TRENDS IN THE INCIDENCE OF CHILDHOOD-ONSET TYPE 1 DIABETES IN SLOVAKIA 1985 – 2000

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SUMMARY

The aim of this work was to study and monitor the patterns in incidence of childhood type 1 diabetes in Slovakia. The incidence of type 1 diabetes per 100,000/year from 1985 to 2000 was determined in children 0 – 14 years old. A total of 1,818 cases were diagnosed during this time. Poisson regression models were used to study incidence trends. The overall incidence of type 1 diabetes varied from 5.62/100,000 per year in year 1986 to 14.46/100,000 in year 1998. This represents a 2.57-fold increase. The incidence increased with age and was the highest among children 10–14 years of age. The incidence of type 1 diabetes in Slovakia is increasing very dramatically, especially in age group 0 – 4 years.

Key words: diabetes type 1, children, Slovakia

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INTRODUCTION

Epidemiological studies from all parts of the world have reported increases in incidence of type 1 diabetes (1, 2, 3). Slovakia is a state in Central Europe with total number of inhabitants 5.4 million at the time of this research. From this number 1.1 million were younger than 15 years of age. Recently published data suggest that Central Eastern Europe showed the highest increase childhood--onset diabetes in Europe in years 1989-1998 (4).

RESEARCH DESIGN AND METHODS

Patients were registered according to European Diabetes Study (EURODIAB) criteria. They were included only if treatment by insulin had begun before the 15th birthday and if the manifestation of diabetes occurred between January 1st 1985 and December 31st 2000. Poisson regression models were used to study incidence trends. Models with terms for gender, age group (0-4, 5-9 and 10-14 years) and calendar years were fitted.

Two sources of ascertainment were used to enable centers to assess their completeness of ascertainment. Capture-recapture methodology, which assumes that independent primary and secondary sources of ascertainment are available, was used to estimate the completeness of registration. The primary source of ascertainment was notification by pediatricians and endocrinologists from outpatient departments. The secondary source was notifications from hospitals, where all children with newly diagnosed type 1 diabetes were sent for initial therapy. The completeness of ascertainment was estimated by 99.9 %.

RESULTS

Between 1985 and 2000 a total number of 924 boys and 894 girls (together 1,818 children) below 15 years of age with newly diagnosed type 1 diabetes have been reported in Slovakia. The numbers of case and age-standardized annual incidence rate are summarized in Table 1 and Table 2. Inspection of rates suggested that there was no regular trend in the incidence of type 1 diabetes.

The mean childhood type 1 diabetes annual incidence is 9.26 per 100,000 (8.76-9.76, 95% CI), varying between 5.62 per 100,000 in year 1986 and 14.46 per 100,000 in year 1999. Age-standardized incidence rates for boys ranged from 5.72 per 100,000 in 1986 to 15.04 per 100,000 in 2000, a 2.63-fold increase. The variation in girls was similar, 5.51 per 100,000 in 1986 to 16.02 per 100,000 in 1999, a 2.91-fold increase. Age standardized mean annual for boys 9.28 per 100,000 does not differ significantly from that for girls 9.24 per 100,000. The most affected age group are boys of 10 - 14 years of age (11.72 per 100,000), while the least affected age group are girls 0 - 4 years of age (5.71 per 100,000). The incidence varies from year to year but with a significant increase between 1990 and 1991 from 5.90 per 100,000 per year to 8.85 per 100,000 per year, representing an annual 1.50-fold increase.

CONCLUSIONS

In summary, there was evidence of strong age effect. The incidence of childhood type 1 diabetes in Slovakia is increasing by 5.9

Table 1. *Number of cases and age standardized incidence of type 1 diabetes in children 0-14 years of age per 100,000 per year*

Year	Cases Boys	Cases Girls	Cases Total	Incidence Boys	Incidence Girls	Incidence Total (95% CI)
1985	40	52	92	5.75	7.79	6.01 (5.37-8.13)
1986	40	37	77	5.72	5.51	5.62 (4.36-6.87)
1987	46	47	93	6.57	7.00	6.78 (5.40-8.16)
1988	50	41	91	7.15	6.13	6.65 (5.28-8.02)
1989	51	50	101	7.38	7.54	7.46 (6.01-8.91)
1990	42	37	79	6.15	5.65	5.90 (4.60-7.21)
1991	51	65	116	7.62	10.14	8.85 (7.24-10.47)
1992	51	61	112	7.95	9.93	8.92 (7.27-10.57)
1993	57	77	134	9.05	12.78	10.88 (9.04-12.72)
1994	63	53	116	9.93	8.73	9.35 (7.65-11.05)
1995	66	69	135	10.66	11.66	11.15 (9.27-13.03)
1996	64	43	107	10.60	7.45	9.06 (7.35-10.78)
1997	79	54	133	13.43	9.61	11.57 (9.60-13.53)
1998	71	57	128	12.41	10.43	11.44 (9.46-13.43)
1999	72	85	157	12.96	16.02	14.46 (12.19-16.72)
2000	81	66	147	15.04	12.83	13.96 (11.35-15.72)

Table 2. *Trends in childhood diabetes incidence (per 100,000 per year) during period 1985-2000 by age group*

Year	Children 0-4 years of age	Children 5-9 years of age	Children 10-14 years of age
1985	2.89	7.73	9.68
1986	2.47	7.16	7.11
1987	3.88	6.61	9.69
1988	2.32	6.46	10.77
1989	3.09	7.92	10.88
1990	2.91	5.13	9.21
1991	6.54	8.85	10.81
1992	6.54	10.65	9.43
1993	8.22	10.88	13.24
1994	8.86	7.92	11.07
1995	10.04	9.11	13.90
1996	5.57	10.80	10.20
1997	9.54	14.08	10.82
1998	6.46	11.24	15.25
1999	11.45	16.10	15.12
2000	10.05	12.57	17.97

± 0.6 % per year. This number is higher than in overall Europe, where the incidence of childhood type 1 diabetes is currently increasing at a rate 3 % per year (1, 2, 3, 4). In order to explore this relation in detail, we fitted separate regression models for each age group. The data obtained are 10.0 ± 1.6 % for age group 0 – 4 years, 5.1 ± 1.0 % for age group 5 – 9 years and 3.8 ± 0.8 % for age group 10 – 14 years. The observed trend may reflect a transition of the age at onset to younger children. These data are in disagreement with the results from several other countries. In most studied populations the incidence rates increased with age and were the highest among children of 10 - 14 years of age (2). On the other hand, in some countries (e.g. Finland) a similar trend was found; the onset age of type 1 diabetes in Finnish children has become younger (5).

Compared to other Central Eastern Europe and neighboring countries in years 1989-1998, the standardized incidence rate in Slovakia 9.4 per 100,000/year is comparable with Austria 9.5 per 100,000/year, Czech Republic 9.8 per 100,000/year, Hungary 9.4 per 100, 000/year, Poland 7.0 per 100,000/year and Slovenia 8.5 per 100,000/year (4).

In contrast to findings of other surveys, a consistently higher incidence in boys than in girls was not observed in this study. This observation is in agreement with the findings that all populations with an incidence higher than 23/100,000 had a male excess, whereas all those with a rate below 4.5/100,000 had a female excess (6, 7). Data for Slovak children fall in between these numbers.

The observed increase in incidence cannot be easily explained. The reason for the increased rate of the childhood-onset diabetes in Slovakia is hardly explicable by the possible shift in the frequency of susceptibility genes and is probably caused by the change of environmental factors. The link between the increase in incidence rates and recent political and social changes is also possible. These two proposed explanations (changing of environmental factors, recent political and social changes) are supported also by findings that in some high-risk regions (Sardinia, Finland) the incidence of childhood-onset diabetes probably have reached plateau, whereas in Central Eastern Europe it is still growing (4). On the other hand, some studies do not support the proposed association of type 1 diabetes with socio-economic status (8, 9).

The effect of a decrease in the child population in Slovakia also may partially contribute to the increasing trend of type 1 diabetes. Similar situation was described in the Czech Republic (10).

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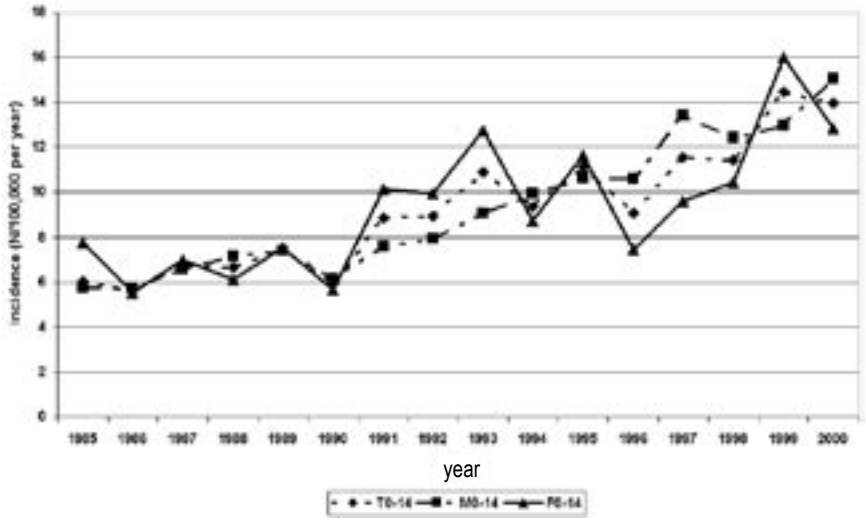

Fig. 1. *Trends in childhood diabetes incidence during period 1985-2000 by sex. F0 - 14 female patient, M0 - 14 male patients, T0 - 14 total children.*

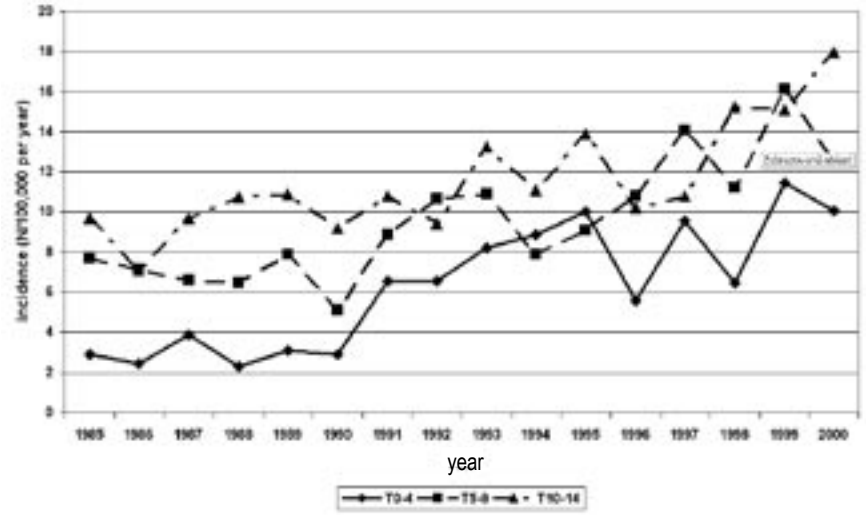

Fig. 2. Trends in childhood diabetes incidence during period 1985-2000 by age group. T0-4 – age group 0-4 years, T5-9 – age group 5-9 years, T10-14 – age group 10-14 years.

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