High incidence of minimal change nephrotic syndrome in Asians

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SUMMARY Between 1973 and 1982 there was a significantly higher incidence of minimal change nephrotic syndrome among Asian compared with non-Asian children in Leicestershire. Most Asians in Leicestershire are Gujarati-speaking Hindus, but Sikhs and Muslims are also represented; no group of Asians (defined by religion, language, or birthplace) was at special risk of developing nephrotic syndrome. Nephrotic syndrome was more preponderant in Asian children living within the city of Leicester, and there was an unusually low incidence in non-Asian children within the city. Both racial and environmental factors may be important in the increased susceptibility to minimal change nephrotic syndrome in Asian children.

Minimal change nephrotic syndrome is universally common in childhood. Its incidence is known to vary in different populations, being 2 to 3/10^5 children aged less than 15 years per year in Europe and North America, but 11/10^5 per year in Arab children in Libya.

The incidence of minimal change nephrotic syndrome in Asians is uncertain, although a study from the Indian subcontinent confirms that, as in Western countries, more than 70% of children presenting with nephrotic syndrome will eventually prove to have minimal change disease. It has also been reported that minimal change disease is a more common cause of nephrotic syndrome in Asian than black children in a South African community.

Leicestershire has accommodated a large immigrant population in the past two decades, and 32% of births in the city of Leicester are now Asian. As there was a subjective impression that Asians were over represented among children with nephrotic syndrome, we set out to analyse this observation more carefully.

Methods

Cases of nephrotic syndrome in children aged less than 15 years at presentation were identified from hospital case records. Minimal change nephrotic syndrome was defined on the basis of steroid responsive nephrotic syndrome (complete abolition of proteinuria within four weeks in response to corticosteroid treatment (usually prednisolone 60 mg/m^2 per day)) with no hypertension or renal impairment. In some cases there was further information from percutaneous renal biopsy material analysed by light, immunofluorescence, and electron microscopy. Leicestershire (population 850,000) has a single major conurbation containing all paediatric and nephrology beds for the county in two hospitals. The peripheries of the county are largely rural, reducing cross referral to other centres and ensuring that analysis of records in the two hospitals would identify most cases.

Three cases of nephrotic syndrome were excluded where there was inadequate data to classify them with certainty (for example, corticosteroids not given, incomplete documentation of steroid responsiveness).

Epidemiological information was derived from national census data for 1981 and from an epidemiological survey of ethnic groups in Leicestershire commissioned by Leicester City Council and Leicestershire County Council (Leicester Survey 1983).

Statistical analysis was by \( \chi^2 \) test.

Results

During 1973–82, 43 cases of minimal change nephrotic syndrome presented in children in Leicestershire. All satisfied clinical criteria for the syndrome, and eight had renal biopsy evidence consistent with the diagnosis. The overall incidence was 2.3/10^5 per year. Twenty one of the 43 were Asian, however, whereas only 11.9% of primary schoolchildren in Leicestershire are Asian (Leicestershire Director of Education, personal communication). Thus the
 incidence among Asians is $9.4/10^5$ per year and among non-Asians $1.3/10^5$ per year. This difference is statistically significant ($P<0.0002$; $\chi^2$).

Asian cases were concentrated in the city of Leicester, where 33% of primary schoolchildren are Asian, and 18 of 20 cases of nephrotic syndrome were Asian. Thirteen further cases (two Asian) lived within the conurbation of Leicester, although outside the city boundary. Within the city boundary the incidence of the syndrome in Asians was $12.1/10^5$ per year, compared with $6.2/10^5$ per year in the remainder of the county.

By contrast, the incidence of nephrotic syndrome in non-Asian children within the city boundary was only $0.4/10^5$ per year compared with $1.6/10^5$ per year in the rest of the county.

Table 1 shows that there was no difference between Asians and non-Asians with nephrotic syndrome in respect of age of onset, sex distribution, or severity of disease (as judged by number of proteinuric episodes treated with steroids). No subpopulation of Asians defined by language, religion, or birthplace seemed to be at special risk of developing nephrotic syndrome (Table 2).

Much of the Asian population in Leicester lives in well defined areas of poor housing and high population density with above average male unemployment and low socioeconomic status. A number of these areas have been identified in Leicester, and have been associated with increased risk of perinatal mortality. Cases of nephrotic syndrome were grouped around two ‘high risk’ areas which also have a high Asian population. One ‘high risk’ area within the city with a large Asian population had no cases of nephrotic syndrome, however, nor were cases of nephrotic syndrome seen in non-Asian ‘high risk’ areas.

**Discussion**

The overall incidence of minimal change nephrotic syndrome in Leicestershire ($2.3/10^5$ per year) is very similar to that in previous studies, but our study shows a significant increase in its incidence among Asian children compared with non-Asians. We know of no previous, published study in the UK suggesting ethnic variations in the incidence of nephrotic syndrome, although recent observations suggest there may be a similar increase among Asian children in the West Midlands (R H R White, personal communication) and Yorkshire (S R Meadow, personal communication). These racial variations suggest that immunogenetic factors may be important. Previous studies of HLA antigen frequencies in white patients with minimal change nephrotic syndrome have been inconsistent for class I antigens, although most reports of class II antigens show an increased frequency of HLA DR$^\perp$. No HLA data are available for the children in this study.

If there are inaccuracies because of missed cases that were diagnosed and treated outside the health district, they are more likely to have lived in the peripheral county areas. The Leicester city figures are thought to be truly representative. These urban statistics show a considerable increase in Asian children with nephrotic syndrome within the city ($12.1/10^5$ per year) and a surprisingly low incidence of non-Asians ($0.4/10^5$ per year), with a large number of non-Asian cases living in the conurbation but outside the city boundary.

Asians in Leicester are predominantly Gujarati-speaking Hindus, although a variety of religion and language is represented. No particular subgroup of Asians seems to be at special risk of developing nephrotic syndrome (Table 2), a finding consistent with the observations of its high incidence in Asian children from the West Midlands and Yorkshire where the predominant groups originate from a different part of the Indian subcontinent and are Muslim.

A considerable proportion of the Asian population in Leicester is relatively poor and lives in crowded conditions. This is reflected in the high risk for perinatal mortality seen in Asian areas and suggests that environmental factors may be impor-

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**Table 1** Clinical features of nephrotic syndrome in Asians and non-Asians

<table>
<thead>
<tr>
<th>Age Mean (SD)</th>
<th>Sex distribution Boys:girls</th>
<th>Episodes of nephrotic syndrome Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian 4-2 (3-0)</td>
<td>14:7</td>
<td>6:2 (5-5)</td>
</tr>
<tr>
<td>Non-Asian 4-3 (2-8)</td>
<td>13:9</td>
<td>4:3 (3-8)</td>
</tr>
</tbody>
</table>

**Table 2** Asian subpopulations (language, religion, and birthplace) in relation to nephrotic syndrome and the population at 1981 census

<table>
<thead>
<tr>
<th>Nephrotic syndrome (n=21)</th>
<th>1981 census (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language and religion</td>
<td></td>
</tr>
<tr>
<td>Gujarati-speaking Hindus</td>
<td>12 (57)</td>
</tr>
<tr>
<td>Punjabi-speaking Sikhs</td>
<td>6 (29)</td>
</tr>
<tr>
<td>Muslims</td>
<td>3 (14)</td>
</tr>
<tr>
<td>Birthplace (n=20)*</td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>13 (62)</td>
</tr>
<tr>
<td>India</td>
<td>5 (24)</td>
</tr>
<tr>
<td>East Africa</td>
<td>2 (10)</td>
</tr>
</tbody>
</table>

*1 Muslim child born Fiji
tant for the development of nephrotic syndrome. The low incidence of nephrotic syndrome, however, among non-Asians in the city, even in poor areas, suggests it is unlikely that environmental factors alone generate the increased risk unless those factors have a strong cultural basis. It is likely that both genetic predisposition and environmental factors play a role in the high incidence of nephrotic syndrome in these children.

Further analysis of this susceptible group of children may provide new information about the pathogenesis of minimal change nephrotic syndrome.

Dr Paul Burton kindly provided epidemiological data on perinatal mortality in Leicester.

References


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Received 27 June 1985