Notes

Diarrhoeal Diseases in Yugoslavia, with Particular Reference to Croatia*

by H. Emili, M.D., Department of Epidemiology, Central Institute of Hygiene, Zagreb, Yugoslavia

Frequency

The data on the frequency of diarrhoeal diseases in Yugoslavia not being reliable, it is rather difficult to draw an exact picture of the situation. The data on these diseases are derived from the following sources: regular compulsory notification of cases of diarrhoea considered to have been caused by bacteria (shigellae) or protozoa (amoebae) but reported as cases of dysentery; reports on the work of hospitals and other health centres and examinations of patients under social insurance; and reports on particular surveys and special studies. Analysis of these data will often show discrepancies. The figures notified by various services in Croatia for the years 1954-56 are shown in the accompanying table.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dysentery, bacillary and amoebic</th>
<th>Gastro-enteritis and colitis of adults</th>
<th>Toxic gastro-enteritis and colitis of infants</th>
<th>Other gastro-enteritis and colitis of infants</th>
<th>Diarrhoea of newborn</th>
<th>Paratyphoid and other Salmonella infections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dept. of epidemiology</td>
<td>Hospitals</td>
<td>Social insurance</td>
<td>Dispensaries</td>
<td>Hospitals</td>
<td>Social insurance</td>
</tr>
<tr>
<td>1954</td>
<td>1 936</td>
<td>1 828</td>
<td>1 226</td>
<td>—</td>
<td>3 706</td>
<td>17 248</td>
</tr>
<tr>
<td>1955</td>
<td>1 941</td>
<td>NA</td>
<td>1 076</td>
<td>—</td>
<td>NA</td>
<td>17 662</td>
</tr>
<tr>
<td>1956</td>
<td>2 355</td>
<td>2 234</td>
<td>1 097</td>
<td>2 058</td>
<td>18 212</td>
<td>806</td>
</tr>
</tbody>
</table>

<sup>a</sup> Number of inhabitants = 4 043 000 (1953 census).
<sup>b</sup> NA = not available, as the data are undergoing statistical processing.

It can be seen, for example that there are a number of notified cases of gastro-enteritis and colitis in social insurance patients, among whom there are no doubt a large number of infective cases that are not included in the statistics of the epidemiological service. The same holds good for the notified cases of gastro-intestinal diseases in children. There is no doubt that the unreliability of the data on diarrhoeal diseases is partly due to irregular notification of these diseases by both physicians and institutions. However, it also derives in part from erroneous diagnoses and the poor use made of the help obtainable from diagnostic laboratories.

Fig. 1, for example, shows the results of the isolation of *Shigella sonnei* in the bacteriological laboratories of Croatia in the period 1949-57. There are 15 such laboratories, well distributed over the country. Whereas the figure shows that the number of *Sh. sonnei* strains isolated from material sent in for examination has been increasing in this period, it can also be seen that the number of strains isolated in laboratories in Zagreb is far greater than that isolated in laboratories outside the capital. There are two reasons for this discrepancy: first, in Zagreb

*Note submitted to the WHO Study Group on Diarrhoeal Diseases, November 1958.
the physicians and institutions check the diagnoses by bacteriological examinations more frequently; and, secondly, the work of the bacteriological laboratories in Zagreb is of a higher quality than that of the provincial laboratories.

Although there is some reason for distrusting the reliability of the data on diarrhoeal diseases furnished by the statistical services, some picture of the incidence of this disease in Yugoslavia can be obtained by analysing all sources.

Fig. 2 shows the incidence of dysentery in Yugoslavia from 1919 to 1955. There is a high morbidity immediately after the First World War, a subsequent sharp decline, a certain increase during the economic crises of 1929 and 1934 and, finally, an increase during the Second World War. From this figure may also be seen a fairly constant decrease in the case fatality rate. It should be pointed out that the vast majority of these data refer to bacillary dysentery, since amoebic dysentery in pronounced clinical forms is rather rare in Yugoslavia.

Fig. 3 shows the incidence of dysentery in Croatia to be almost the same as for the whole of Yugoslavia. In addition to the peaks appearing in the chart for Yugoslavia during the two wars and in times of economic crisis, there is another peak here in the period 1952-54, due to a change for the worse in the epidemiological situation of dysentery in the south-west of Croatia (Dalmatia). In Croatia, too, the case fatality rate shows a constant tendency to decline as a result of the increasing number of infections with mildly pathogenic dysentery strains (Sh. flexneri) and of an increased use of sulfonamides and antibiotics in the therapy of diarrhoeal diseases.

Dysentery in this part of the country was once a far more a severe disease than it is today, and Sh. dysenteriae was no doubt a more frequent representative of the shigellae than now. Fig. 4 shows high case fatality rates for dysentery (at times almost up to 40%) in some districts of Croatia towards the end of the last century. Today, the case fatality rate in these regions has not exceeded 0.4% to 0.5% for many years.

The mortality of infants and children in this country is an important sanitary and social problem, the infant mortality rate in Croatia today varying between 9.8% and 10.4%. It is very difficult to determine either the part played by diarrhoea in the morbidity and mortality of infants and young
children or the frequency of diarrhoea caused by live agents, since cases of diarrhoea are not notified regularly and since for fatal cases a secondary cause of death, often pneumonia, is usually diagnosed. It is considered, on the basis of observations in the field, that every fifth to sixth child in Croatia is affected by diarrhoea.

According to the records of the epidemiological service, the dysentery morbidity rate in children would seem to be rather high in spite of poor recording, as shown in Fig. 5, giving the incidence of dysentery by age-group for 1953.

Dysentery shows a pronounced seasonal fluctuation in Yugoslavia. Thus, for example, the monthly distribution of notified cases in Croatia in the period 1945-53 was as follows: January, 4.2%; February, 4.4%; March, 3.1%; April, 3.5%; May, 4.2%; June, 6.9%; July, 15.8%; August, 25.9%; September, 15.5%; October, 9.6%; November, 4.0%; December, 2.9%. Along the Istrian coast, and particularly in Dalmatia, the infection often culminates even earlier, in July. No doubt at this season of the year the actual number of cases is far greater than that in fact recorded.

Finally, it should be pointed out that diarrhoeal diseases in children and adults are, in view of their high incidence, not only a health problem in Yugoslavia, but an economic problem too, since considerable funds have been invested for their control and treatment. We therefore believe that a controlled investigation of diarrhoeal diseases in Yugoslavia would prove of general importance for both the public health and the economy of the country.

Outline of programme of investigation

Investigation of the etiology, epidemiology and prevention of diarrhoeal diseases is one of the most compelling tasks facing the public health authorities in Yugoslavia because of the high incidence and great importance of these diseases.

A number of investigations have already been made and a great deal of knowledge has been accumulated, but there are still many problems to be solved whose complexity requires well-co-
ordinated and well-planned research. A multidisciplinary approach and team work seem to be the only methods which may be expected to yield good results, and consequently further investigations in this field will be planned in such a way as to ensure team work and good co-operation among the various disciplines involved.

The following is an outline of a possible programme of investigation under joint study by the School of Public Health and the Central Institute of Hygiene in Zagreb. The actual planning, organization and co-ordination of the investigation would be carried out by a commission, along the lines of the well-known Yugoslav Typhoid Commission.

**Statistical approach.** Since it appears that the data collected so far are unreliable both as regards the number of cases and their etiology and as to the accuracy of the diagnoses, it is intended that as a first step a rather small limited area with relatively good health services should be chosen and an attempt made to discover, diagnose and record all outbreaks and sporadic cases of diarrhoeal disease and to compare earlier data with the new findings. This may make it possible to estimate both the degree
of under-reporting and the real incidence and importance of diarrhoeal diseases in the country.

Meteorological data for the country are already in hand. Statistical analysis of these may give an opportunity to find out what relation, if any, exists between diarrhoeal diseases and weather conditions in the various regions and climatic zones throughout the year. This in turn may make it possible to determine which meteorological conditions favour outbreaks of diarrhoeal diseases and thus to devise adequate preventive measures for particular times of year.

Records from laboratories and clinical wards and from the social insurance service could also be studied in order to determine the reliability of the data collected.

Study of etiology. Studies of the etiology of diarrhoeal diseases have been limited to the microbiological and parasitological aspects and have yielded rather poor results, leaving a large proportion of the diarrhoeal diseases undiagnosed. It is therefore necessary to make a more profound investigation into all possible etiological factors and their complex interrelation. One of them —weather—has already been mentioned above.

This research will be conducted by a team of bacteriologists, parasitologists, virologists, nutritionists, sanitary engineers, clinicians and epidemiologists.

From earlier investigations carried out in Yugoslavia it is apparent that the presence of shigellae in stools does not necessarily give rise to disease and that, on the other hand, diarrhoea is frequently met in which no bacterial agents are found. Very little is known about the virus origin of diarrhoeas, and this has to be investigated further.

Observations (made by Dr. B. Cvjetanović) in some areas of Yugoslavia have shown that chronic diarrhoeas are connected with pellagra and that they can be treated with vitamins. Much more research is required in order to determine the role nutrition plays in the causation of diarrhoeas and the possible preventive and curative effects of corrected nutrition. Valuable research might be conducted into the nutritional habits in different parts of the country, and particularly in remote areas with unusual diets. The areas to be investigated should be of limited size in order to ensure an accurate and complete survey.

Sanitation. In some regions (especially in Dalmatia) the incidence of diarrhoeal disease in the late summer months is very high, and this seems to be connected with the water supply (the cisterns containing polluted rainfall water, especially in late summer when the water in the cisterns is at its lowest and the risk of pollution at its highest). This problem has not been studied sufficiently and little is known about the role of cistern water in the spread of diarrhoeal diseases. An investigation of the water in these areas may give information about its importance in the spread of diarrhoeal diseases and lead to their control through relatively simple methods—chlorination, for example.

It might also be possible to carry out a programme of sanitation of all privies and waste disposal in one or two villages with high diarrhoea incidence in order to see what effect that might have.

Chemoprophylaxis. Though chemoprophylaxis with sulfa drugs should not be a substitute for sanitary measures, it is worthwhile considering it under certain conditions, such as the movement of one group (tourists, schools, army units) from one camping place to another.

Chemoprophylaxis in the armed forces has proved useful in the control of some outbreaks. It has, however, never been used among the civil population. This method should be investigated, possibly in a field trial, in order to determine its efficiency both in checking an outbreak and in preventing the spread to new foci.