

Incidence of type 1 diabetes in the children's hospital dr. Robert reid cabral, 2010-2019. Dominican republic

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Abstract

Background

The Children Hospital Dr. Robert Reid Cabral, the principal children hospital in the Dominican Republic has no recent data on type 1 diabetes (T1D) incidence in children, therefore a study was undertaken to determine this in people aged <15 years (y).

Methods

Data were collected on all new T1D diagnoses between 2010-2019 from the The Children Hospital Dr. Robert Reid Cabral that care for children with T1D. Diagnosis was made according to standard American Diabetes Association criteria. No secondary ascertainment source was available. Significances around sex, age and incidence were assessed using the Chi-square (X²) and Pairwise Pearson Correlations tests.

Results

There were 513 new cases of T1D diagnosed in children aged <15 y; a mean of 51.3 per year. Mean $\pm$ standard deviation age of T1D diagnosis was 8.5 ± 3.8 y, and there was also a not significant female preponderance ($p < 0.35$). New cases were consistently highest in the 10-14 y (48.5%), and lowest in the 0-4 y age group (18.6%).

Overall, mean crude annual incidence was 1.73 per 100,000 population, with no significant trend of increase or decrease.

Background

The Dr. Robert Reid Cabral Children's Hospital is located in the city of Santo Domingo, Dominican Republic where it has functioned as the main pediatric care center since 1961. During the study period (2000-2019) the hospital offered care to diabetics from patients from the southeast and southwest regions whose territories occupy 64% of the population.

Santo Domingo is the capital of the Dominican Republic, a country that occupies two-thirds of Hispaniola, the second largest island in the Caribbean which is considered by the United Nations an Upper Middle-Income Country (1).

Mean crude T1D annual incidence was 4.3 (95% CI 3.5–5.1) per 100,000 population < 15 years in a recent national study for the Dominican Republic was reported (2)

Methods

Data collection

The Dominican Republic is divided into three departments: Cibao or North, South-east and South-west (3).

All children in Dominican Republic aged <15 y diagnosed with T1D from south-east and South-west are routinely referred to the

endocrinology service of the Pediatric Hospital Dr Robert Reid Cabral in Santo Domingo. The Children from Cibao or North were referred to the Hospital Dr Arturo Grullon in Santiago, the second major city of the country.

In this study, data were collected on new T1D diagnoses in patients aged <15 y, from the clinical records where it was analysed the age of diagnosis, sex, and annual incidence. No secondary ascertainment source could be identified.

Diagnosis of T1D was according to American Diabetes Association (4) based on a classic history and clinical features in the absence of features suggesting type 2 or secondary diabetes, by a pediatric endocrinology. Diabetes autoantibody and C-peptide assays are not routinely done in Dominican Republic. Two patients diagnosed aged <6 months and managed on oral agents were excluded as they presumably have monogenic diabetes.

Source population

At the last national census in 2010, the population of Dominican Republic was 9,445,281, with a slight male preponderance (50.2%) (5). Population data for each year from 2010-2019, for persons aged <15 y, were obtained from the National Statistics Office (6); the population essentially remained stable during this period (2010=2,966,704; and 2019=2,963,951). In 2019, 27.6%

of the population in the Dominican Republic was aged <15 y.

Data analyses

Descriptive statistics were calculated to describe the sample, with age at T1D diagnosis expressed as mean±standard deviation (minimum-maximum). Crude annual T1D incidence was calculated as number of newly diagnosed cases per 100,000 children in 5-y (0-4, 5-9 and 10-14) and <15 y age brackets. Annual incidence was obtained by dividing the number of cases by the total population for the age group and adjusting for 100,000 children at risk, and overall incidence (2010-2019) by dividing the total number of cases by the total number of children at risk and adjusting for 100,000 children. Standardised rates were based on the 2019 world population <15 y (7). Significances around sex, age and incidence were assessed using the Chi-square (X²) and Pairwise Pearson Correlations tests. 95% Confidence Intervals (CI) are reported, and statistical significance was set at $p < 0.05$.

Analyses were undertaken using IBM SPSS Statistics version 26 (Armonk, USA); G*Power version 3.1.9.6 (Heinrich Hein University Düsseldorf, Germany); MinitabStatistics version 20.4.1.0 (Minitab, Pennsylvania, United States of America); Graphpad Prism for Windows Ver 9.4, San Diego California, United States of America; MedCalc Software, Version 20.114, Acaciaaan 22, Ostend, Belgium; Microsoft Office 365 (- Excel 365, - Word 365, - PowerPoint 365).

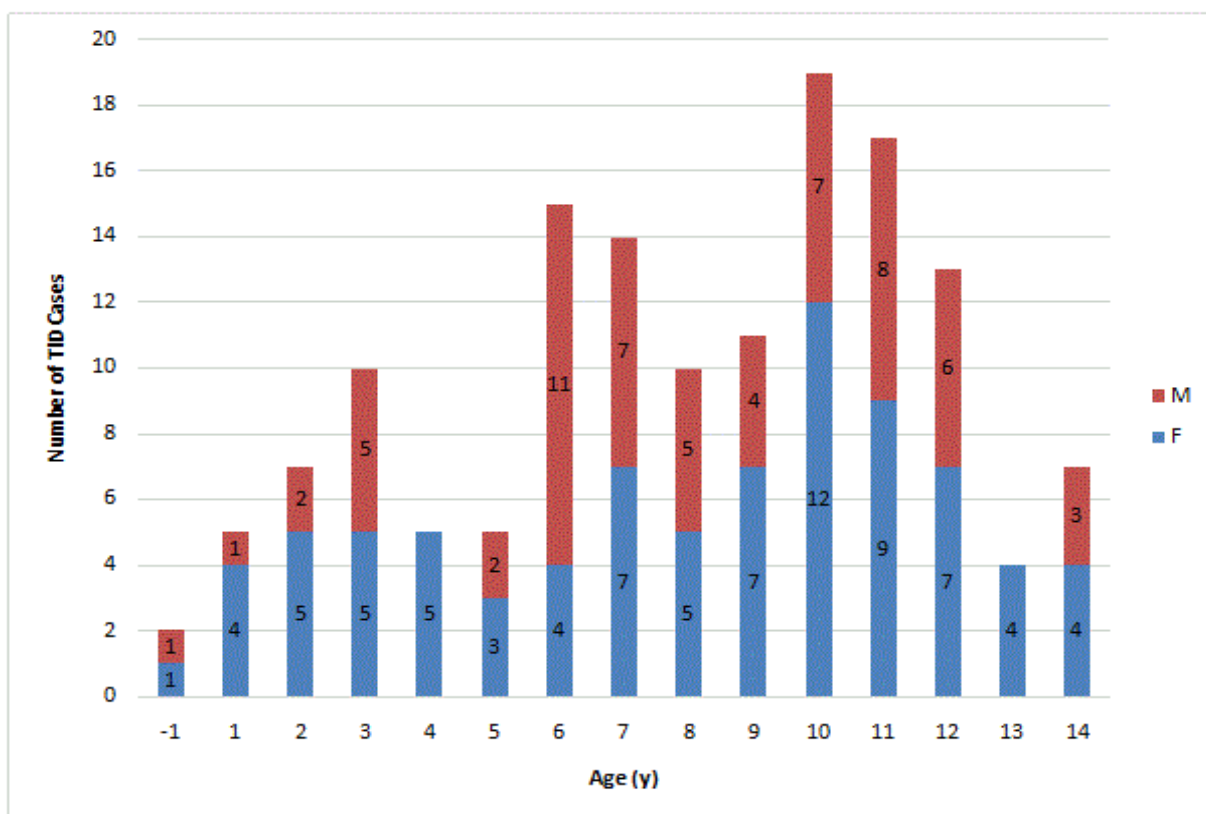
Results

Diagnoses and demographic data

There were 513 new cases of T1D diagnosed in children aged <15 y, between 2010-2019 (Table 1); a mean ± standard deviation 51.3 ± 2.8 cases per year.

Overall age at T1D diagnosis was 8.71 ± 3.91 males and 8.38 ± 3.78 y in females.

Cases per age peaked at 10 y (Figure 1). There was also a significant female preponderance ($n = 315$, 61.4% vs. $n = 198$ 38.7%; $p < 0.001$) (Table 1); the male: female ratio was 0.63. Figure: 1 When examined by age group, each year new cases were consistently highest in the 10-14 y age group, and lowest in the 0-4 y age group (Table 1).



y=Years; and T1D=Type 1 diabetes.

Figure 1 : Age onset of type 1 diabetes in HIRRC aged <15 y

Table 1: T1D cases and incidence < 15 years in HIRRC

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Overall
	Population										
Total	2967710	2963572	2961566	2961447	2962490	2964047	2966846	2970016	2973167	2975626	29666487
	Cases										
By age Group - n (%)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
0-4 y	8 (15.8)	11(20.0)	10(19.2)	12(21.4)	7(14.3)	9(19.1)	8(15.7)	12(23.1)	5(10.4)	11(21.6)	93 (18.1)
5-9 y	22 (42.3)	17(30.9)	16(30.8)	21(37.5)	15(30.6)	12(25.5)	21(41.2)	19(36.5)	14(29.2)	14(27.5)	171(33.3)
10-14 y	22(42.3)	27(49.1)	26(50.0)	23(41.1)	27(55.1)	26(55.3)	22(43.1)	21(40.4)	29(60.4)	26(51.0)	249(48.5)
By gender - n (%)											
Female	34 (65.4)	26 (47.3)	29 (55.8)	36 (64.3)	35 (71.4)	33 (70.2)	36 (70.6)	28 (53.8)	28 (58.3)	30 (58.8)	315 (61.4)
Male	18 (34.6)	29 (52.7)	23 (44.2)	20 (35.7)	14 (28.6)	14 (29.8)	15 (29.4)	24 (46.2)	20 (41.7)	21 (41.2)	198(38.6)
Total	52	55	52	56	49	47	51	52	48	51	513
Incidence per 100,000 (95% CI)											
By age group											
0-4 y	0.8 (0.4, 1.6)	1.1 (0.6, 2.0)	1.0 (0.5, 1.9)	1.2 (0.7, 2.1)	0.7 (0.3, 1.5)	0.9 (0.5, 1.7)	0.8 (0.4, 1.8)	1.2 (0.7, 2.1)	0.5 (0.2, 1.2)	1.1 (0.6, 2.0)	0.9 (0.8, 1.1)
5-9 y	2.4 (1.5, 3.4)	1.7 (1.1, 2.8)	1.6 (1.0, 2.7)	2.1 (1.4, 3.3)	1.5 (0.9, 2.5)	1.2 (0.7, 2.2)	2.1 (1.4, 3.3)	1.9 (1.7, 3.0)	1.4 (0.8, 2.4)	1.4 (0.8, 2.4)	1.7 (1.5, 2.0)
10-14 y	2.2 (1.5, 3.4)	2.73 (1.9, 4.0)	2.6 (1.8, 3.9)	2.3 (1.6, 3.5)	2.8 (1.9, 4.0)	2.7 (1.8, 3.9)	2.3 (1.5, 3.4)	2.2 (1.4, 3.3)	3.0 (2.1, 4.3)	2.7 (1.8, 3.9)	2.5 (2.2, 2.9)
By gender											
Female	2.3 (1.6, 3.2)	1.8 (1.2, 2.6)	2.0 (1.4, 2.9)	2.5 (1.8, 3.4)	2.4 (1.7, 3.4)	2.3 (1.6, 3.2)	2.5 (1.8, 3.4)	1.9 (1.3, 2.8)	1.9 (1.3, 2.8)	2.1 (1.4, 2.9)	2.2 (1.9, 2.4)
Males	1.2 (0.8, 2.0)	1.9 (1.3, 2.8)	1.5 (1.0, 2.3)	1.3 (0.9, 2.1)	0.9 (0.6, 1.6)	0.9 (0.6, 1.6)	1.0 (0.6, 1.6)	1.6 (1.1, 2.4)	1.3 (0.9, 2.0)	1.4 (0.9, 2.1)	1.3 (1.1, 1.5)
Total	1.8 (1.3, 2.3)	1.9 (1.4, 2.4)	1.8 (1.3, 2.3)	1.9 (1.5, 2.5)	1.7 (1.3, 2.2)	1.6 (1.2, 2.1)	1.7 (1.3, 2.3)	1.8 (1.3, 2.3)	1.6 (1.2, 2.1)	1.7 (1.3, 2.3)	1.7 (1.6, 1.9)

T1D incidence

Overall, crude annual incidence was mean (range) 1.73 per 100,000.

When examined per 5-y age group, incidence did not significantly vary, being highest in the 10-14y age group, and lowest in the 0-4 y age group (, Table 1, and Figures 2 and 3).

Discussion

This is the first study to provide epidemiological data on T1D in children in HIRRC since the 1990s. Peak age of onset was greater in Age group 10-14. The incidence of 1.7 per 100,000 population over the period 2010-2019, in individuals <15 y is statistically significant less when compare with rate in Dom Rep

(4.1 100,000) $p < 0.000$ but the hospital only received patient for some area of the country.

Incidence of type 1 diabetes by year in HIRRC children aged < 15 y was very constant probably due to the increased in this population yearly.

Due to genetic and environmental factors T1D incidence in children <15 y varies widely across different continents and between countries, (8,9,10)

T1D incidence is highest in northern-European-origin populations, in some Arab populations in the Middle East and North Africa (11,12,13).

In some Latin-American countries the incidence reported is

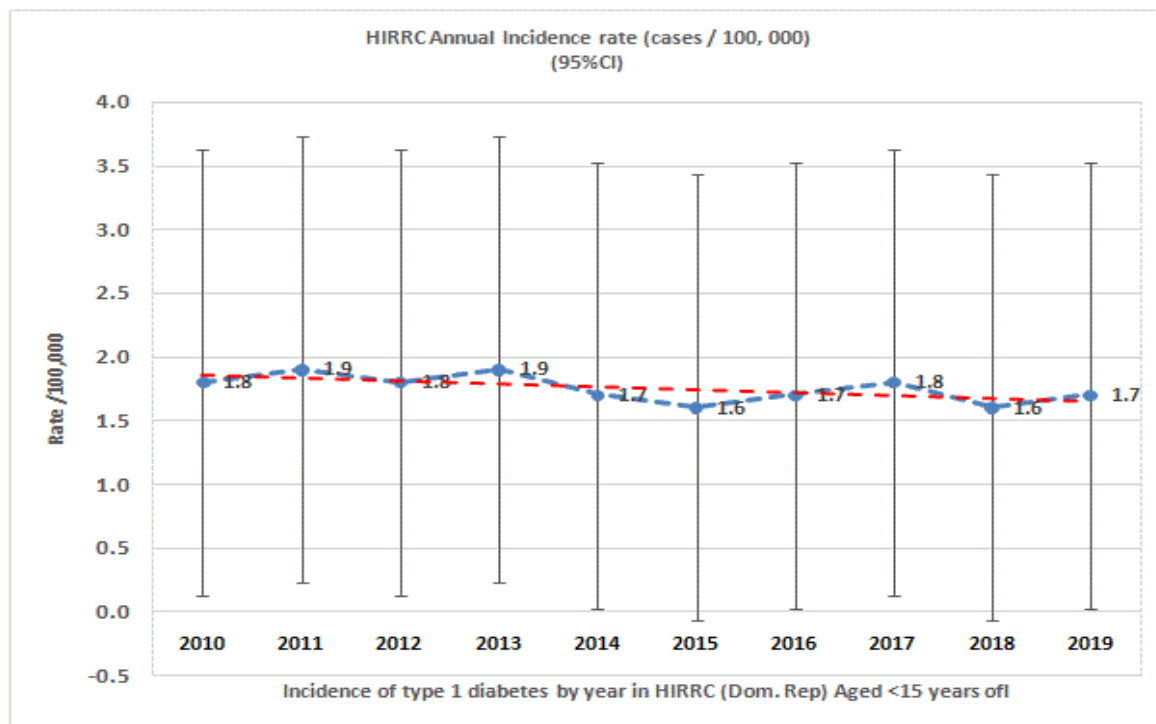
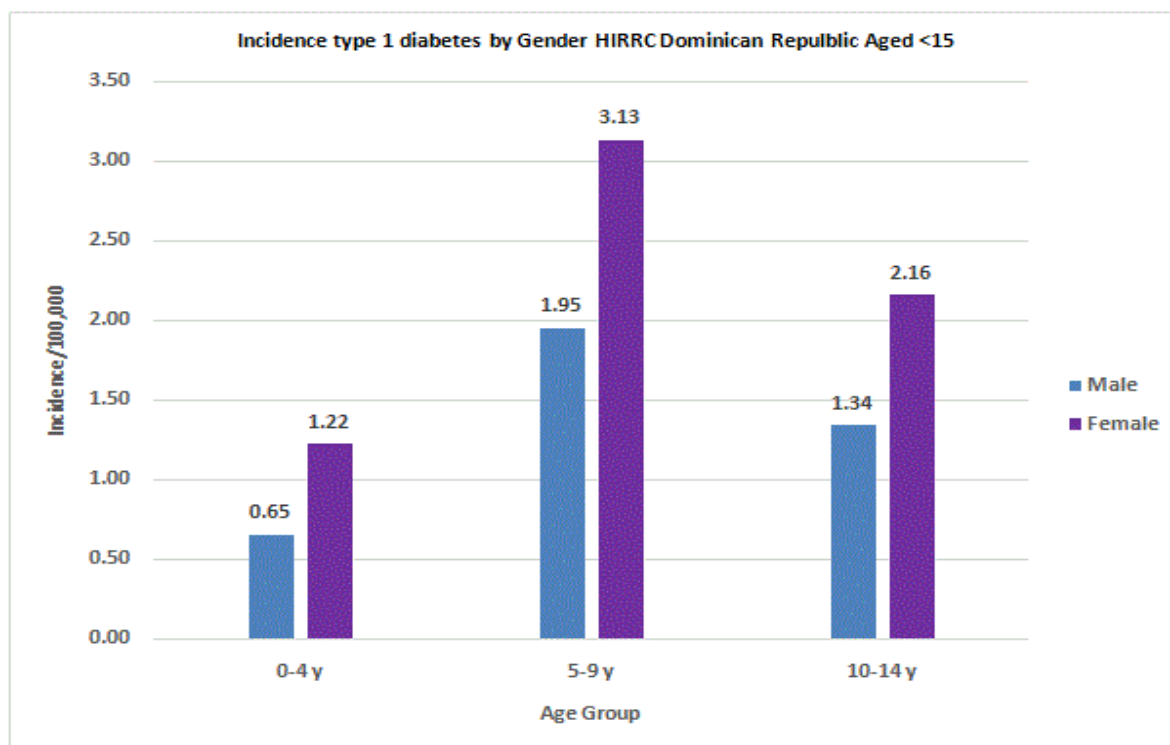


Figure 2 : Incidence of type 1 diabetes by year in HIRRC children aged < 15 y.



T1D=Type 1 diabetes; y=Years

Figure 3 : Incidence of type 1 diabetes by gender in HIRRC < 15 y.

There was not a statistically significant difference between the incident x100,000 by gender vs age group: Chi-S = 0.54, DF= 2, P = 0. 0.7603

variable : Brazil (16.3)14, than Colombia, Bolivia (both 2.2) (15) (16), and, but much lower than Chile (13.9) (17) and . Mexico (3.2) (18).

The absence of a single health system in Latin American countries makes it difficult to obtain global data and rather correspond to segments of the population. In the Dominican Republic, those who go to public hospitals such as the HIRRC are usually the middle and poor social classes although we do not believe that diabetics from other social extracts are so abundant and these at some point consult the public system in search of other experiences.

The T1D incidence in HIRRC is low compared to the reported for the country but the increase in new cases observed in the Dominican Republic and in all the countries after Covid19 pandemia surely will change this perception

As the limitation of a retrospective study, this information is very valuable for the hospital assistant.

Conclusions

The incidence of T1 Diabetes in children aged <15 years assisted in the principal children hospital in Santo Domingo, Dominican Republic is low according to the international parameter IDF region.

Author contributions

ElbiMorla, Rosario Almanzar, Carmen Rosario codesigned the study. Lunisol Rivera, Michelle Burgos collected data, and assisted with confirming patient information. Jorge Sansary assisted with data interpretation. All authors co-wrote the manuscript.

Acknowledgments

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Competing interests

None declared.

Ethics approval

The study was approved by the children's hospital Dr Robert Reid Cabral Ethical Committee, which included the decision that informed consent was not required.

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