The Rising Incidence of Type 1 Diabetes in the Northeastern Part of Thailand

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Objective: *To determine the incidence of T1DM in children under 15 years in 19 provinces in northeast Thailand.*
Material and Method: *Data of new cases of T1DM during 10 years between 1996 and 2005 were collected retrospectively by a mail survey from 275 hospitals in northeast Thailand.*
Results: *Three hundred forty cases, 134 (39.4%) boys and 206 (60.6%) girls were identified. The incidence rate of T1DM was 0.6/100,000/year (95% confidence interval 0.57; 0.71), a two-fold increased from the previous study between 1991 and 1995. More than half of the cases were diagnosed between the ages of 10 and 14 and the incidence rate in girls was 1.5 fold that of boys.*
Conclusion: *Though the increased in incidence rate, the study indicated that the incidence of T1DM in northeast Thailand is still one of the very low incidence rates in the world.*

Keywords: *Type 1 diabetes mellitus, Incidence, Northeast Thailand*

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Worldwide, the incidence of childhood type 1 diabetes mellitus (T1DM) varies widely. The highest incidence in Finland is more than 400 folds compared with those in China and Asian countries[1]. Thailand is one of the countries with a low incidence of T1DM in the world, especially in the northeast, which is one third of the total population[2]. The crude incidence of T1DM in children in this area during the period between 1991 and 1995 was 0.3/100,000, the highest incidence in age group 10-14 years old[3]. However, epidemiological studies have shown a high and rising incidence of childhood T1DM in the past two decades in Europe, America, and Asia[4]. The aim of the present study was to determine the incidence of T1DM in children aged 0-14 years in the period between 1996 and 2005 in the northeast region of Thailand and analyzed epidemiological trends in age and sex of children with T1DM over this period.

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Material and Method

A 10-year retrospective study was conducted by mail survey in the 275 hospitals, 19 provinces in the northeast Thailand. The following criteria were set for eligibility: 1) the age at the onset of T1DM was below 15 years, 2) the patients were diagnosed as having diabetes between January 1, 1996 and December 31, 2005, 3) the patients must be residents of the 19 provinces of northeast Thailand. The questionnaire information included age, sex, address, birth date, and date of the first insulin injection. The exclusive criteria were patients who were diagnosed with type 2 diabetes, and other types. The annual census report from the Thai Bureau of Census was used for denominators to calculate the annual incidence rates. The average incidence rate between 1996 and 2005 was estimated by pooling all cases and dividing by a total of 10 years population. A 95 percent confidence interval (CI) was derived using a Poisson Distribution[5]. The

protocol was approved by the ethics committee of the Faculty of Medicine, Khon Kaen University.

Results

One hundred eighty of the 275 (65.5%) hospitals responded to the first mail survey. The second mail survey was conducted with the remaining 95 hospitals and 32 (77.1%) responded. The third mail survey response was 29 of 63 hospitals. Overall, 241 (87.6%) hospitals participated in the present study. The overall 340 T1DM patients, 134 boys (39.4%) and 206 girls (60.6%) were identified with an incidence rate of 0.6/100,000 (95% CI 0.57; 0.71) (Table 1). The peak age at onset was between the ages of 10 and 14 in both sexes (Table 2).

Discussion

The incidence rate of T1DM for youths in several Asian countries during the time period ranging from the 1970s to 2001 varied from < 1.0 to the highest 3.3:100,000 in Japan[2,6-12]. In Thailand, prospective registration of newly diagnosed children with type 1 diabetes has not yet covered the whole country and most of the reports are retrospective. The number and the incidence rate of T1DM during the first 5 years (1996-2000) of the present study was rather stable. There were 82 patients and 0.3/100,000, the same as the authors previous study[3]. It has been rising at a faster pace than expected during the second 5 years (2001-2005). The number of patients increased to 258 patients with the incidence rate of 0.97/100,000 and the current mean number of new cases of T1DM has tripled. However, these incidence rates may underestimate because T1DM could not have survived without insulin, some children may die before diagnosis or treatment. Prospective worldwide registries from DIAMOND and EURODIAB demonstrated an increasing trend in incidence of T1DM in most regions of the world over the last few decades[4]. The etiology of T1DM remains unknown, although both genetics and environmental factors are likely to be involved in the pathogenesis. Epidemiological studies have identified environmental risk factors that might have contributed to the increasing trend in incidence. These include enteroviral infections[13], early introduction of cow's milk proteins[14,15], old maternal age[16], maternal preeclampsia[17,18], cesarean section delivery, neonatal respiratory diseases, increased birth weight and gestational age, blood group incompatibility and an increased rate of postnatal growth[19,20]. The international Trial to Reduce T1DM in the Genetically at Risk (TRIGR) launched the pilot study to determine whether weaning to a highly hydrolyzed formula in infancy reduced the incidence of T1DM in these infants. They found that in infants fed with a cow's milk based formula, the levels of IgA and IgG antibodies to cow's milk and casein were higher than in infants with highly hydrolyzed formula reflecting the difference in intake of cow's milk protein[21]. Other interesting hypothesis is that of sunshine and vitamin D. A European population-based case-control study clearly indicated vitamin D as a protector[22]. For the age-specific incidence rates, in most registries presented by using 5-year age groups (0-4, 5-9 and 10-14 years). There was increased incidence rate in younger children under 5 years of age in several European studies[23,24]. It is possible that the obesity epidemic is also a factor in the increased incidence of T1DM. In early childhood, rapid growth in height and obesity are risk factors for developing T1DM[25] and the "accelerator hypothesis" predicts earlier onset of T1DM in heavier children[26]. In the present study,

Table 1. Incidence of T1DM in northeast Thailand between 1996 and 2005

Year	Population under 15 years*	T1DM (cases)	Incidence per 100,000	95% CI
1996	5,219,050	17	0.32	0.17; 0.48
1997	5,273,960	12	0.23	0.10; 0.36
1998	5,328,042	16	0.30	0.15; 0.45
1999	5,344,857	16	0.30	0.15; 0.45
2000	5,351,188	21	0.39	0.23; 0.56
2001	5,373,420	35	0.65	0.44; 0.87
2002	5,402,296	37	0.68	0.46; 0.90
2003	5,414,925	44	0.81	0.57; 1.05
2004	5,316,857	76	1.43	1.11; 1.75
2005	5,196,712	66	1.27	0.96; 1.58
Total	53,221,307	340	0.64	0.57; 0.71

* Thai Bureau of Census

Table 2. Age at onset of T1DM in northeast Thailand in 1996-2005

Age at onset (year)	Boys (cases)	Girls (cases)	Total cases (%)
0-4	16	24	40 (11.8)
5-9	42	46	88 (25.9)
10-14	76	136	212 (62.3)
0-14%	134 (39.4)	206 (60.6)	340 (100.0)

the number of the patients increased with age, the incidence peak was at puberty, and the highest, 62.3%, in age group 10-14 years, which had more exposure to the environment and had hormonal change during puberty. Concerning the sex incidence, it mainly affected girls in all age groups. A slight female excess has been reported in populations of African and Asian origin and a minor male excess in the incidence has been reported in Europe[27]. There is a weak association between male sex and high incidence if an incidence higher than 23/100,000 per year and population with an incidence lower than 4.5/100,000 per year have a female excess.

In conclusion, the incidence of childhood onset T1DM in the northeast Thailand continues to rise and would have important implications for the planning of public health programs related to control and prevention of childhood T1DM in this area.

Potential conflicts of interest

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การเพิ่มขึ้นของอุบัติการณ์ของเบาหวานชนิดที่ 1 ในภาคตะวันออกเฉียงเหนือของประเทศไทย

อวยพร ปะนะมณฑา, จารุบุตร ธรรมเจริญ, มนัส ปะนะมณฑา, นารี ปะนะมณฑา, ฉัตรชัย ซื่อศิริสวัสดิ์

ภูมิหลัง: *เบาหวานชนิดที่ 1 เป็นโรคที่พบในวัยเด็ก อุบัติการณ์ของการเกิดโรคต่ำเมื่อเทียบกับเบาหวานชนิดที่ 2 ในผู้ใหญ่*
วัตถุประสงค์: *เพื่อศึกษาอุบัติการณ์ของการเกิดเบาหวานชนิดที่ 1 ในเด็กอายุต่ำกว่า 15 ปีใน 19 จังหวัดของภาคตะวันออกเฉียงเหนือของประเทศไทย*
วัสดุและวิธีการ: *รวบรวมข้อมูลผู้ป่วยเบาหวานที่ได้รับการวินิจฉัยใหม่แบบย้อนหลังโดยใช้แบบสอบถามส่งทางไปรษณีย์จาก 275 โรงพยาบาลในเขตภาคตะวันออกเฉียงเหนือระหว่างปี พ.ศ. 2539-2548 เป็นระยะเวลา 10 ปี*
ผลการศึกษา: *พบผู้ป่วยเบาหวานจำนวน 340 คน เป็นชาย 134 คน (ร้อยละ 39.4) เป็นหญิง 206 คน (ร้อยละ 60.6) อุบัติการณ์ของการเกิดเบาหวานเท่ากับ 0.6/100,000/ปี (95% confidence interval 0.57; 0.71) เป็น 2 เท่าของอุบัติการณ์ระหว่างปี พ.ศ. 2534-2538 มากกว่าครึ่งหนึ่งมีอายุระหว่าง 10 ถึง 14 ปีและพบในเพศหญิงมากกว่าเพศชาย 1.5 เท่า*
สรุป: *ถึงแม้อุบัติการณ์ของการเกิดเบาหวานชนิดที่ 1 ในภาคตะวันออกเฉียงเหนือจะเพิ่มขึ้น ก็ยังคงเป็นเขตที่มีอุบัติการณ์ต่ำมากในโลก*