

# Incidence of type 1 diabetes mellitus in 15–29 age group in Warmia and Mazury Region between 1994–2003

## Abstract

**Background.** The incidence rate of type 1 diabetes (T1DM) has increased worldwide. Most studies have been performed in the 0–14 year age-group and only a few registries include the group over 15 years of age. The aim of the study was to assess the incidence of T1DM in the age group 15–29.

**Materials and methods.** Between 1994–2003 all newly diagnosed cases of T1DM in the age group 15–29 years in Olsztyn Region were recorded prospectively. General data on the population were taken from the Demographic Yearbook of Poland. Incidence in the group aged 15–29 years by age, sex, were calculated per 100,000 population.

**Results.** A total number of new cases registered 1994–

–2003 was 148. The incidence rate per year was 7.7 in age group 15–29 years. There was no sex differences. The highest incidence was recorded in women aged 25–29 — 7.8 and men aged 15–19 — 9.3. Comparing 5-years periods there were no significant changes in the incidence. During the 10-year observation period the incidence did not increase. The annual increase in incidence was 0.7%.

**Conclusions.** 1. The incidence rate per year was 7.7/100 000 in 15–29 age-group in Olsztyn Region. 2. In years 1994–2003 the incidence of T1DM was not growing. 3. The annual increase in incidence was 0.7%.

**key words:** type 1 diabetes, epidemiology, incidence

## Introduction

The incidence of type 1 diabetes mellitus varies in different regions of the world; so far most of the epidemiological studies referred to childhood diabetes and relatively few data can be available for incidence of type 1 diabetes mellitus in patients older than 15 [1–11]. The peak incidence is in puberty, however the highest number of new cases is observed in adults, so the aim of the study was to establish the incidence of type 1 diabetes mellitus in individuals aged 15–29.

## Material and methods

### Register of type 1 diabetes mellitus

The following inclusion criteria were applied to register type 1 diabetes mellitus:

- age 15–29 years at onset;
- onset between 1/01/1994 and 31/12/2003;
- diagnosis of type 1 diabetes mellitus by physician according to WHO criteria (1985) [12];
- the date of first injection of insulin was assumed as the date of diagnosis;
- permanent residence in Olsztyn or Olsztyn county (despite territorial changes after 01/01/1999 the register of type 1 diabetes mellitus, due to epidemiological considerations, covered the same area, formerly defined as Olsztyn County);
- since 2001 the diagnosis of type 1 diabetes mellitus was confirmed by low concentration of C-peptide (first three months after diagnosis);
- cases not confirmed as type diabetes mellitus were excluded from register (MODY, type 2 diabetes mellitus).

The register was approved by local Ethics Committee.

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## Recording of the new cases

The cases of newly diagnosed type 1 diabetes mellitus were recorded from following sources:

- medical records of County Paediatric Hospital in Olsztyn (children and youngsters below 18 years of age);
- medical records of County Specialized Hospital in Olsztyn (individuals over 18 years of age);
- medical records of internal medicine departments of hospitals in Olsztyn County;
- registers of the County Diabetological Polyclinic for Children and Adolescent in Olsztyn;
- registers of the Diabetological Polyclinic of County Specialized Hospital in Olsztyn (before 2003: Olsztyn Centre of Diabetology and Metabolic Disorders);
- registers of the Warmia-Mazury Public Health Centre in Olsztyn (1994–1996 County Centre of Medical Analyses in Olsztyn; 1997–1998 County Centre of Organisation, Economics and Information in Health Service in Olsztyn [12–14]).

The integrity of the register was evaluated by capture-recapture method.

## Indices of incidence

Incidence was defined as the number of new cases of type 1 diabetes mellitus per 100 000 individuals per year, with 95% CI.

Incidence rate and trends of incidence were calculated for:

- the whole population aged 15–29 years;
- different age groups;
- female and male;
- two 5-years periods of observation: 1994–1998 and 1999–2003.

Statistical analysis of data was performed with Excel XP and Statistica 6,0 software.

## Results

In the period 1994–2003 in Olsztyn County 148 newly onset type 1 diabetes mellitus were registered in age group 15–29 years (65 females and 83 males). The tightness of the register for that period was 99.1%.

Table 1 shows that mean incidence in observation period was 7.7/100 000/year (CI 6.4–8.9). There was the single peak incidence in 1995 — 11.1/100 000 (CI 8.6–13.6). The incidence of type 1 diabetes mellitus for females aged 15–29 was 6.9/100 000/year (CI 5.2–8.5) and for males 8.5/100 000/year (CI 6.7–10.3) (Table 2).

For the whole studied population and for different age groups there were no statistically significant differences with respect to gender. The highest incidence was observed in females aged 25–29 — 7.8/100 000/year (CI 4.5–11.2) and males aged 15–19 — 9.3/100 000 (CI 6.2–12.5) (Table 3).

**Table 1.** The incidence of type 1 diabetes mellitus in the age group 15–29 in years 1994–2003 in Warmia and Mazury Region, Poland

Years	Incidence rate* (95% CI)
1994	5.7 (3.9–7.5)
1995	11.1 (8.6–13.6)
1996	6.0 (4.2–7.8)
1997	9.0 (6.8–11.2)
1998	7.2 (5.3–9.1)
1999	7.5 (5.6–9.4)
2000	7.9 (5.9–9.8)
2001	7.8 (5.8–9.7)
2002	7.2 (5.3–9.1)
2003	7.1 (5.2–9.0)
1994–2003	7.7 (6.4–8.9)

\*Incidence rate per 100 000 of population/year

**Table 2.** The incidence rate of type 1 diabetes according to sex in years 1994–2003 in Warmia and Mazury Region, Poland

Years	Incidence rate* (95% CI)	
	Female	Male
1994	5.8 (3.2–8.3)	5.6 (3.1–8.1)
1995	10.1 (6.8–13.5)	12.0 (8.4–15.6)
1996	7.8 (4.8–10.7)	4.3 (2.1–6.4)
1997	8.6 (5.6–11.7)	9.4 (6.3–12.5)
1998	7.3 (4.6–10.1)	7.1 (4.4–9.8)
1999	10.2 (7.0–13.4)	4.9 (2.7–7.1)
2000	4.0 (2.0–6.0)	11.6 (8.3–15.0)
2001	4.9 (2.7–7.1)	10.6 (7.4–13.7)
2002	6.2 (3.7–8.8)	8.1 (5.2–11.0)
2003	4.1 (2.1–6.2)	10.0 (6.9–13.2)
1994–2003	6.9 (5.2–8.5)	8.5 (6.7–10.3)

\*Incidence rate per 100 000 population/year

When periods 1994–1998 and 1999–2003 were compared, we found no statistically significant increase in incidence on type 1 diabetes mellitus in this age group (Table 4).

Analysis of trends of incidence for whole study period revealed that in age group 15–29 the incidence declined (–0.7), in female group declined –6.0% and in male group increased 3.5% (Table 5).

## Discussion

In Poland and other countries there are very few studies on incidence of type 1 diabetes mellitus in age group 15–29 [1–3, 5–7, 9, 10, 15–17]. Changing definitions and criteria for diagnosis of type 1 diabetes mellitus in last three decades and different models on care

**Table 3.** The incidence rate of type 1 diabetes in the age group 15–29 according to age subgroups and sex in years 1994–2003 in Warmia and Mazury Region, Poland

Age groups	Incidence index* (95% CI)			P
	Overall	Female	Male	
15–19	8.1 (6.0–10.2)	6.8 (4.1–9.5)	9.3 (6.2–12.5)	0.29
20–24	6.8 (4.8–8.8)	6.1 (3.4–8.8)	7.5 (4.6–10.4)	0.58
25–29	8.2 (5.8–10.6)	7.8 (4.5–11.2)	8.6 (5.1–12.0)	0.88
15–29	7.7 (6.4–8.9)	6.9 (5.2–8.5)	8.5 (6.7–10.3)	0.22

\*Incidence rate per 100 000 population/year

**Table 4.** The incidence rate of type 1 diabetes in the age group 15–29 according to age subgroups 15–19, 20–24, 25–29 in two periods of observation (1995–1999 and 2000–2004) in Warmia and Mazury Region, Poland

Age groups	Incidence rate* (95% CI)			P
	1994–2003	1994–1998	1999–2003	
15–19	8.1 (6.0–10.2)	7.6 (4.7–10.5)	8.6 (5.6–11.6)	0.38
20–24	6.8 (4.8–8.8)	7.7 (4.6–10.7)	6.0 (3.5–8.6)	0.14
25–29	8.2 (5.8–10.6)	8.3 (4.7–11.8)	8.2 (4.9–11.4)	0.99

\*Incidence rate per 100 000 population/year

**Table 5.** Relative increase in incidence of type 1 diabetes mellitus an age group 15–29 in years 1994–2003 in Warmia and Mazury region, Poland

Age group (years)	Annual increase in incidence (%)
15–29	–0.7
15–29 females	–6.0
15–29 males	3.5

Annual increase in relation to mean in observation period

worldwide were major obstacles of tight registers in individuals above 14 years old [12, 18–22].

In Olsztyn County the incidence of type 1 diabetes mellitus in age group 15–29 was based on register of 0–29 age group. At the beginning of study period in 1994, the incidence in age group 15–29 was 5.7/100 000/year. The first epidemiological, retrospective study on incidence of type 1 diabetes mellitus in individuals aged 15–29 performed in Rzeszów County between 1980 and 1992 showed mean incidence 5.55/100 000/year, which increased in following years to 6.88/100 000/year in 1994 [17]. In Kraków County in 1987 incidence was 5.89/100 000/year and increased to 6.79/100 000/year in 1994 [3]. In the beginning of 90 higher incidence than in our region was noted in Białystok County — 6.0/100 000/year [2].

In the following years of observation the incidence of type 1 diabetes mellitus in this age group remained almost unchanged. Mean rate in the whole period was 7.7/100 000/year and there was no significant difference in age subgroups: 15–19, 20–24, 25–29. The peak of incidence (11.1/100 000/year) in 1995 is difficult to explain. In other regions of Poland the same peak was noted only in Kraków County — 8.2/100 000/year [3] and in the rest of the country incidence was similar: Białystok 6/100 000/year, Rzeszów 7.04/100 000/year, Warszawa 6.3/100 000/year in 1998 and 3.4/100 000/year in 1999 [1, 2, 5].

In Europe, comparable results were observed in Italy (Torino), Austria and Lithuania [7, 10, 15]. Higher incidence was in Belgium — 8.8, and Sweden 16.1/100 000/year [8, 9].

In Olsztyn County in studied decade there was no increasing trend of incidence of type 1 diabetes mellitus. Annual incidence was negative: –0.7%. Similar results were observed in other regions of Poland, in Belgian and Swedish populations [1, 2, 8, 9]. There was no increase of incidence in Lithuania and United Kingdom [6, 10]. The exception was Kraków County, where rising trend appeared [3].

In our region we found higher incidence of type 1 diabetes mellitus in age group 15–29 in male (8.5/100 000/year) than in female (6.9/100 000/year) but the difference was not significant. Our results were in line with those from Białystok, Kraków and multicenter studies of Mini-

ster of Public Health performed in Kraków, Rzeszów, Warszawa and Białystok [5, 25].

Several studies from Western Europe indicated that males aged over 15 have higher incidence, particularly in countries with overall high incidence. In Sweden incidence in age group 15–34 was 16.1 in males and 9.1/100 000 in females [9]. This pattern of incidence was also noted in Lithuania, Austria, Belgium and Italy (Torino) [7, 8, 10, 15]. These differences in incidence between males and females are, so far, not clearly explained; genetic predisposition, life style were potential factors [8, 10, 15].

## Conclusions

1. The mean incidence rate of type 1 diabetes mellitus between 1994 and 2003 in Olsztyn County in young adults aged 15–29 was 7.7/100 000/year.
2. In this period there was decreasing trend of incidence of type 1 diabetes mellitus in age group 15–29.
3. The annual decline of incidence was 0.7%.

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