NEPHRITIS IN NORTH YORKSHIRE

BY

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Outbreaks of acute glomerulonephritis have been reported, associated in recent years with *Streptococcus pyogenes* type 12 and sometimes with other types (Rammelkamp, 1954). As the potentially epidemic nature of nephritis may still not be generally recognized, some events in northern Yorkshire during the past 18 months are recorded.

Present Investigation

On March 25, 1957, it was learnt that during the last fortnight in January there had been 24 cases of acute pharyngitis among 56 boys in a residential school for the educationally subnormal, followed 10–19 days later by acute nephritis in four of them and suspected rheumatic fever in a fifth. On February 15 all the children were given oral penicillin, and this was continued for three days. The school, which was situated in a small and rather isolated village, was visited on March 26, and nose and throat swabs and urine specimens were obtained from the 24 children who had been ill. *Str. pyogenes* type 12 was isolated from seven; the urine of three of the four who had had nephritis still contained blood cells in moderate numbers, and that of the fourth was clear; red cells were also present in the urine of five other children, two of these specimens also showing casts.

In order to ascertain the extent and effect in the community of the type 12 infection, the small local primary school (school A), a quarter of a mile (400 m.) away, was visited on March 31 and specimens were obtained from the pupils. It was clear from the results (see Table), and from the fact that a clinical case of nephritis was found, that the outbreak was not limited to the residential school. Six primary schools in villages within a 5-mile (8-km.) radius were therefore visited during the next few days, and evidence of type 12 infection was found in three of them (B, C, and D). The Table shows that 11 streptococcal strains isolated from school C were of a degraded type. Dr. R. E. O. Williams, of the Streptococcal Reference Laboratory, who was responsible for the typing of all the strains

Incidence of Str. pyogenes Type 12, Acute Nephritis, and Symptomless Urine Abnormalities in Pupils Attending Certain Schools in March–April, 1957

School	No. of Pupils				
	Examined	Harbouring <i>Str. pyogenes</i> Type 12	With Acute Nephritis	Showing Symptomless Urine Abnormalities	
				Red Blood Cells	Casts
Residential ..	24	7 (29%)	4	5	2
A* ..	26	14 (54%)	1	11	4
B..	34	16 (47%)	0	6	0
C ..	48	11 (23%) (degraded)	0	13	2
D ..	38	3 (8%)	0	0	0
E..	18	0 (—)	0	0	0
Secondary ..	570	32 (6%)	0	Not tested	
Secondary Form 1B	32	9 (28%)	0	3	0

* In the same village as the residential school.

mentioned in this report, found that these strains belonged to a type related to 12, but he could not be certain whether they were derived from type 12 strains. The strains isolated from the other schools were typed without difficulty. Urine was obtained from the children in the four positive schools (A, B, C, and D), and in one negative school (E). Red blood cells were seen in 31 of the 146 specimens from the positive schools but not in 18 specimens from the negative school. Only one of these children had symptoms of nephritis—the case in school A already mentioned.

Children over the age of 11 years from the affected villages attended a large bilateral secondary school 7 miles (11 km.) away from the centre of the original outbreak. In order to assess the extent to which infection had been carried into an unaffected locality by the older children, it was decided to investigate children at this school. Throat and nose swabs were taken from the whole school early in April and urine specimens were examined from children in the form (1B) showing the highest proportion of type 12 strains. The number of red cells found in the urinary deposits of children from the different schools ranged from 1 to 50 per high-power field; as there was no standard of normality with which to compare these findings, urine samples were obtained from 287 children of similar age in two schools 20 miles (32 km.) away from the affected area. No red cells or casts were found in any of them.

No further cases of nephritis came to our notice until December, 1957, when three occurred in the Northallerton District, some 25 miles (40 km.) north of the original outbreak. Further cases occurred in the York City and Northallerton areas during January and February, 1958, so at the beginning of March circular letters from the county medical officer and from the pathologist in York were sent to all doctors in York and the North Riding warning them of the situation and asking for information on cases of nephritis. During the first six months of 1958, 27 cases were unofficially notified in and around York City, and a further 18 in or near Northallerton. In York, 25 of the 27 cases were admitted to hospital and two were treated at home. Four of the hospital cases were admitted to surgical wards—three adults for investigation of haematuria and one child as an abdominal emergency. All 27 patients were examined bacteriologically, but mostly some time after onset and many had already received antibiotic treatment; *Str. pyogenes* type 12 was isolated from nine cases and type 22 from another. In Northallerton, 15 of the 21 cases were admitted to hospital and six treated at home. Throat swabs were taken from 14 cases; eight yielded *Str. pyogenes* type 12 and one a group B streptococcus. One patient, although having a negative swab, had antibodies to *Str. pyogenes* type 12 in her blood, and another, also with a negative swab, had a sibling from whom a type 12 strain was isolated.

We are thus aware of 53 cases of frank acute nephritis in York or the North Riding during the past two winters—5 in the first winter and 48 in the second. *Str. pyogenes* type 12 was isolated from 19 of them, and many of the remainder were either not swabbed or not swabbed at a suitable time. In addition, 38 children in schools were found to have red cells in the urine but no symptoms of nephritis; *Str. pyogenes* type 12, or a related type, was isolated from 19 of these. All but four of the cases of nephritis had a history of sore throat or otitis media, and so did most of those with haematuria but no clinical illness. In some cases, however, the initial infection was not severe enough for the patient to seek medical advice. No cases followed scarlet fever.

There was no evidence that the infection was transmitted except by direct contact. The sexes were equally affected, and the commonest age group was 5–15 years, which was the group most fully investigated. Nevertheless adult cases of nephritis occurred in both sexes, the oldest being a woman of 37 and a man of 44. The average period between infection and the onset of nephritis in those giving a reliable history was 14 days; the time ranged from 7 to 24 days, but in only two cases did it exceed 18 days.

Summary

An epidemic of nephritis associated with *Streptococcus pyogenes* type 12 occurred in York and in predominantly rural areas of the North Riding during the winter months of 1957 and 1958. In several schools in which there was evidence of type 12 infection in 1957 some children were also found with symptomless haematuria. Spread of infection took place in schools and at home. Symptoms of the initial streptococcal infection were usually present but often slight, and were followed by the onset of nephritis 7 to 24 days later.

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REFERENCE

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AN OUTBREAK OF NEPHRITIS IN NORTHAMPTONSHIRE

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In April, 1957, the head teacher of a village school telephoned the county health department to say that three children in the upper junior class at his school had fallen ill with nephritis within a period of a month. A fourth child, in the lower junior class, had been taken by his parents to Portsmouth, where he had become ill; the doctor had diagnosed pyelitis and sent the family home. Another child in the village attending a different school was under observation by the family practitioner with a sore throat and puffiness under the eyes. As a result of this outbreak there was considerable anxiety amongst the parents in the village; some of the children were being kept away from school unnecessarily, others were returning to school in an unfit condition. Although there had been a considerable amount of upper respiratory infection in the infant and lower junior classes in the early months of the year, it was not until April that the upper junior class had been affected, and it was in this month that nephritis had suddenly arisen as a complication.

Investigation

The school, which was visited on the same day, was soundly constructed and the rooms were well ventilated and

not overcrowded. All the children and staff were examined, and swabs were taken from any lesions suggestive of streptococcal infection. Group A type 12 haemolytic streptococci were obtained from lesions in two children in the upper junior class in which the cases of nephritis had occurred. One of the two children had a sore throat, the other a sore place in the nostril. The desks occupied by these two children and the children with nephritis were not grouped, but were dispersed among other desks in the classroom.

Apart from reassurance and advice to the head teacher it seemed desirable to assess the size of the outbreak. From discussions with practitioners it was evident that other cases had occurred in near-by villages, and from the paediatric department it was learned that about 25 children from the county had been admitted to hospital with nephritis since the previous October. In order to obtain further information Dr. C. M. Smith, the County Medical Officer of Health, wrote to all doctors practising in the county giving them particulars of the outbreak and asking to be notified of any cases under their care. From the replies received it is possible to present the following information.

Epidemiological Distribution

Only four cases were ascertained in 1955 (Fig. 1). Then in the first quarter of 1956 five children living in Kettering were taken ill; three of them lived in the same neighbourhood—two in houses almost opposite each other. Two months later cases were reported from Wellingborough, where the infection continued until June of the following year. By March and April, 1957, the infection had spread south-west to Northampton County Borough and had reached considerable proportions, the incidence in the county town being reflected in several small outbreaks in the outlying village communities, such as that already described. The infection then appeared to continue south-west, and by the late autumn it looked as though it was dying out. Over the winter months, however, another, and smaller, outbreak occurred, which was centred round Northampton, and again cases occurred in outlying villages and towns which had not been affected in the first outbreak.

It would be unwise to draw conclusions from data which are probably incomplete. Nevertheless, from the cases ascertained it can be said that there was no similarity between the distribution of cases of scarlet fever and nephritis during the period under review. Many of the scarlet-fever notifications were sporadic "dropping" cases, so that inevitably there were occasions when both conditions occurred in the same area at the same time. Beyond this, however, there was no evidence of association in the spread of the two infections.

Age and Sex Incidence.—In all, 89 cases were ascertained. Seventy-three occurred in children, 52% of whom were boys. One child under 3 was affected; 12 cases occurred in children aged 3 and 4 years; 45 cases in children aged 5 to 9 years; 15 cases in children aged 10 to 15 years (Fig. 2); and 16 cases in persons aged 15 years.

FIG. 1.—Nephritis in Northamptonshire. Incidence of 89 cases by month of onset, May, 1955, to May, 1958.

FIG. 2.—Nephritis in Northamptonshire. Age distribution of 73 cases in children.