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Diabetes-associated autoantibodies in aboriginal children

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Type-2 diabetes is increasing in aboriginal children and adolescents and must be distinguished from type-1 diabetes in this population. The absence of diabetes-associated autoantibodies supports the clinical impression of type-2 diabetes in the affected members of this population.

The number of children with type-2 diabetes mellitus is increasing and is a particular concern in Canadian children of aboriginal origin. There is evidence that the prevalence of this disorder in children is increasing and is not simply the result of increased detection.[1]

The diagnosis of diabetes is made using biochemical criteria. The subsequent differentiation between type-1 diabetes and type-2 diabetes is currently based on clinical impression.[2] This can be a difficult distinction to make in childhood and adolescents. The distinction is important because of different education, treatment, and prevention strategies. The diagnosis is more firmly established on an individual basis by following the natural history of the disease (eg, without insulin therapy). The presence or absence of episodes of diabetic ketoacidosis is not helpful, as this complication has been seen in both type-1 diabetes and type-2 diabetes in children.[2]

Diabetes-associated autoantibodies have been identified with increased frequency in patients with type-1 diabetes mellitus. In one large cross-sectional study involving over 3000 schoolchildren in England, autoantibodies were present in 97% of those with type-1 diabetes; 92% had increased concentrations of two or more markers.[3] By contrast, diabetes-associated autoantibodies were absent in 90·6% of the non-diabetic schoolchildren. Less than 1% of non-diabetic schoolchildren had raised concentrations of two or more autoantibodies.[3] The presence of serum antibodies is helpful in the prediction of type-1 diabetes in both populations at risk and in the general population.[3]

Diabetes-associated antibody positivity has been studied in type-2 diabetes, 5·8% were positive for islet cell antibodies (ICA), 9·8% for glutamic-acid-decarboxylase antibodies (GAD), and 3·9% were positive for both. The presence of autoantibodies was predictive of the need for insulin therapy within 6 years. It was most predictive in those under 35 years of age, with a leaner phenotype which is more suggestive of type-1 diabetes.[4] This group may not have type-2 diabetes, but a latent form of autoimmune type-1 diabetes.

We did a cross-sectional survey to find out whether the absence of diabetes-associated autoantibodies could be used to support the diagnosis of type-2 diabetes in young aboriginal children.

	Present study		Study of Bingley et al[3]	
	Type-2 diabetes (n=20)	Controls (n=40)	Type-1 diabetes (n=256)	Controls (n=2855)
No antibody markers	19 (95)	40 (100)	8 (3)	2587 (90·6)
ICA512	1 (5)	0	193 (75)	60 (2·1)
GAD antibodies	0	0	190 (74)	63 (2·2)
IAA	0	0	177 (69)	57 (2·0)
Two or more antibodies	0	0	237 (92)	20 (0·7)

Data are prevalence *n* (%).

Antibody markers above the 99th percentile in 20 cases and 40 controls

Serum samples for three diabetes-associated autoantibodies—islet-cell antibodies, glutamic acid decarboxylase antibodies, and insulin autoantibodies—were drawn on 20 children affected with type-2 diabetes and 40 controls matched for age and sex. The 40 control samples were collected as part of a screening study involving 717 aboriginal children from a remote northern Manitoba community.[1] All children (cases and controls) were between 10–17 years of age, were of aboriginal origin, and resided in either northwestern Ontario or Manitoba, Canada. The affected children clinically had classic type-2 diabetes with obesity, acanthosis nigricans, and a positive family history of type-2 diabetes in first or second-degree relatives. All these children had fasting glucose levels of 7·0 mmol/L or higher in accordance with the diagnostic criteria adopted by the Canadian Diabetes Association. All could be maintained without exogenous insulin therapy with no acute decompensation. Autoantibodies were assayed in a single laboratory. Positive cut-offs for insulin autoantibodies, GAD, and ICA were 0·01, 0·032, and 0·071, respectively.[5]

Of the affected cases, only 1 (5%) child was weakly positive for ICA (0·073). There were no children positive for either GAD or insulin autoantibodies in the affected group. Thus, 95% of cases were negative for all three diabetes-associated autoantibodies (95% CI 0·93–0·98). From the control group, there were no children positive for ICA, GAD or insulin autoantibodies. Overall, 1·7% children were positive for ICA, 0% for GAD and insulin autoantibodies for the controls and cases combined (table). While the control sample is small, the prevalence of diabetes-associated autoantibodies does not seem to differ substantially from previously published control data derived primarily from Caucasian children. The absence of antibody markers for type-1 diabetes may provide a useful biochemical tool to aid in the distinction between type-1 diabetes and type-2 diabetes in aboriginal youth in Canada.

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