

A National Database on Children and Adolescent with Diabetes (e-DiCARE): Results from April 2006 to June 2007

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SUMMARY

In Malaysia, Diabetes in Children and Adolescents Registry (DiCARE) was launched nationwide in August 2006 to determine and monitor the number, the time trend of diabetes mellitus (DM) patients, their socio-demographic profiles, outcome of intervention and facilitate research using this registry. This is an on going real time register of diabetic patients ≤ 20 years old via the e-DiCARE, an online registration system. To date were 240 patients notified from various states in Malaysia. The mean age was 12.51 years (1.08 -19.75) and 46.4% were boys. The mean age at diagnosis was 8.31 ± 4.13 years old with an estimated duration of diabetes of 4.32 ± 3.55 years. A total of 166/240 (69.2%) have T1DM, 42/240 (17.5%) have T2DM and 18/240 (7.5%) have other types of DM. Basis of diagnosis was known in 162 patients with T1DM and 41 patients with T2DM. In T1DM patients, 6.0% of the girls and 19.1% boys were overweight or obese. As for T2DM, 64.3% had their BMI reported: 66.7% girls and 91.6% boys were overweight or obese. Most patients (80.4%) practiced home blood glucose monitoring. Patients were seen by dietitian (66.7%), diabetes educator (50.0%), and optometrist or ophthalmologist (45.0%). Only 10.8% attended diabetic camps. In the annual census of 117 patients, the mean HbA1c level was $10.0\% \pm 2.2$ (range 5.2 to 17.0%). The early results of DiCARE served as a starting point to improve the standard of care of DM among the young in the country.

KEY WORDS:

Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM), Children, Adolescents, Registry

INTRODUCTION

In Malaysia, very little is known about the epidemiology of diabetes mellitus (DM) in children and adolescents. Hence, Diabetes in Children and Adolescents Registry (DiCARE) was launched nationwide in August 2006 to provide a uniform data collection system.

In most western countries, type 1 diabetes mellitus (T1DM) accounts for more than 90% of childhood and adolescent DM, (EURODIAB and DIAMOND)¹. Wide variations exist between the incidence rates of different countries, within

countries and between different ethnic populations. The annual incidence rates for childhood T1DM (0-14 year age group) are 0.1-37.4 per 100, 000¹. The incidence is lowest in

China and Venezuela (0.1 per 100,000 per year) and highest in Finland and Sardinia (37 per 100,000 per year). In South-East Asia only 2 countries, India (4.2 per 100,000 per year) and Mauritius (1.4 per 100,000 per year) have published rates. In the Western Pacific, with the exception of Australia and New Zealand, the incidence in this region appears to be low².

Over the last decade, it has become apparent that type 2 diabetes mellitus (T2DM) extends not only to the young adult population but is also found in adolescents and even occasionally in children. The limited data that are currently available present a rather uncertain picture, with a rather wide range of prevalences and incidences of T2DM in children and adolescents³. It affects mainly obese children and certain ethnic populations as African, Hispanic, Asian and Native American origin¹. It is an emerging problem in Malaysia with the rise in obesity rate among children and adolescents.

OBJECTIVE

This paper attempts to highlight the early finding of the registry.

MATERIALS AND METHODS

This is an on going real time register of patients ≤ 20 years old with all types of DM from hospitals throughout Malaysia. Patients was purely voluntary. The registry captured data on demographic, clinical features and outcome of treatment via the e-DiCARE, an online case report forms, coordinated by the Clinical Research Centre, Hospital Kuala Lumpur. Ethic approval was obtained from the MREC MOH.

RESULTS AND DISCUSSION

For the first year study, from April 2006-June 2007, there were 240 patients notified from various states in Malaysia. Many patients were reported from hospitals in Selangor and the Federal Territory which were the main tertiary referral centres

Table I: Number and Proportion of Basis of Diagnosis by Type of Diabetes Mellitus amongst those with known Basis Diagnosis, DiCARE April 2006-June 2007

Basis of Diagnosis		T1DM N=162		T2DM N=41	
		N	%	N	%
Incidental Clinical	Asymptomatic	2	1.2	1	2.4
	Diabetic ketoacidosis (DKA)	89	57.1	2	5.6
	Obesity	3	1.9	20	55.6
	Acanthosis nigricans	3	1.9	16	44.4
	Pruritis (genitalia)	2	1.3	5	13.9
	Recurrent abscess	1	0.6	0	0
	Weight loss	78	50.0	8	22.2
	Hyperosmolar symptoms (polyuria or polydipsia or secondary enuresis)	98	62.8	23	63.9
	Incomplete data	2	1.3	1	2.9
Biochemistry	RBS > 11.1 mmol/L (RBS)	122	89.1	23	69.7
	FBS > 7.0 mmol/L (FBS)	27	19.7	16	48.5
	OGTT (2 hours) > 11.1 mmol/L	3	2.2	8	24.2
	Insulin auto-antibodies	4	2.9	0	0
	C-peptide/ insulin level	17	12.4	5	15.2
	Ketonuria	94	68.6	4	12.1
	Ketonaemia (>0.5 mmol/L)	14	10.2	1	3
	HCO ₃ < 15mmol/L	54	39.4	1	3
	Incomplete data	0	0	1	3

Table II: Number, Mean and Median of HbA1c by Type of Diabetes Mellitus amongst those with known HbA1c study, DiCARE April 2006- June 2007

Type	N	Mean (SD)	Median (min. max)
T1DM	50	9.9 (2.0)	9.5 (6.8, 17.0)
T2DM	20	9.7 (2.3)	9.8 (5.2, 13.4)
Others	7	10.8 (3.7)	10.2 (6.8, 16.3)

in Malaysia. The mean age was 12.51 years ranging from 1.08 – 19.75 years old and 46.4% were boys. The mean age at diagnosis was 8.31 ± 4.13 years old with an estimated duration of diabetes of 4.32 ± 3.55 years.

Among the three major ethnic groups in Malaysia, the Malays constituted 45.4%, Chinese 32.5% and Indians 19.2%. Our national data from National Health Morbidity Survey (NHMS) showed that Malays constitute 65.1%, Chinese 26.0% and Indians 7.7% of the population⁴. Positive family history of diabetes is present in 22/166 (13.3%) of T1DM patients and 27/42 (64.3%) of T2DM patients.

A total of 166/240 (69.2%) have T1DM, 42/240 (17.5%) have T2DM and 18/240 (7.5%) have other types of DM that included secondary causes such as thalassaemia.

Clinical characteristics and basis of diagnosis of T1DM:

Out of 166 patients with T1DM reported in this registry, basis of diagnosis is known in 162 patients. The clinical presentations of these patients at diagnosis included hyperosmolar symptoms (62.8%), DKA (57.1%) and weight loss (50%). The biochemical characteristics at the time of diagnosis included RBS >11.1 mmol/L (89.1%), ketonuria (68.6%) and HCO₃ < 15mmol/L (39.4%). Of these patients only 2.9% had insulin auto-antibodies measured and 12.4% had C-peptide/insulin level tested. This may reflect the unavailability of these tests in most centres. Two patients had the diagnosis made incidentally based only on biochemical findings (Refer Table I).

Of all T1DM patients (N=166) reported in the registry, only 67% had their BMI reported. Of the 64 girls with BMI reported, only 2 (3.0%) were obese and 2 (3.0%) were overweight. One girl was noted to be underweight. Majority (92.2%) of the girls with T1DM fall in the normal weight category. Of the 47 boys with BMI reported, 4 (8.5%) were obese and 5 (10.6%) were overweight while 6 (12.8%) were underweight. Thirty-two boys (68.1%) with T1DM fall in the normal weight category. It appears that more boys seem with T1DM in this registry had weight problems as compared to girls (refer Figure 1 and Figure 2).

Clinical characteristics and basis of diagnosis of T2DM:

Out of 42 T2DM patients in this registry, the basis of diagnosis was reported for 41 patients. The common clinical manifestations were hyperosmolar symptoms (63.9%), obesity (55.6%) and acanthosis nigricans (44.4%). Only 5.6% of these patients presented with DKA, while 2.4% had the diagnosis made incidentally. DKA is an uncommon presentation in this group of patients with T2DM. The observed discrepancy between the number of patients with DKA and those with bicarbonate <15 mmol/L may suggest overdiagnosis of DKA. The diagnosis is confirmed by biochemical findings which include RBS >11.1 mmol/L (69.7%), FBS >7 mmol/L (48.5%) and OGTT (2 hours) >11.1 mmol/L (24.2%). Only 15.2% of patients had their C-peptide / insulin levels measured (Refer Table I).

Of all T2DM patients (N=42) reported in the registry, only 64.3% had their BMI reported. Of the 15 girls with BMI reported, 6 (40.0%) were obese and 4 (26.7%) were

overweight. Five (33.3%) girls were of normal weight. None were underweight. Of the 12 boys with BMI reported, 7 (58.3%) were obese and 4 (33.3%) were overweight while 1 (8.3%) had normal weight. None were found to be underweight. (As expected, our data shows that overweight and obesity is more common in T2DM). It appeared that more boys seem with T2DM in this registry have overweight and obesity in comparison to the girls. (Refer Figure 1 and Figure 2) 67.7% of T2DM girls who have their BMI reported in this registry are overweight / obese as compared to only 6.3% in T1DM girls. Majority (91.7%) of T2DM boys who have their BMI reported in this registry are overweight / obese as compared to only 19.1% in T1DM boys.

Diabetes management and self care practice of:

Most patients (80.4%) practiced home blood glucose monitoring while only a few did blood ketone testing (2.5%) and urine ketone testing (1.3%). As to the management of patients by the diabetes team, patients were seen by dietitian in 66.7%, by diabetes educator in 50.0%, and by optometrist or ophthalmologist in 45.0%. However, only 10.8% reported to have attended diabetic camps. Other self-care practices included patients carrying medic alert (10.0%), carrying simple carbohydrates (36.7%) and keeping glucagon at home (2.1%). At the time of diagnosis, there were 78.0% patients who were on insulin, 14.7% who were on oral hypoglycaemics only, and 2.8% were on combination of both insulin and oral hypoglycaemics.

Outcome

The annual census on the 117 patients reported did not show good glycaemic control with a mean HbA1c level of 10.0% + 2.2 (median 9.7, minimum 5.2, maximum 17.0). The mean HbA1c results of all types of DM were also noted to be above that of the target (Table II).

CONCLUSION

This study found that there are more T1 than T2 children and adolescent diabetic in this sample. Boys appeared to suffer from weight problem more than girls. However, the first year

report of 240 would not reflect true national estimate encouraged to register new sites (SDP) and more cases. Tracking of outcome on an annual basis would provide a richer insight into the crux of the matter. Hence, better validity of the condition can lead to better ways to care for this subgroup health of the population.

More work is needed on e-DiCARE. Further improvement in reporting to DiCARE must be emphasized to more doctors so as to obtain more accurate and complete information. The early results of DiCARE however, serve to be a good starting point to improve the standard of care for young people with diabetes. National benchmarking and also perhaps later on international comparisons would spell standards of care in the future.

It is timely that this study is undertaken in Malaysia so that further research on diabetes can stem out of this national registry. From the registry, we can evaluate the efficiency and effectiveness of health care among the young diabetics and the health economics of diabetes. It is hope that if we tackle the issues related to diabetes care when the patients are still young, they will become knowledgeable adults who can reasonably handle their diabetes well and decrease the long term complications.

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