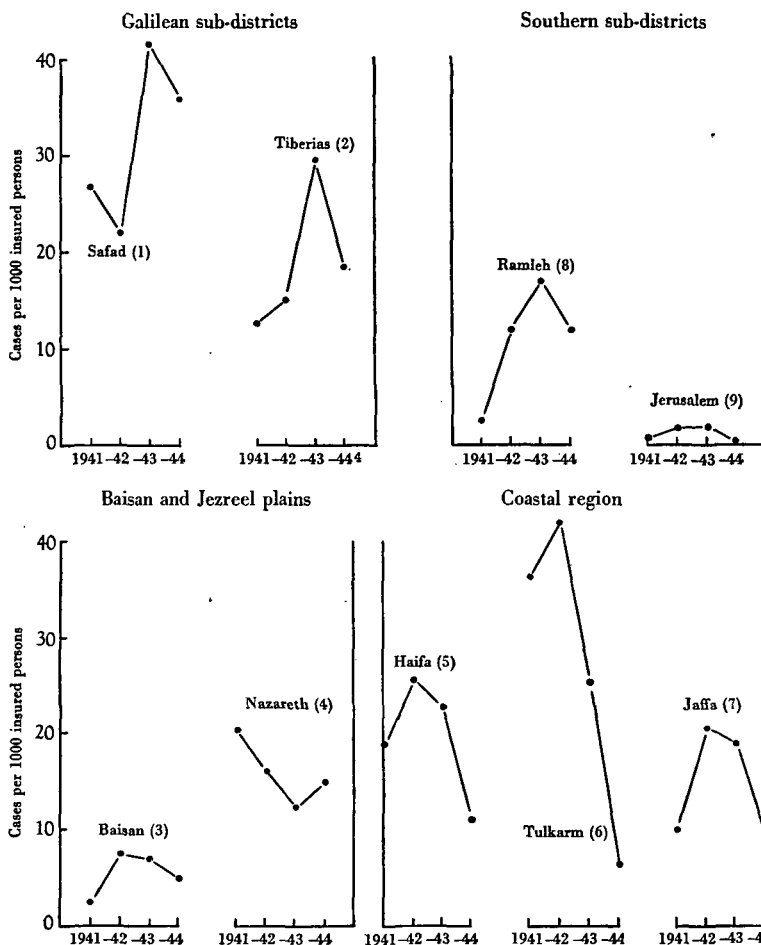


Fig. 5. Trend of incidence of infective hepatitis during the years 1941-4 for administrative subdistricts excluding towns (W.S.F. records).

bacillary dysentery showed a bimodal curve with one peak in May and a second, which was often the major peak, in November. They found typhoid fever rising to one peak in July and to another in October, while the respiratory infections, influenza and pneumonia, attained their greatest frequency in December.

Records of patients admitted to H.M.O. hospitals served as the basis for the analysis of the seasonal distribution of hepatitis cases, and the monthly indices were obtained in the following manner: The

H.M.O. hospitals. Their monthly trends are shown in Figs. 6 and 7, with the year beginning in May, which was the month with the lowest index.

The frequency of hepatitis among adults rose from a minimum in May to a peak in December and then dropped (Fig. 6). Among children under 4, however, the index rose sharply from a minimum in May to a peak in July and August; it receded in September and later rose to a major peak in December. Among children between 4 and 14 years of age,

the index was lowest in June, rose to a major peak in December, dropped, and then rose again in

Table 5. *Palestine: monthly frequency indices of infective hepatitis and other liver diseases among patients of Hadassah Medical Organization Hospitals, 1924-44*

Month	Infective hepatitis				
	All patients	Adults only	Children (years)		Other liver diseases
			0-3	4-14	
January	154	166	86	128	88
February	86	91	52	86	87
March	83	76	69	143	93
April	59	65	34	43	81
May	42	41	17	71	113
June	59	63	69	29	118
July	91	91	137	57	99
August	95	97	137	43	110
September	88	95	34	86	85
October	121	117	154	128	118
November	134	123	172	171	101
December	186	175	240	214	108
Total cases analysed	709	555	70	84	1896

The monthly indices of cases of infective hepatitis among persons benefiting from the two sick funds and of children under the supervision of Health Welfare Centres are given in Table 6. The sick-fund groups also show frequencies reaching a maximum in December and January, but among children the indices were high during a 6-month period from August through January.

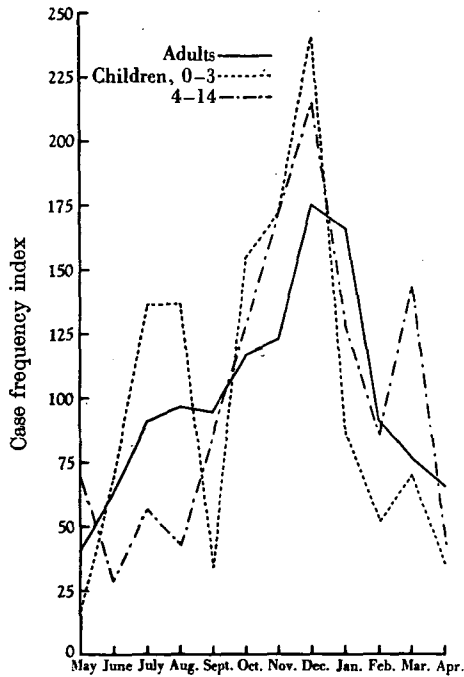


Fig. 6. Monthly trend of infective hepatitis indices for specific age groups (H.M.O. hospital records, 1924-44).

March. In Fig. 7 the sharp rise and fall of the indices for all hepatitis cases is in marked contrast with the mildly fluctuating course of those for all other liver diseases.

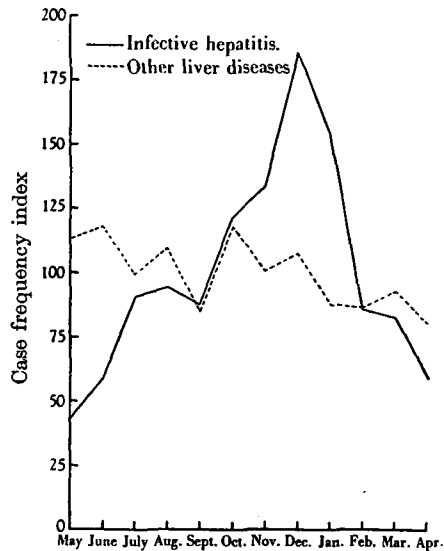


Fig. 7. Monthly trend of infective hepatitis indices compared with those of other liver diseases (H.M.O. hospital records, 1924-44).

Apart from the seasonal trends given by data from the country as a whole, there are regional variations of three general types (Fig. 8). The first is the single-peaked distribution given by the W.S.F. data for the whole country, Tel-Aviv, the Jordan Valley and the southern part of the coastal plain. In these regions incidence attained a single high peak in the winter months. The second type of distribution is that shown by data from Haifa and its surroundings and by the mountainous region around Jerusalem. In these places there was a major peak in the winter and a lesser elevation in the late summer. The third type exhibits two or three peaks of similar magnitude, one in the summer, another in winter and possibly a third in the spring (March). This type of distribution characterized the data for Upper Galilee, the Jezreel plain and the coastal region of Samaria south of Haifa. It is of interest that similar local variations were noted by Kligler & Bachi (1945) in the seasonal occurrence of typhoid- fever cases.

The significance of the age and regional differences in the seasonal occurrence of infective hepatitis is not clear, and when the indices are derived

from small numbers these differences may not be important. The single-peaked distribution characterizes both H.M.O. hospital and W.S.F. data for the country as a whole, and in this respect resembles that for the respiratory diseases. There appears to be a subsidiary rise, however, in the frequency index for young children during the summer months.

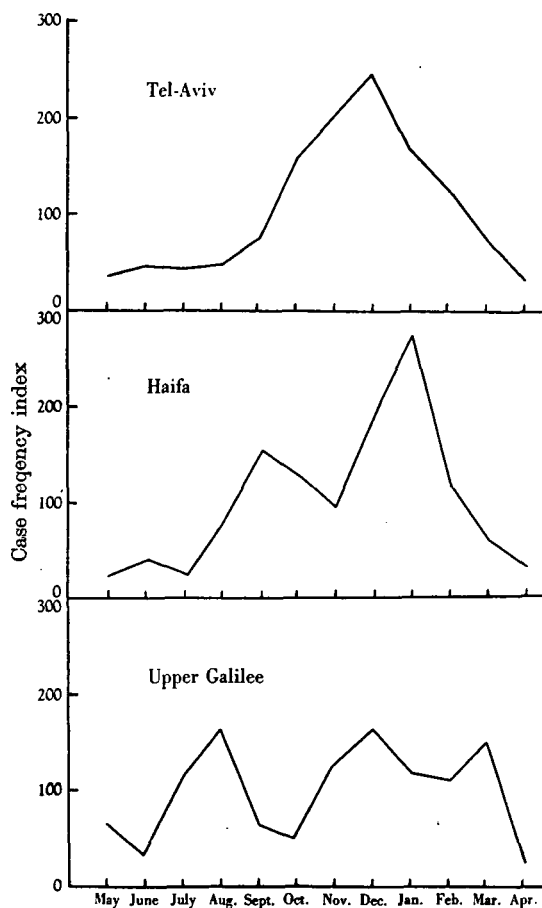


Fig. 8. Three types of seasonal distribution of infective hepatitis indices in various parts of Palestine (H.M.O. hospital records, 1924-44).

COUNTRY OF ORIGIN OF PERSONS AFFECTED

The Jewish people in Palestine are congregated in three types of communities, depending on the part of the world they came from. The Ashkenazi communities contain the Europeans, who comprise at present about 80% of the Jewish population. Sephardi communities contain Jews from the Mediterranean basin, while the Oriental communities comprise those from countries of the Near East, Yemen, Iraq, Kurdistan, etc. Persons in the

Oriental communities live under relatively primitive conditions.

Table 7 contains the data for children under the supervision of Health Welfare Centres, according to type of community as described above. Apparently incidence of hepatitis among Ashkenazi pre-school children did not differ from that for Sephardi and Oriental children. Among school children the rate in 1942-3 in Ashkenazi communities was definitely higher than that for the other group (16.5 as compared with 5.3 per 1000), but during the next 2 years the rates for this group were only slightly above those for Sephardi and Oriental children.

AGE AND BIRTHPLACE OF PERSONS AFFECTED

Information regarding the distribution of hepatitis cases by age is limited to that for hospitalized patients, and the resemblance that such a distribution bears to that for the population at large depends upon (1) the severity of the disease among persons in different age groups, which determines the frequency with which affected persons enter the hospital, and (2) the ratios of hospital admissions to persons of specific age groups of the population. For what they are worth the data are presented in Table 8 together with age specific rates derived from the average annual number of cases in H.M.O. hospitals and the Jewish population. Data in this last column of the table suggest that frequency of the disease was relatively high among children, rose to a peak among young adults and then dropped.

The age specific percentage distributions for various groups of hospitalized patients are shown in Table 9. Again the interpretation of the data is difficult, since corresponding distributions for the total population of the groups are not given. In this table the data for H.M.O. hospitalized patients have been classified according to place of birth and to type of community.

The interesting feature of this table is the large proportion of hepatitis cases, nearly 50%, among children under 5 who were born in Palestine, whereas approximately 60% of the foreign-born patients were between 15 and 29 years of age. In fact the distributions of patients by age differed with respect to place of birth, not with the type of community. The data suggest, therefore, that infective hepatitis is primarily a disease of childhood in the native population, while for immigrants, among whom there are fewer children, infection is more prevalent later in life.

SEX, LENGTH OF RESIDENCE IN PALESTINE AND MARITAL STATUS

Jews. Records for the years 1933-42 indicate that 51.7% of Jewish immigrants were females and

*Infective hepatitis among civilians in Palestine*Table 6. *Palestine: monthly frequency indices among persons supervised by sick funds, Health Welfare Centres and School Hygiene Service*

Month	W.S.F. adults and children,	R.S.B.F. adults and children		H.M.O. Health Welfare Centres, children aged 0-4,	School children under supervision,
	1941-4	1943	1944	1943-4	1942-4*
January	202	285	204	142	239
February	126	318	102	82	135
March	65	139	11	52	55
April	38	46	45	52	7
May	40	40	45	22	14
June	42	46	34	15	25
July	48	53	102	22	—
August	71	33	136	112	—
September	79	33	91	104	—
October	102	66	91	224	75
November	152	33	158	201	127
December	235	106	181	171	222
Total cases analysed	7718	181	106	133	871

* School years 9 months only.

Table 7. *Palestine: infective hepatitis cases per 1000 Jewish children under supervision according to type of community**

	Ash- kenazim	Sephardim and Orientals	Total
Pre-school children in Health Welfare Centre with majority			
Infants (0-1):			
1942	1.3	2.6	2.0
1943	—	1.3	0.7
1944	3.3	2.7	3.0
Average 1942-4	2.7	2.6	2.7
Average no. under supervision	2959	3196	6155
Children (1-4):			
1942	5.2	5.7	5.5
1943	4.0	2.6	3.1
1944	7.2	7.7	7.5
Average 1942-4	5.5	5.3	5.4
Average no. under supervision	4788	7487	12,275
School children with majority			
1942-3	16.5	5.3	13.0
1943-4	4.3	2.6	3.7
1944-5	7.0	3.5	5.7
Average 1942-5	9.3	3.8	7.5
Average no. under supervision†	16,586	8860	25,446

* Ashkenazim, of European origin; Sephardim, from the Mediterranean basin; Orientals, from the Near East.

† Exclusive of school children in Tel-Aviv municipality.

48.3% were males. Among females 40.8% were single and 59.2% married, and the corresponding percentages for males were 51.6 single and 48.4 married. The sex distribution was similar, therefore, but fewer male immigrants were married.

Sickness records from the H.M.O. hospitals suggest that among persons under 16 years of age the incidence of infective hepatitis among boys did not differ from that for girls. The number of cases among Ashkenazi males and females born in Palestine or immigrants to the country was as follows:

	Infective hepatitis	Infective hepatitis in pregnancy	Other liver diseases
Born in Palestine:			
Males	38	—	9
Females	31	1	38
Immigrants:			
Males	322	—	94
Females	166	33	318

Among natives the cases were apparently similarly distributed as to sex, but among immigrants a larger proportion (62%) were males. More females than males were affected with other liver diseases.

The percentage distribution of hepatitis cases in H.M.O. hospitals in Tel-Aviv and Haifa by length of residence in Palestine, according to marital status, are shown in Table 10 for persons over 15 years of age. The tabulation is based on records for 218 males and 97 females for whom complete data were available, and does not include those for pregnant women.

Among unmarried persons 51% of both males and females had been in residence from 1 to 2 years only, while among married persons this proportion was 27% for all persons, with the frequency among married females less than half that among married males. The greater speed with which infection was acquired by single persons, particularly single males, was probably due to the necessity for living and eating in public hostels and restaurants. Some of the married men may have come without their families and likewise incurred infection in public eating places soon after arrival.

Non-Jews. Data concerning Christians other than policemen are too few for consideration. Among Moslems 71 males and 38 females were admitted to hospitals with infective hepatitis in 1944. In 1943 Moslem admissions to hospitals included 15,514 men and 8866 women, giving a proportion of men to women slightly lower than that for the hepatitis cases. It seems probable, therefore, that the disease in the Moslem community occurs with similar frequency among males and females.

DURATION OF ILLNESS

The number of days of absence from school among children with infective hepatitis is shown in Table 11 and may be considered an indication of the duration of illness. The 364 cases pertained to 2 school years, and the absence periods ranged from less than 5 to 30 days or more, with an average of about 17 days.

While school absences may overestimate the length of illness, an understatement is that given by the number of days spent in the hospital, which is known for H.M.O. hospital patients for the years 1924-43. The average period for patients of specific ages is shown in Table 12. The averages for children between 5 and 15 years of age were slightly under those given by absences from school, and for all persons between 11 and 40 years the periods of hospitalization averaged about 15 days. Among patients over 40 the period was somewhat longer.

OCCUPATIONAL STATUS OF AFFECTED PERSONS

In Table 13 the patients with infective hepatitis admitted to H.M.O. hospitals during the period 1924-44 are distributed by occupational status. Although Table 1 indicated a significantly higher frequency of the disease in rural communities, as based on W.S.F. data, only about 5% of the hospitalized persons were engaged in agriculture, forestry or fishing. It is probable, however, that the hospital patients came more largely from urban areas. Inasmuch as information regarding occupation is not available for the total Jewish population, the implications of the data presented in Table 13 are not known.

SUMMARY AND CONCLUSIONS

A study has been made of the epidemic and endemic aspects of infective hepatitis as it affects the civilian population of Palestine. Since the data analysed pertain primarily to Jews who have migrated to the country during the last 25 years, the results must be interpreted in terms of this group, although available data for other segments of the population are presented. The analysis was based on (a) records of persons who were members of the Sick Fund of the General Federation of Jewish Labour (W.S.F.) and the Rural Sick Benefit Fund (R.S.B.F.), (b) records of infants and children under the supervision of the Hadassah Medical Organization (H.M.O.) and the Tel-Aviv municipality, (c) records of persons admitted to H.M.O. hospitals over a 20-year period, and (d) records of the Government Department of Statistics for 1944.

Sick-fund records and those of supervised children afford reasonably reliable incidence rates for these groups in various parts of the country. Hospital records, however, which have been the only source

*Infective hepatitis among civilians in Palestine*Table 8. *Palestine: age incidence of infective hepatitis among hospital admissions and the total population*

Age	Cases of infective hepatitis per 1000 hospitalized patients in each age group			Average annual no. of cases of infective hepatitis per 100,000 population in each age group
	All hospital patients 1944		H.M.O. hospitals 1924-44	H.M.O. hospitals 1924-44
	Moslems	Jews	Jews	Jews
0-4	0.6	1.3	2.7	10.9
5-9	0.6	1.9	5.0	6.7
10-14	3.0	3.7	3.5	9.4
15-19			15.5	
20-29	5.2	4.1	21.7	19.6
30-39	6.8	3.3	6.6	7.5
40-49	4.1	2.8	3.1	5.3
50+	4.7	2.4	2.6	5.5
Average	4.3	3.0	6.3	10.3

Table 9. *Palestine: percentage distribution by age of hospitalized infective hepatitis cases among native and foreign-born Jews by type of community*

Age	Jewish infective hepatitis cases in H.M.O. hospitals, 1924-44						
	Cases of infective hepatitis in hospitals other than H.M.O., 1944		Born in Palestine			Born abroad	
	Moslems	Jews	All patients	Ashkenazim	Sephardim and Orientals	Ashkenazim	Sephardim and Orientals
0-4	0.8	4.7	11.8	49.6	48.5	1.2	7.1
5-9	0.8	3.5	6.1	20.3	20.4	1.9	6.0
10-14	3.2	2.3	4.2	11.9	4.9	2.7	8.0
15-19	11.9	10.5	11.2	7.0	4.9	11.7	26.9
20-29	27.8	26.7	40.6	6.4	12.7	50.3	32.0
30-39	27.8	29.1	14.0	3.2	4.3	17.1	13.1
40-49	11.9	11.6	5.1	—	0.3	6.7	3.7
50+	15.9	11.6	6.9	1.7	4.1	8.4	3.1
Total	100.0	100.0	99.9	100.1	100.1	100.0	99.9
No. of cases	126	86	666	69	74	488	35

Table 10. *Palestine: percentage distribution of infective hepatitis cases according to years of residence in Palestine. Patients over 15 years of age in Hadassah Medical Organization Hospitals of Tel-Aviv and Haifa (1924-44) according to sex and marital status*

Length of stay (years)	Total	Males		Females		Males and females	
		Married	Unmarried*	Married	Unmarried	Married	Unmarried
1	22.5	17.1	30.4	7.5	22.7	13.0	28.6
2	19.0	18.6	20.3	7.5	29.5	13.8	22.4
3	13.3	11.4	16.9	15.1	2.3	13.0	13.5
4 and 5	13.3	12.9	13.5	13.2	13.6	13.0	13.5
5	29.5	38.6	18.2	50.9	27.3	43.9	20.3
Born in Palestine	2.2	1.4	0.7	5.7	4.5	3.3	1.6
Total	100.0	100.0	100.0	99.9	99.9	100.0	99.9
No. of cases	315	70	148	53	44	123	192

* Unmarried includes divorced and widowed.

of information regarding other aspects of the disease are affected to an unknown extent by various factors which determine the selection of persons who apply for hospital care. The analysis has brought out the following points:

1. Incidence of infective hepatitis has been estimated at 100 per 10,000 of the people of Palestine.

equally affected, but there were more immigrant males than females in the hospitalized group of cases. Unmarried persons evidently acquired the disease sooner after their arrival than did those that were married.

In conclusion it may be said that the information derived from the hospital records suggests that the

Table 11. *Palestine: cases of infective hepatitis among school children distributed by duration of absence from school*

Year	Days absent								Total	Mean	Average no. of pupils under supervision
	0-4	5-9	10-14	15-19	20-24	25-29	30+				
1942-3	1	38	96	64	48	10	26	283	17.0	—	
1943-4	—	8	33	10	15	4	11	81	17.9	—	
Total	1	46	129	74	63	14	37	364	17.2	25,022	
Percentage	0.3	12.6	35.4	20.3	17.3	3.8	10.2	100.0	—	—	

Table 12. *Palestine: average length of stay in Hadassah Medical Organization Hospitals of infective hepatitis patients, 1924-43*

Age	Average period of illness (days)	Number of cases
0-5	13.9	95
6-10	10.0	27
11-15	16.3	29
16-20	14.5	95
21-30	16.0	297
31-40	15.6	75
41-50	21.1	28
50+	22.9	38
Total	15.8	684

About 2 per 10,000 Jews in the population were hospitalized with the disease. Incidence was significantly greater in rural districts.

2. Incidence rose to epidemic proportions during the years 1941-4 in the various administrative subdistricts inhabited largely by Jews. On the coastal plain the epidemic reached its peak in 1942, but in the interior incidence was highest in 1943. Rates declined in 1944.

3. Fatality was generally low, but the disease may pursue a severe and even fatal course among children and pregnant women.

4. The monthly distribution of hepatitis cases varied somewhat with age and district. In general monthly indices reached their peak in December and January and dropped to a minimum in May, but among young children a subsidiary peak appeared in July and August.

5. Among native Palestinians 50% of the hospitalized patients were under 5 years of age, whereas among those born elsewhere, whether in Europe, the Mediterranean basin or the Near East, some 60% were between 15 and 29 years of age.

6. Males and females born in Palestine were

Table 13. *Palestine: distribution by occupation of adult patients hospitalized in Hadassah Medical Organization Hospitals, 1924-44**

Occupation	No. of patients	Percentage
Agriculture, forestry and fishing	35	4.9
Industries (skilled):		
Woodwork	21	12.6
Metalwork	4	
Food products and tobacco	6	
Dress and toilet	32	
Building	19	
Industries relating to literature and artistic trades	7	
Unskilled workers, industry not defined	246	34.7
Transportation and communication	16	2.3
Commerce and finance	26	3.7
Clerical service	35	4.9
Public officials, police and army	38	5.4
Profession and liberal arts:		
Religion	16	10.8
Medicine	39	
Education	6	
Engineering	2	
Arts	3	
Students	11	
Persons of no occupation	147	20.7
Total	709	100.0

* Code used by the Government of Palestine for classification of death and birth cards.

disease is endemic in Palestine and is usually acquired in childhood. Immigrants from non-endemic regions are likely to become infected soon after their arrival. The monthly distribution of infective hepatitis cases resembles that of the respiratory diseases, but the secondary rise among children in July and August suggests that flies and food contamination may play a part in transmission.

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