Diabetologia (2001) 44 [Suppl 3]: B 48–B 50

Diabetologia

The large increase in incidence of Type I diabetes mellitus in Poland

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Abstract

Aims/hypothesis. A rising incidence of Type I (insulin-dependent) diabetes mellitus in different countries in Europe during the last decade has been recently reported. However, in the early 1990s, Poland was reported to have a stable low incidence of this disease. This study aimed to estimate the annual incidence of Type I diabetes in a north-eastern region of Poland (Białystok region) and investigate if it is associated with age, sex, urban rural differences and the season of disease onset.
Methods. A register of patients with Type I diabetes using two independent sets of data sources was established in 1994 as part of the EURODIAB TIGER programme. The primary data sources were paediatric and internal medicine divisions of the hospitals in the Białystok province and the secondary were outpatient diabetic clinics in the region. The degree of ascertainment was 98.5 % for the combinated data sources.
Results. We found a significant rising trend in the incidence of Type I diabetes in children under 15 years of age (in 1998 the incidence was approximately twice as high as in 1994). Increasing incidence rates were observed in the rural areas but not in urban populations. Seasonal variation in the incidence was also found, with a peak in winter and nadir in summer.
Conclusions/interpretation. These results show that the north-eastern region of Poland is an area with a moderate rather than a low risk of Type I diabetes. Our observations confirm the important role of environmental and socio-economic factors or both in the pathogenesis of Type I diabetes. [Diabetologia (2001) 44 [Suppl 3]: B 48–B 50]

Keywords Type I diabetes, incidence, Poland, epidemiology, ethiopathogenesis.

Investigators have recently reported an extremely high incidence of Type I (insulin-dependent) diabetes in Finland, the highest not only in Europe but also in the world [1]. Incidence of Type I diabetes in other countries in Europe is also thought to be rising. Poland was believed to belong, however, to the countries with a stable low incidence of the disease (4–5 cases per 100000 person-years) [2, 3]. Unexpectedly between 1993 and 1994, during screening for the ENDIT (European Nicotinamide Diabetes Intervention Trial) programme, we observed a high frequency of islet cell antibodies (ICA) among first-degree relatives of diabetic subjects in the Bialystok province, which was two to three times higher than in other parts of Poland and similar to the frequency of ICA in Finnish families [4]. However, only 10 to 15 % of new cases occur in families with a previous history of Type I diabetes, sparking speculation that these high percentages of relatives with humoral immune alterations directed against pancreatic autoantigens could reflect an increase in the incidence of Type I diabetes in the general population in the north-eastern region of Poland.

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Abbreviations: EURODIAB TIGER, EUROpe and DIABetes: Type I Genetic Epidemiology Resource; ENDIT, European Nicotinamide Diabetes Intervention Trial; ICA, islet cell antibodies

Table 1. The incidence rates and 95 %-Confidence intervals (cases per 100 000 person-years) of Type I diabetes in the north-eastern region of Poland in association with sex from 1994 to 1998

Age (years)	Total	Females	Males	Significance of sex differences (p value)
0–4	4.0 (2.7–5.7)	4.8 (2.5–8.5)	3.6 (2.2–5.6)	0.425
5–14	10.6 (8.9–12.5)	10.0 (7.7–12.7)	11.2 (8.8–14.1)	0.486
15–29	6.0 (5.0–7.4)	5.9 (4.3–7.8)	6.4 (4.8–8.3)	0.670
0–29	7.3 (6.4–8.2)	7.3 (6.0–8.6)	7.3 (6.1–8.5)	0.610

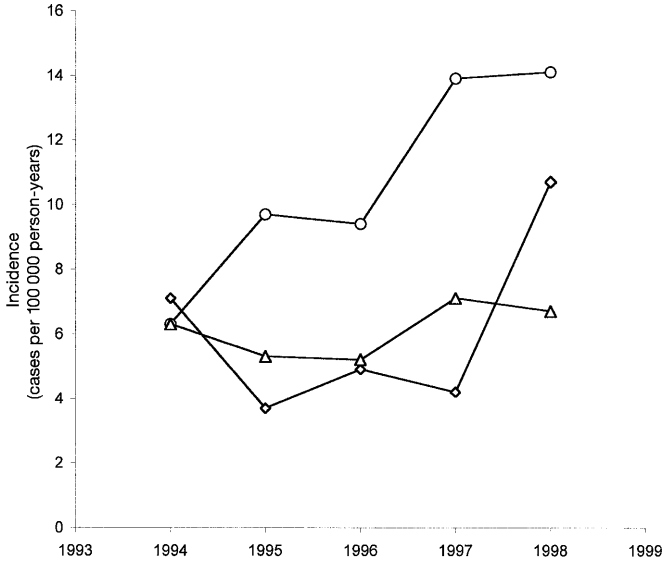

Fig. 1. Annual incidence of Type I diabetes per 100 000 person-years in the north-eastern region of Poland between 1994 and 1998 in association with age. –◇–, 0–4 years; –○–, 5–14 years; –△–, 15–29 years

The Białystok province is a mainly rural region in north-eastern Poland with an area of 27 209 km^2 and a genetically homogeneous population of 1 543 490. No epidemiological data of the incidence of Type I diabetes in this region have been published to date.

For this reason we, in collaboration with the EURODIAB, established a prospective register of new cases of insulin-dependent diabetes in the Białystok region from 1 January, 1994. This study aimed to estimate the annual incidence of Type I diabetes in the region and to investigate if it is associated with age, sex, urban-rural differences and the season of onset of the disease.

Subjects and methods

The prospective register of new cases of Type I diabetes in the population aged 0–29 years was established using two independent sets of data sources. The primary data sources were the paediatric and internal medicine divisions of the hospitals in Białystok and the secondary were the outpatient diabetic clinics in the region. Between 1994 and 1998, in the Białystok region, all subjects with Type I diabetes were admitted to hospital at the onset of the disease followed by obligatory treatment in one of the outpatient diabetic clinics (they were not treated by family doctors). All children below 19 years of age followed an obligatory course of treatment in the Paediatric University Hospital in Białystok, whereas adolescents and adults were treated in the Department of Endocrinology of the Medical Academy Białystok or in one of the ten regional hospitals. In the Białystok region there are two outpatient diabetic clinics for children and seven outpatient diabetic clinics for adults where all patients with Type I diabetes were treated and all diabetologists collaborated in the registration of new cases.

The diagnosis of Type I diabetes was made according to the criteria defined by WHO in 1985 and its classification was based on the presence of ketosis, low body mass index and the need for insulin therapy [5]. None of the patients with newly diagnosed Type I diabetes were obese. Cases of maturity-onset diabetes of the young (MODY) were excluded because it is usually manifested by mild hyperglycaemia and resistance to ketosis.

The number of subjects collected through the primary sources was 276 and through the secondary, 274. The degree of ascertainment was 98.5 % for the combined data sources.

Incidence rates were expressed as the number of new cases per 100 000 persons-years. The 95 %-confidence intervals were computed assuming the Poisson distribution [6]. Chi-square tests (χ^2) were used to estimate the variations of the incidence in association with age, sex, season of the year and urban-rural differences (Statistica 5.0, StatSoft, Tulsa, Okla., USA).

Results

Altogether, 277 new subjects (152 males and 125 females) were registered during the registration period of 5 years. The sex-specific and total incidence rates for the different age groups are shown in Table 1.

We observed a rising trend in the incidence of cases per 100 000 person-years from 6.4 in 1994 to 9.9 in 1998 ($p < 0.05$). The highest incidence rate increase was recorded in children aged 5 to 14 years (14 cases per 100 000 person-years between 1997 and 1998 vs 6.7 cases per 100 000 in 1994) (Fig. 1). This rising trend was observed in rural but not in urban areas where the incidence did not change ($p < 0.02$) (Fig. 2). We did not observe any differences in the percentage of familial cases of Type I diabetes between the rural areas, with the rising trend in the incidence, and urban populations, with the lower incidence (10.2 vs 9.7 %).

Seasonal variation in the incidence was also recorded, with a peak in winter (December-February) and nadir in summer (June-August) ($p < 0.001$) (Fig. 3). There were no statistically significant differences in the incidence of Type I diabetes between males and females (Table 1).

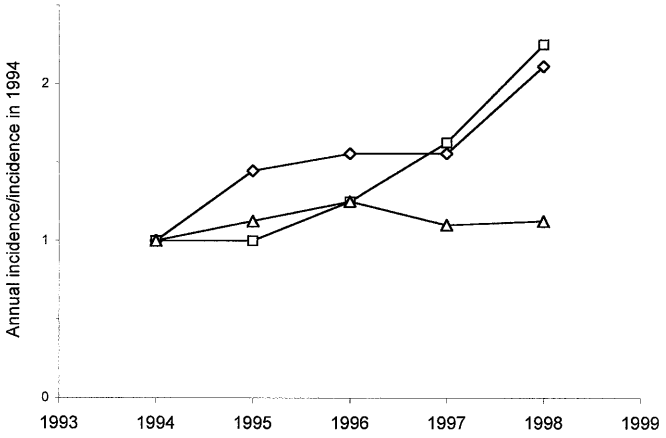

Fig. 2. The relative increase in the incidence of Type I diabetes in the north-eastern region of Poland in association with urban/rural differences in 1994–1998 (with point of reference to the incidence in 1994). –◇–, villages; –□–, cities < 50 000; –△–, cities > 50 000

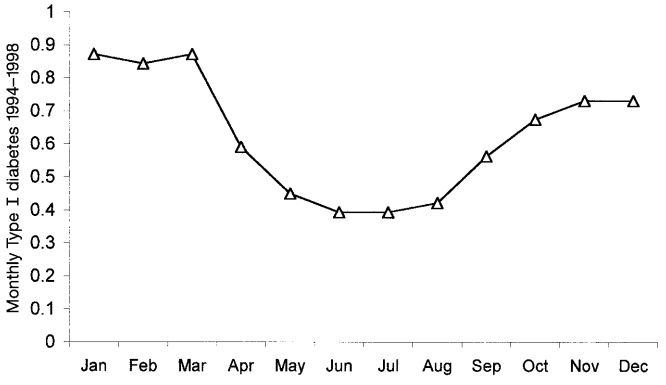

Fig. 3. Monthly variation in the incidence of Type I diabetes (cases per 100 000 person-months) in the north-eastern region of Poland during 1994–1998

Discussion

These data show that in contrast to results of previous studies from the 1980s and early 1990s [2, 3, 7], the incidence of Type I diabetes in the north-eastern region is twice as high as in other parts of Poland with an increasing tend in this region. We do not believe that the higher incidence of Type I diabetes in our study than that previously observated in other parts of Poland is a result of the degree of ascertainment because they were similar (98.5 % vs 95–99 %) [2, 7].

It is difficult to explain the reasons for this increase. Because of the seasonal differences in Type I diabetes incidence and an increase in the incidence of respiratory viral infections (e. g. influenza, para-influenza) and rubella during the period studied (data from Province Statistics Bureau [8]) the rise in the Type I diabetes incidence could be connected with environmental factors.

The influence of socio-economic factors on the increase in Type I diabetes cannot, however, be excluded. Statistical data have suggested that as a result of the transformation of the political system in 1989 there has been a gradual improvement in the economic status (increase of mean income per person) and hygiene (increase of money spent for hygiene purposes) in the population we studied [8]. It has been suggested that the increasing incidence of insulin-dependent diabetes is a consequence of improved hygiene [9].

Interestingly, apart from the relatively high frequency of ICA among first-degree relatives of diabetic subjects in our previous studies, we did not observe any differences in the percentage of familial cases of Type I diabetes between the rural areas, where there is a rising trend in the incidence, and urban populations, where the incidence was low at that time. However, during the 5-year follow-up, only 3 from 29 first-degree relatives with ICA of more than 20 JDF, who participated in the ENDIT programme from the Białystok region, developed diabetes. It is premature to speculate if this could influence the incidence of Type I diabetes in the urban areas.

Our study shows that the north-eastern region of Poland is one of the areas with a moderate rather than a low risk of Type I diabetes. Our observations confirm the importance of the environmental and socio-economic factors or both in the pathogenesis of Type I diabetes.

Acknowledgements. This study represents the Białystok region contribution to EURODIAB-TIGER programme (BMH4-CT96 0577).

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