Incidence of Type 1 Diabetes in Children Under 15 Years in Northern Thailand, from 1991 to 1997

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Abstract

The annual incidence of Type 1 diabetes in children under 15 years in northern Thailand from 1991 to 1997 was a retrospective study by analyzing the data gathered from the Pediatric Endocrine Division, Faculty of Medicine, Chiang Mai University and through a mail survey to 202 hospitals in the government and private sector in northern Thailand. The response to the mail survey from 1991 to 1992 and 1993 to 1997 was 90.1 per cent and 94.5 per cent respectively.

During the seven year period, 76 new cases of Type 1 diabetes were identified. The crude annual incidence ranged from 0.31-0.56 /100,000 per year, with an average incidence of 0.37/ 100,000 per year (95% C.I = 0.29-0.46). This very low figure had risen 2.2 fold (over 100%) from that reported in 1984. The annual incidence was relatively constant from 1991 to 1996, although there was a moderate rise in 1997 (0.56/100,000 per year). There was no statistically significant difference between the annual incidence of 1996 and 1997. It remains for further studies to confirm the trend of increased incidence.

The median age of onset was 11 years, whereas, the peak age of onset occurred in the 10-14 year age group of both sexes. There was a greater incidence among female in this study.

These data confirm the need to develop a national registry of Type 1 diabetes for further epidemiological research.

Key word : Type 1 Diabetes, Children, Incidence, Northern Thailand

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Type 1 diabetes is one of the most important chronic diseases in children worldwide. There are many variations in incidence among children ≤15 years of age, depending on the geographic and ethnic distribution of the population[1,2]. The incidence in the Caucasoid population is higher than in Mongoloids and Negroids. In Europe, the incidence ranged from 35.6/100,000 per year in Finland[1] from 1989 to 1992 to less than 5/100,000 in Greece [3]. These and other reports have led to the theory of a north-to-south gradient in the risk factor of the disease. However, there has been a strikingly high incidence of insulin dependent diabetes mellitus found in Sardinia, Spain and continental Italy[4-8]. There are also large differences in incidence between the Jewish and Arab population in Israel[9]. The reason for this wide variation between and within major ethnic groups suggests that environmental factors are significant in the etiology of Type 1 diabetes.

In Asia, the incidence is low or very low compared to that of the Nordict region. Asian variations ranged from 0.1-4.6/100,000 per year in China [10], 0.7/100,000 per year in South Korea[11], 1.02/100,000 per year in Karachi, Pakistan[12], 1.4/100,000 per year in Hong Kong[13] to 0.19-0.14/100,000 per year in Thailand from 1984[14] to 1985 [15].

The incidence of Type 1 diabetes has increased markedly over the last ten years in all regions[16], thus, increasing the major health care and economic burdens on society.

The aim of this entire study was to evaluate the incidence of Type 1 diabetes in children under 15 years in northern Thailand from 1991 to 1997 and analyze the trend in the incidence rate. This part of the study evaluated the incidence of Type 1 diabetes in children under 15 years in Thailand from 1991 to 1995, which was conducted by Tuchinda C, Siriraj Hospital, Mahidol University.

SUBJECT AND METHOD

This was a retrospective study that analyzed information gathered from the primary source of the Pediatric Endocrine Division, Faculty of Medicine, Chiang Mai University and through a mail survey conducted over a 7 year period, 1991 to 1997. The mail survey was carried out by sending 202 questionnaires to all government and private hospitals in northern Thailand. To achieve a complete analysis, the mail survey was conducted four times with an overall response rate for the periods 1991 to 1992 and 1993 to 1997 of 90.1 per cent and 94.5 per cent, respectively.

The inclusion criteria were:

1. Newly diagnosed patients with Type 1 diabetes aged under 15 years at the time of their first insulin administration.

2. The patients required continuous insulin treatment.

3. The patients were residents of 17 provinces in northern Thailand.

The information from the mail survey included name, sex, age, date of birth, and date of diagnosis and first insulin treatment.

The annual incidence was calculated as being the number of newly diagnosed diabetes subjects per 100,000 person-year. The general population data for each year were obtained from the Thai Bureau of Statistics[17].

Age adjustment for the rate was completed at 5 year intervals (0-4, 5-9, and 10-14 years) using the direct method with a standard population consisting of equal numbers of children in each of the 3 subgroups. The 95 per cent confidence intervals (CI) were estimated assuming the Poisson distribution of the cases. The chi-square test was used to examine the difference in annual incidence from 1996 to 1997.

RESULTS

Incidence

The annual incidence during the study period is shown in Table 1. There were 76 children aged < 15 years diagnosed with Type 1 diabetes, which resulted in an average annual incidence of 0.37/100,000 (95% C.I = 0.29-0.46).

The annual incidence from 1991 to 1996 was relatively constant, although there was a moderate rise during 1997 (0.56/100,000).

Sex and age distribution

There were 43 females and 33 males, that gave an overall female to male ratio of 1.3:1. The age of onset in male and female patients is illustrated in Fig. 1. It ranged from 10 days to 14 years 11 months with a median age of 11 years. The incidence increased with age in this population. The

Table 1. Annual incidence of type 1 diabetes/100,000 person per year.

Year	Population < 15 years	Total	Annual incidence (per 100,000)	95% C.I.
1991	2,768,935	10	0.36	0.17 - 0.66
1992	2,920,579	9	0.31	0.14 - 0.58
1993	2,953,584	10	0.34	0.16 - 0.62
1994	2,978,101	10	0.34	0.16 - 0.62
1995	2,974,082	10	0.34	0.16 - 0.62
1996	2,996,574	10	0.33	0.16 - 0.61
1997	3,022,834	17	0.56	0.33 - 0.90

* crude average annual incidence during 1991-1997 is 76/20,614,689 = 0.37/100,000 (95% C.I. = 0.29-0.46)

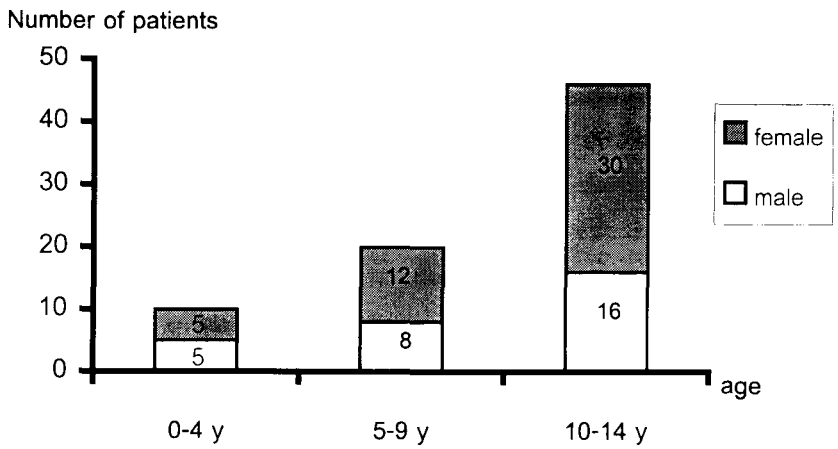

Fig. 1. Number of patients demonstrated according to age-group and sex.

peak incidence occured between the age of 10-14 years in both sexes, but 40 per cent were under 10 years of age.

Two children were identified with Type 1 diabetes with the onset occurring before 1 year of age. Both developed diabetes during the neonatal period and were permanent diabetes.

DISCUSSION

The distribution of incidence rates was divided into five groups[10]: 1) very low, <1/100,000 per year; 2) low, 1-4.9/100,000 per year; 3) intermediate, 5-9.9/100,000 per year; 4) high, 10-19.9/100,000 per year; and 5) very high, > 20/100,000 per year.

The average annual incidence of Type 1 diabetes in children under 15 years in northern Thailand from 1991 to 1997 was 0.37/100,000, which was very low and similar to that reported by Changsha and Harbin in China[10] and northeastern Thailand [18]. The annual incidence increased 2.2 fold, or over 100 per cent, compared to that reported in 1984[14]. The low incidence of Type 1 diabetes in children in some populations may be related to genetic factors or protective immunity from increased exposure to common microbial infections in early life. This may decrease the subsequent susceptibility to Type 1 diabetes. Conditions could tend to increase exposure to infection in childhood such as high population density and a crowded family[19]. Although this did not reach statistical significance [20].

In recent years, the incidence of Type 1 diabetes in children appears to be increasing in almost

all populations worldwide[16], and it is particularly rapid in these with a low incidence[21].

During the seven year period of this study, the incidence of Type 1 diabetes in children under 15 years in northern Thailand seems to be relatively constant, although there was a moderate increase in 1997. There is a question of whether this increase represents real change, which results from changing environmental factors linked to industrialization, with more pollution, a rapid economic rise that leads to different lifestyles, changing methods in the food industry and nutritional habits, or is simply an improvement in case analysis. However, there is no significant difference of the annual incidence from 1996 to 1997 when using the chi-square test given the p value of 0.138. It is currently impossible to determine the difference because the 7-year period covered in this study is too short to accumulate enough cases for an appropriate analysis. This statistic remains to be determined in further studies to demonstrate a possible increase in the trend of Type 1 diabetes incidence in northern Thailand. Also, the variation in national incidence in some countries may be random because of the small number of cases. Therefore, data for a longer period are needed before those spatial differences can be confirmed.

The data in this study showed the peak incidence in a 10-14 year-old population, which is similar to the pattern usually seen in northeastern Thailand[18], Europe[22] and northern Italy[23]. This could be partly due to the rapid growth rate during puberty, in addition to more stress and change of life-style. This finding is in contrast to other Italian regions, where the highest incidence has been found in the 5-9 year age group[24-26]. However, in New South Wales, Australia, there is an increasing incidence in all age groups with a trend towards a greater rise occurring in younger children (0-4 years)[27]. This suggests a genetic factor that may strongly influence the occurrence of Type 1 diabetes in younger children[28], whereas, the environmental risk factor may play a greater role in older children.

The slight female predominance observed in this study is similar to that seen in northeastern Thailand[18] and other Asian populations[29]. This may represent an actual phenomenon or may be due to the relatively small number of patients compared to larger studies[28]. A slight male preponderance in the incidence of Type 1 diabetes has been reported, especially in areas with a high or intermediate incidence rate, but not in those where the incidence is low[3,6,7,21].

The rising incidence of Type 1 diabetes in children is cause for serious concern regarding health and society. These data confirm the need to develop a national population-based registry for Type 1 diabetes in Thailand. This would enable epidemiological studies to confirm the rising incidence in order to plan for more research study and needed services for the patients.

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อุบัติการณ์โรคเบาหวานชนิดที่ 1 ในเด็กอายุน้อยกว่า 15 ปีในภาคเหนือ ปี พ.ศ. 2534–2540

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ได้ทำการศึกษาอุบัติการณ์โรคเบาหวานชนิดที่ 1 ในเด็กอายุน้อยกว่า 15 ปีแบบย้อนหลังใน 17 จังหวัดภาคเหนือ เป็นระยะเวลา 7 ปี ระหว่าง พ.ศ. 2534–2540 โดยศึกษาจากข้อมูลผู้ป่วยเด็กโรคเบาหวานประเภทที่ 1 ของภาควิชากุมาร-เวชศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่ และจากการส่งแบบสอบถามไปยังโรงพยาบาลของรัฐและเอกชนในภาคเหนือจำนวน 202 ฉบับ ได้แบบสอบถามกลับเป็นจำนวนร้อยละ 90.1 และ 94.5 สำหรับข้อมูลระหว่าง พ.ศ. 2534–2535 และ พ.ศ. 2536 –2540 ตามลำดับ

พบอุบัติการณ์โรคเบาหวานประเภทที่ 1 ระหว่าง 0.31–0.56/100,000 ต่อปี โดยมีอุบัติการณ์เฉลี่ยเท่ากับ 0.37/100,000 ต่อปี เพิ่มขึ้นเป็น 2.2 เท่า ของที่รายงานในปี พ.ศ. 2527 อุบัติการณ์โรคเบาหวานระหว่าง พ.ศ. 2534–2539 ค่อนข้างคงที่ และเพิ่มขึ้นเป็น 0.56/100,000 ต่อปีใน พ.ศ. 2540 แต่ไม่พบความแตกต่างทางสถิติเมื่อเทียบกับอุบัติการณ์ใน พ.ศ. 2539

พบอุบัติการณ์สูงสุดในเด็กอายุระหว่าง 10–14 ปี ทั้ง 2 เพศ พบเด็กหญิงต่อเด็กชายในอัตรา 1.3 ต่อ 1 จากผลการศึกษานี้ควรมีการศึกษาต่อไปเพื่อดูแนวโน้มอุบัติการณ์ของโรค โดยการลงทะเบียนผู้ป่วยโรคเบาหวานประเภทที่ 1 ในเด็กทุกรายเพื่อให้ได้ข้อมูลทางระบาดวิทยาที่แน่นอน และจะได้วางแผนในการรักษาและป้องกันต่อไป

คำสำคัญ : อุบัติการณ์, โรคเบาหวานชนิดที่ 1, เด็ก, ภาคเหนือ

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