Type 1 Diabetes in Thai Children Aged 0-14 Years

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Abstract

Fifty-nine patients were diagnosed with diabetes in the ten years from 1987 to 1996 in the Division of Endocrinology and Metabolism, Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Bangkok, Thailand. All patients were less than fifteen years old. Fifty-five patients (93.3%) were type 1 diabetes, three (5%) were type 2 diabetes and MODY, and one (1.7%) was diabetes secondary to ß thalassemia major. Patients with type 2 diabetes, MODY, and secondary diabetes were excluded from this study, and fify-five patients with type 1 diabetes were analysed.

The aims of this study were to determine some of the general characteristics of Thai childhood type 1 diabetes and to see whether a seasonal variation is present. The results showed a female to male ratio of 1.39:1. The peak age at diagnosis was from 9 to 12 years. Seventy-seven per cent had diabetic ketoacidosis at the time of diagnosis. The majority of patients (93.9%) had a BMI of less than 20 kg/m2. A family history of diabetes was reported in 38 per cent but only 2 per cent were type 1 diabetes. We found a high prevalence of patients in the summer and winter seasons (35-48% and 37-50% respectively) and a lower prevalence in the rainy season (14.8-15%). These results are different from a previously reported study in 1984-1985 which found no differences in summer, winter, and rainy seasons. Further research study into Thai childhood type 1 diabetes is needed, especially the influence of seasonal factors, the incidence of the disease, and the significance of family history.

Key word : Childhood and Adolescent Diabetes, Type 1 Diabetes, Diabetes

It is generally accepted that the majority of children develop type 1 diabetes as a result of genetic susceptibility combined with various environmental factors. Viral infections and diet are most often suggested as the environmental factors. In countries with a high incidence of type 1 diabetes, there is often a suggestion of a seasonal variation in incidence[1-6] and that the disease appears to be

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Table 1. Prevalence of antibodies to GAD in type 1 diabetes among different population.

Population	No	Age of onset	Anti-GADPositive (%)	References
Australia	45	<20	38 (84%)	Tuomi T et al. 1995[11]
Japan	34	<15	23 (68%)	Sugihara S et al.1996[15]
Korea	18	<15	7 (39%)	Lee HC et al. 1995[16]
Thailand	39	<20	20 (51%)	Tuomi T et al. 1995[11]

Table 2. Susceptibilities(S) and Protective(P) gene, of MHC in type 1 diabetes among different populations.

	DRB 1		DQA 1 52		DQB 1 57	
	S gene	P gene	S gene	P gene	S gene	P gene
U.S.A.[17]	0301	1501	3031R	0102S	0201N	0602D
	0405		0501R		0302N	
Japan[14]	0405	1501	0302R	0103S	0401D	0301D
	0901			0101S	0303D	0602D
Korea[16]	3	*	0301R	0103S	0201N	0301D
	4		0501R	0101H	0302N	0602D
	9				0303D	
Thailand[18]	0301	*	0301R	0101S	0201N	*
	0405		0501R			

* = no data

more common during the winter months, at the time when viral respiratory tract infections are most prevalent.

There have been only a few epidemiological studies of childhood diabetes in Thailand[7-10]. There is a low incidence (0.19 /100,000/yr) of type 1 diabetes[10]. However, there have been some studies of genetic markers and antibodies[11]. The results in Thai patients are similar to those in other Asian countries (Tables 1, 2). It is important to have more information on the general characteristics of this disease, such as the clinical presentation, how the diagnosis is made, and if other environmental factors or temporal trends are present. Such information may be useful for the future management and prevention of this disease.

We retrospectively reviewed our medical records of diabetic patients who attended the pediatric endocrinology unit at Siriraj Hospital from 1987 to 1996, a 10 year period, in order to determine some of the general characteristics of childhood type 1 diabetes. In particular we sought to establish whether there was a seasonal variation in the incidence of the disease.

MATERIAL AND METHOD

We analyzed the medical records of all diabetic patients who had been diagnosed in the Department of Pediatrics from 1987 to 1996. The inclusion criteria were: (1) Diagnosis of diabetes before the date of the patient's fifteenth birthday during the ten years from 1987 to 1996. (2) Presence of clinical features of type 1 diabetes i.e. ketoacidosis prone, requiring exogenous insulin to prevent ketosis, and a continued need for insulin injections for blood glucose control for more than 2 years. (3) Assessment by the pediatric endocrinology unit in Siriraj Hospital.

Patients with type 2 diabetes, MODY, and secondary diabetes were excluded from this study.

Of the fifty-nine patients diagnosed as having diabetes, three of them were subsequently found to have type 2 diabetes and mature onset diabetes of the young (MODY), and one had diabetes

secondary to hemosiderosis of ß Thalassemia major. Hence, a total of fifty-five patients presenting with type 1 diabetes were analyzed in this study.

RESULTS

The number of newly diagnosed type 1 diabetes patients in each year has been increasing over the last 10 years as shown in Fig. 1. The average number of patients in each year was 5.5. Of a total of fifty-five patients, thirty-two were female and twenty-three were male, giving a female to male ratio of 1.39:1. Seventy-seven per cent presented with diabetic ketoacidosis and the remaining twenty-three per cent presented with symptoms of polyuria and polydipsia and were found to have hyperglycemia with ketosis.

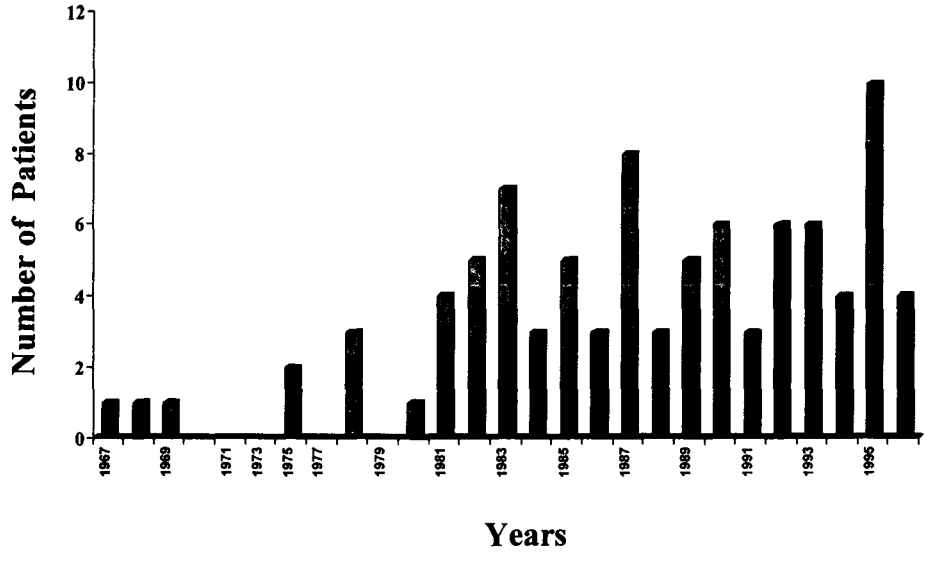

Fig. 1. Number of newly diagnosed in Thai Type 1 diabetes in each year.

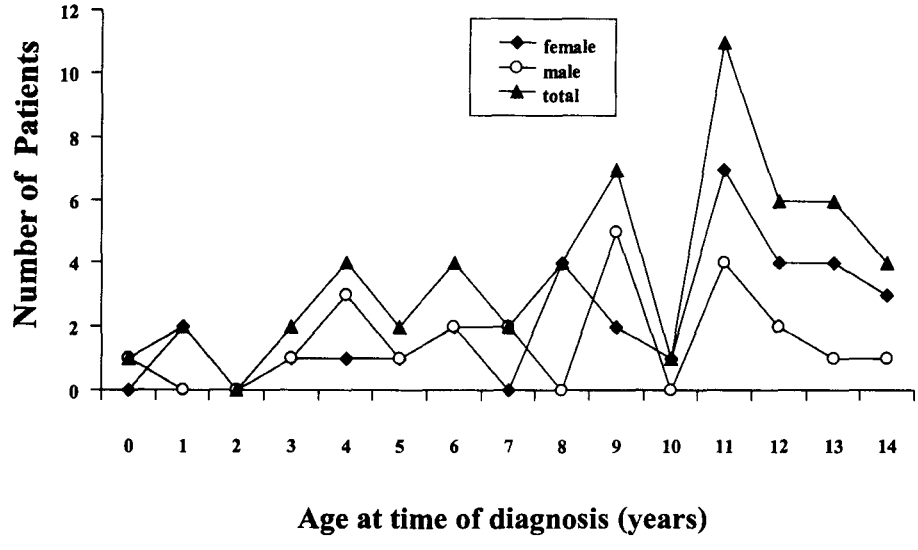

Fig. 2. Age at time of diagnosis.

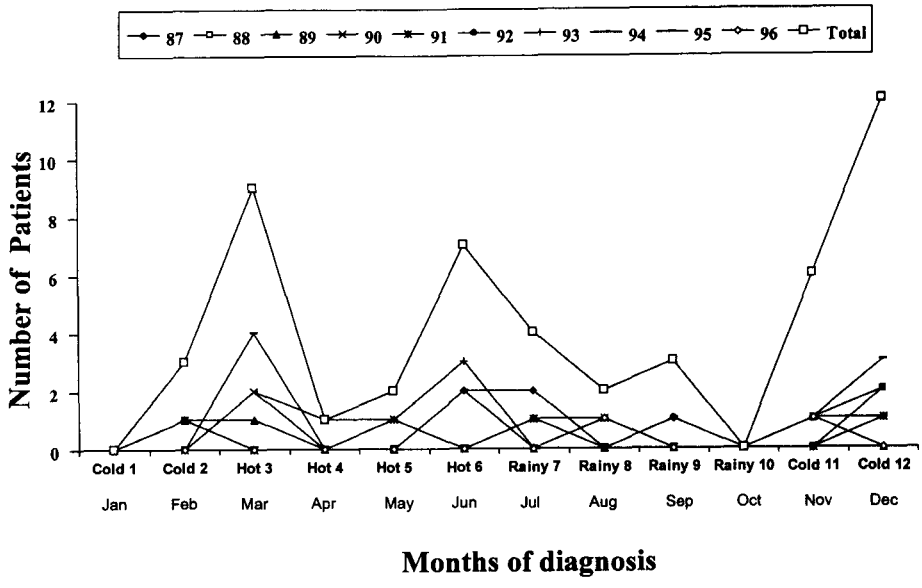

Fig. 3. Month of diagnosis.

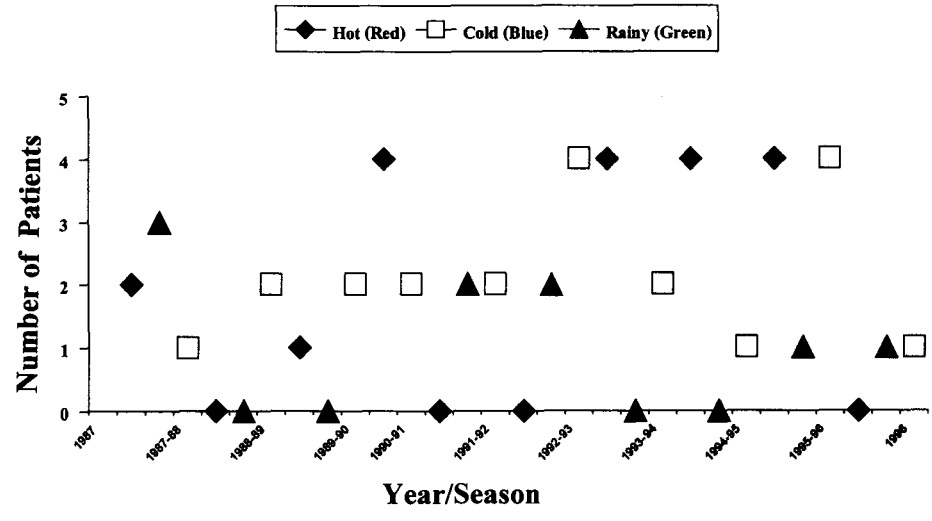

Fig. 4. Seasonal variation in diagnosis over the last 10 years.

Age of diagnosis

During the 10 years of the study, the age when a diagnosis of type 1 diabetes was made ranged from 3 months to 14 years. Fig. 2 shows that the diagnosis was made more frequently in children aged 9 to 12 years. There was no difference between sexes.

Seasonal variation

In Bangkok, there are three seasons in a year, the hot season (March to June), the rainy season (July to October) and the cold season (November to February). Fig. 3 illustrates the total number of patients diagnosed in each month of the year over the 10 year period (n=49, 89.1%). There was a

Table 3. Seasonal variation correlated to onset of Thai type 1 diabetes : compared to previous study.

Seasonal	1984-85 Tuchinda[10]	1987-91 this study	1992-96 this study
No cases	65	20	27
Winter (Nov. to Feb.)(%)	38.7	50	37
Summer (Mar. to Jun.)(%)	27.3	35	48.2
Rainy (Jul. to Oct.) (%)	34	15	14.8
Data from	Around country	Siriraj Hospital	Siriraj Hospital

notable absence of diagnosis of type 1 diabetes in January and October and a consistently lower number of diagnoses were made during the rainy season. Fig. 4 illustrates the seasonal variation for each individual year. In the last three years, there has been a consistent pattern with more patients being diagnosed during the hot season months, and the least during the rainy season. The data was compared to our previous study and is shown in Table 3.

Body Mass Index (BMI)

Of those patients whose BMI was recorded at the time of diagnosis (n=45, 81.8%), the majority (93.9%) had a BMI less than 20 kg/m2. There was a range of 10.96 to 20.4 kg/m2, with a mean BMI of 15.17 ± 2.64 kg/m2. There was no significant difference between sexes.

Family history

Of those patients whose family history was recorded at the time of diagnosis (n=52), there were only 38 per cent who claimed to have a family history of diabetes. Of these 2 per cent were type 1 diabetes, 6 per cent were type 2 diabetes and in 30 per cent the type of diabetes could not be identified. Thirty-three (62%) denied any family history of diabetes. There was no obvious difference between the patterns of family history seen in the various age groups. One patient reported a family history of both type 1 and type 2 diabetes. The relationship between the affected relative and the patient was not specified in many cases.

DISCUSSION

This study demonstrated that diabetes in Thai children aged 0-14 years was mostly type 1 diabetes (93.3%). Type 2 diabetes and MODY accounted for 5 per cent and secondary diabetes for 1.7 per cent. These results for childhood diabetes are similar to findings in other populations[12,13]. We have observed an increasing number of cases of type 1 diabetes in children under 15 years over the last ten years. Most commonly the diagnosis is made in children between 9 and 12 years of age. Diagnosis in late childhood and early adolescence was a common finding in other studies[3,4,6]. Only 38 per cent of patients had a positive family history of diabetes. Almost all of patients were thin, 93.9 per cent having a BMI of less than 20 kg/m2.

Twenty three per cent of patients presented with hyperglycemia and ketonemia without symptoms of severe metabolic acidosis. This result implies that our pediatricians were alert for this illness and in many cases were able to make an early diagnosis.

Tuchinda et al[10] have previously reported that there was no seasonal variation of Thai childhood diabetes in a study carried out during the years 1984 and 1985. The results of this study demonstrate that in the period 1987 to 1996, more patients were diagnosed at Siriraj Hospital, Bangkok, in the winter and summer seasons rather than in the rainy season. When we separated all patients into two periods 1987-1991 and 1992-1996, we could then identify that the prevalence was higher in the summer and winter seasons and consistently lower prevalence of 14-15 per cent was observed in the rainy season. These observations demonstrate that there are significant environmental factors which influence this disease.

Unfortunately, there have been few studies on the epidemiology of infections in our population to provide reference information. In Thailand, and especially in Bangkok which is a big capital city with a population of ten million, the construction work, the busy traffic, and the polluted environment are worst during the summer period, and this may

play a role in increasing the prevalence of the type 1 diabetes during these months. However, in the rainy season, heavy rain results in less polluted air and a cleaner environment, and this may reduce infections in children during this period.

We have also observed that there are more allergic children among our newly diagnosed young patients. This may be related to the different pattern of onset of diabetes observed during the past ten years.

SUMMARY

Our review has demonstrated that the peak age for diagnosis of Thai childhood diabetes was 9 to 12 years, and that one-fourth of patients were diagnosed before severe diabetic ketoacidosis occurred. In the past ten years, more new patients have been diagnosed during the winter and summer seasons, than in the rainy season. This is different from what has been previously observed. Further research into the influence of seasonal factors and the significance of family history of Thai type 1 diabetes is needed.

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โรคเบาหวานชนิดที่ 1 ในเด็กไทยอายุ 0–14 ปี

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ผู้ป่วยเด็กโรคเบาหวานชนิดที่ 1 ที่ได้รับการวินิจฉัยก่อนอายุ 15 ปี ในหน่วยต่อมไร้ท่อเด็ก ภาควิชากุมารเวชศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล ระหว่าง พ.ศ. 2530–2539 จำนวน 55 ราย จากทั้งหมด 59 ราย (ที่เหลือ 3 ราย (5%) เป็นเบาหวานชนิดที่ 2 และ MODY 1 ราย (1.7%) เป็นเบาหวานทุติยภูมิจากโรคเบต้าธาลาสซีเมีย) ได้นำมาศึกษาเพื่อรวบรวมข้อมูลทางระบาดวิทยาของโรค อุบัติการความชุกและฤดูกาลของการเกิดโรค พบว่าผู้ป่วยอายุน้อยที่สุดได้แก่ 3 เดือน อายุมากที่สุด 14 ปี เป็นชาย 23 ราย และหญิง 32 ราย กลุ่มอายุที่พบมากที่สุดระหว่าง 9–12 ปี ผู้ป่วย 77% มีอาการ diabetic ketoacidosis เมื่อแรกวินิจฉัย, 93.9% มี Body Mass Index (BMI) น้อยกว่า 20 kg/m2, 38% มีประวัติครอบครัวเป็นโรคเบาหวานแต่มีเพียง 2% ที่เป็นเบาหวานชนิดที่ 1 ความชุกของการเกิดโรคกระจายตลอดปีในแต่ละปี แต่การศึกษาในครั้งนี้ พบว่าผู้ป่วยส่วนใหญ่ได้รับการวินิจฉัยโรคในฤดูหนาวและฤดูร้อน 37–50% และ 35–48.2% ตามลำดับ และพบเพียง 14.8–15% ที่ได้รับการวินิจฉัยโรคในฤดูฝนซึ่งต่างจากรายงานในปี พ.ศ. 2527–2528 ที่ไม่พบความแตกต่างระหว่างฤดู

คำสำคัญ : เบาหวานในเด็กและวัยรุ่น, เบาหวานชนิดที่ 1, เบาหวาน

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