Type 1 diabetes metabolic control and epidemiologic characteristics at the Hospital San Juan de Dios of Costa Rica

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Abstract

Objectives: to determine the epidemiologic characteristics of type 1 diabetes patients at the Hospital San Juan de Dios and their glucose control rates.

Materials and methods: during April to October 2007 we reviewed the charts of 99 consecutive type 1 diabetic patients who presented to the outpatient clinic of the Endocrinology Department at the Hospital San Juan de Dios, Costa Rica. Epidemiologic data were recorded and also the latest laboratory tests regarding metabolic control (Hba1c, lipid profile, microalbuminuria, creatinine, TSH). We also recorded the physical exam data (blood pressure, waist circumference, weight, height).

Results: 99 patients, 57.6% women. Their average age is 24.9 ± 9.8 years and on average they were diagnosed at age 12.18 years. 65.7% is actually over 18 years old (adult group). Average Hba1c is 8.62%, teenagers have an average of 9.35% and adults 8.2% (p=0.009). 21.2% have a Hba1c below 7% and 10.1% below 6.5%. Hba1c below 6.5% was reached on 9.2% of adults and 11.2% of teenagers and a target below 7% was reached by 24.6% of adults and 14.7% of teenagers. Average BMI is 24,71 ± 3,72 kg/m2 (adults have a higher BMI), insulin dose was 1,04 ± 0,36 units/kg. 15.2% had an associated thyroid disease, 9.1% hypertension, 33% dyslipidemia. 40.4% had diabetic nephropathy, 9.1% retinopathy and 3% neuropathy. Overall 90% reached their blood pressure goals. 74.8% of patients were treated with intensive insulin regimens. 24.6% of adult patients met metabolic syndrome criteria and on average their Hba1c was higher (9.09% vs 8.06%, p=0.08).

Conclusions: blood glucose control is inadequate in most of type 1 diabetics at our center. We had a metabolic syndrome prevalence in this population similar to that reported in the DCCT.

Background

Since the publication of the DCCT trial back in 1993, intensive glucose control has been the mainstay of treatment to prevent complications. Despite medical advances, a great proportion of patients does not reach Hba1c goals worldwide.

In Costa Rica, average hba1c is 7.7% in the pediatric type 1 diabetes population back en 2002. Type 2 diabetes average hhba1c is 8.3% but we do not have data regarding type 1 diabetes in the adult population.

Patients over 12 years of age are referred to continue control in the Hospital San Juan de Dios. This is a public hospital and is part of the Costa Rican Social Security System. Most of the patients are controlled in the Endocrinology Department.

Teenage population have different characteristics compared to the adult population. Puberty increases insulin resistance so their insulin requirements may increase during this period but also social circumstances change. Their need for peer acceptance makes them often not compliant with lifestyle and pharmacologic recommendations.

Insulin treatment is associated with weight gain. Since obesity is the mainstay of insulin resistance, we have been concerned regarding this weight gain induced by insulin. If the patients become obese, they may also develop other complications such as metabolic syndrome and their insulin requirements may be higher than those diabetic patients with normal weight.

Type 1 diabetes diagnosis age has changed in several countries. For example, in Belgium patients now are diagnosed at a younger age (Weets et al 2007). A possible explanation is that childhood obesity may accelerate pre-existing inmune damage and beta cell destruction by overloading the insulin cells metabolically.

Objectives

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Materials and methods

This is a prospective case series study. During April to October 2007 we reviewed the charts of 99 consecutive type 1 diabetic patients who presented to the outpatient clinic of the Endocrinology Department at the Hospital San Juan de Dios, Costa Rica. Epidemiologic data were recorded and also the latest laboratory tests regarding metabolic control (Hba1c, lipid profile, microalbuminuria, creatinine, TSH). We also recorded the physical exam data (blood pressure, waist circumference, weight, height). We divided the these patients in 2 groups: those between 12 and 18 years were classified as adolescents and those over 18 years old were in the adult group.
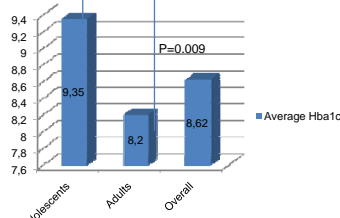
Statistical analysis was performed using SPSS 15.0

Results

99 patients were included in the present study. Average age is 24.9 ± 9.8 years. Diagnosis was made at 12.18 ± 6.43 years. Referral age to San Juan de Dios Hospital was at 16.88 ± 6.24 years.

42.4% are male patients. 34.4% are adolescentes (12-18 years) and 65.7% adults (over 18years old).

Graph 1. Average hba1c comparison

Graph 2. Percentage of patients reaching Hba1c targets
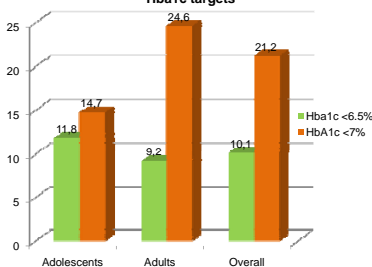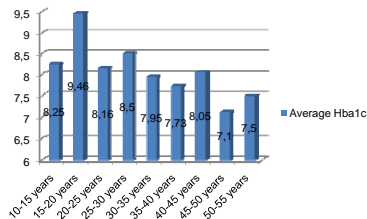

Graph 3. Average HbA1c by age group

Table 1. BMI, insulin dose and prevalence of chronic complications

|	Adolescents	Adults	Overall	P
BMI (average ± SD)	22.64±2.89	25.89±3.64	24,71 ± 3,72	<0.001
Insulin dose (units/kg)	1.14 ± 0.37	0.98± 0.34	1,04 ± 0,36	0.041
Thyroid disease	14.7%	15.4%	15,2%	0.589
Hyperten-sion	2.9%	12.3%	9,1%	0.118
Dyslipi-demia	2.9%	49.2%	33,%	<0.001
Retinopathy	0%	13.8%	9,1%	0.018
Nefropathy	17.6%	52.3%	40,4%	0.001
Neuropathy	2.9%	3.1%	3%	0.729

Graph 4. Type 1 diabetes diagnosis age when compared by actual BMI (N=65, only adult population included)
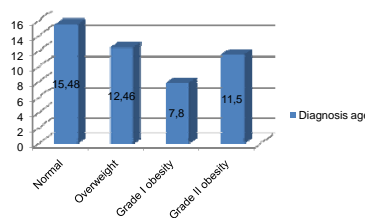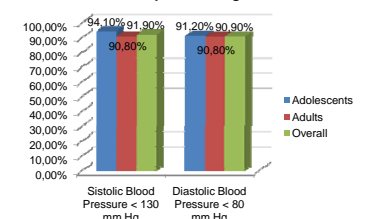

Graph 5. Percetage of patients that have metabolic syndrome (diabetes plus two other criteria)
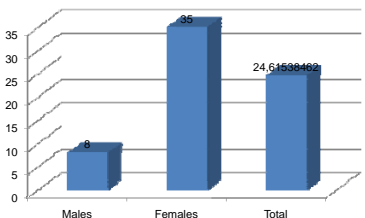
Graph 7. Average Hba1c when comparing patients with and without metabolic syndrome
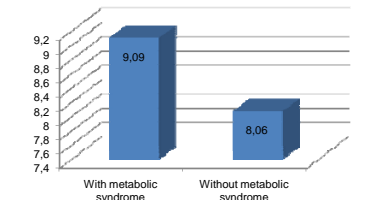
Graph 8. Percentage of patients reaching blood pressure targets

Discussion

This is the first description of characteristics and metabolic control in adult Costa Rican type 1 diabetic patients. As expected, these are young patients with few associated comorbidities. Unfortunately, most of the patients are not reaching hba1c targets, either 6.5% or 7%.

We found that adolescent patients had a poorer control than adult patients. This may be explained by different factors such as psychosocial (adolescents may have trouble with their peers if they tell them they are diabetics so sometimes they may not follow the diet or medical recommendations). For these patients we may need psychological support to improve their blood glucose control.

Hba1c improved with years of diabetes. Diabetic patients may be more educated, may have a diet control and be more mature. Also, as years go by, patients will know more about the disease and this may improve control. If this is the case, once again we need better education programs right from the start.

In other countries, such as Austria and Germany, type 1 adolescent patients had a better control in the first two years after diagnosis (hba1c 7.1%) and 7.9% thereafter. This control is slightly better than that observed in our patients (Gerstl 2007). Economic issues in our countries may account for part of the observed differences, but in poor African countries such as Algeria, Keddari et al showed that in 722 type 1 diabetic patients their average hba1c was 7.4% and 40% of the patients reached hba1c lower than 7%. On the other hand, Rosilio et al reported that in France average hba1c on type 1 diabetic patients was 8.97%.

There has been some concern with the weight gain induced by insulin in diabetic patients. Hypothetically, this weight gain may induce insulin resistance and therefore metabolic syndrome. Kilpatrick et al looked at this in a post hoc analysis of the DCCT trial, where they showed that 22% of these patients met metabolic syndrome criteria. In our series, 24% of our patients met these same criteria, so it is very similar to that observed in the DCCT. In our patients, average Hba1c was higher in patients meeting metabolic syndrome criteria which may be explained by the presence of insulin resistance. Also, these patients may be less compliant with lifestyle modifications.

A interesting finding was that as we increase actual BMI, the age at which type 1 diabetes was diagnosed is younger. If this is the trend, as we have more childhood obesity, a younger age of diagnosis should be expected and this has already been described elsewhere (Weets 2007). In a genetically susceptible individual, hyperinsulinism (due to obesity) may increase the inmunological response and beta cell destruction rendering these patients diabetic at a younger age.

Since this is a young population, it is not surprising that most of the patients met the blood pressure control goal. Thyroid disease prevalence is just 15%, but we do not know the prevalence of thyroid disease in the general Costa Rican population.

Conclusions

Blood glucose control is inadequate in most of type 1 diabetics at our center. We had a metabolic syndrome prevalence in this population similar to that reported in the DCCT. Adult diabetic patients have a better blood glucose control compared with adolescents. Average Hba1c was higher in patients meeting the metabolic syndrome criteria.

References

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