



ORIGINAL ARTICLE

Continuous insulin therapy *versus* multiple insulin injections in the management of type 1 diabetes: a longitudinal study



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KEYWORDS

Type 1 diabetes mellitus;
Insulin;
Insulin infusion systems;
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Abstract

Objective: To compare multiple doses of insulin and continuous insulin infusion therapy as treatment for type 1 diabetes mellitus.

Methods: 40 patients with type 1 diabetes mellitus (21 female) with ages between 10 and 20 years (mean=14.2) and mean duration of diabetes of 7 years used multiple doses of insulin for at least 6 months and after that, continuous insulin infusion therapy for at least 6 months. Each one of the patients has used multiple doses of insulin and continuous insulin infusion therapy. For analysis of HbA1c, mean glycated hemoglobin levels (mHbA1c) were obtained during each treatment period (multiple doses of insulin and continuous insulin infusion therapy period).

Results: Although mHbA1c levels were lower during continuous insulin infusion therapy the difference was not statistically significant. During multiple doses of insulin, 14.2% had mHbA1c values below 7.5% vs. 35.71% while on continuous insulin infusion therapy; demonstrating better glycemic control with the use of continuous insulin infusion therapy. During multiple doses of insulin, 15–40 patients have severe hypoglycemic events *versus* 5–40 continuous insulin infusion therapy. No episodes of ketoacidosis events were recorded.

Conclusions: This is the first study with this design comparing multiple doses of insulin and continuous insulin infusion therapy in Brazil showing no significant difference in HbA1c; hypoglycemic events were less frequent during continuous insulin infusion therapy than during multiple doses of insulin and the percentage of patients who achieved a HbA1c less than 7.5% was greater during continuous insulin infusion therapy than multiple doses of insulin therapy.

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PALAVRAS-CHAVE

Diabetes melito tipo 1;
Insulina;
Sistemas de infusão de insulina;
Adolescentes

Insulinoterapia contínua versus múltiplas injeções de insulina no tratamento da diabetes tipo 1: um estudo longitudinal

Resumo

Objetivo: Comparar terapia com múltiplas doses de insulina e o sistema de infusão contínua de insulina no tratamento da diabetes melito tipo 1.

Métodos: 40 pacientes com diabetes melito tipo 1 (21 mulheres) com idades entre 10 e 20 anos (média=14,2) e duração média do diabetes de sete anos utilizaram múltiplas doses de insulina durante pelo menos seis meses e, depois disso, sistema de infusão contínua de insulina por pelo menos seis meses. Todos os pacientes usaram múltiplas doses de insulina e sistema de infusão contínua de insulina. Para a análise de HbA1c, níveis médios de hemoglobina glicada (mHbA1c) foram obtidos em cada período de tratamento (múltiplas doses de insulina e sistema de infusão contínua de insulina).

Resultados: Embora os níveis de mHbA1c tenham sido menores com o uso de sistema de infusão contínua de insulina a diferença não foi estatisticamente significativa. Durante o uso de múltiplas doses de insulina, 14,2% tiveram valores de mHbA1c <7,5% vs. 35,71% quando usando sistema de infusão contínua de insulina; demonstrando melhor controle glicêmico com o uso de sistema de infusão contínua de insulina. Durante o uso de múltiplas doses de insulina, 15-40 pacientes tiveram eventos hipoglicêmicos graves contra 5-40 com sistema de infusão contínua de insulina. Não foram registrados episódios de cetoacidose.

Conclusões: Esse é o primeiro estudo cujo desenho comparou o uso de múltiplas doses de insulina e sistema de infusão contínua de insulina no Brasil, não demonstrando nenhuma diferença significativa nos níveis de HbA1c. Eventos hipoglicêmicos foram menos frequentes com o uso de sistema de infusão contínua de insulina do que com múltiplas doses de insulina e a porcentagem de pacientes que obteve um HbA1c <7,5% foi maior com sistema de infusão contínua de insulina do que com múltiplas doses de insulina.

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Introduction

Diabetes mellitus (DM) is a chronic metabolic syndrome characterized by intense catabolism. Type 1 diabetes mellitus (T1DM) is due to deficient insulin secretion, in most cases after autoimmune destruction of pancreatic beta cells. It is a very frequent chronic disease affecting children,¹ with incidence increasing all over the world.² In this way, diabetic ketoacidosis (DKA) and hypoglycemia are acute complications of T1DM associated with variety adverse effects and both can have fatal effects if not reversed in time.³

The DCCT study (The Diabetes Control and Complications Trial Research Group)⁴ demonstrated that intensive insulin therapy with multiple doses of insulin (MDI) or with a continuous insulin infusion therapy (CIIT) would be the best treatment for T1DM. In spite of the knowledge about both, MDI⁵⁻⁷ and CIIT,⁷ the comparison between these therapeutic schemes, particularly among children and adolescents, is incipient. Several studies have suggested that CIIT may provide better glycemic control,⁸⁻¹¹ with lower risk of severe hypoglycemia and a smaller weight gain⁸ compared to the MDI therapy. Among these analyses, few of these studies have been conducted on children and adolescents.^{9,10}

The aim of the present study was to assess, in a comparative manner, the MDI therapy and the use of CIIT regarding metabolic control and the occurrence of acute complications of the disease in a sample of children and

adolescents with T1DM followed up at a public hospital in São Paulo state, Brazil.

Method

This was a longitudinal study based on data obtained retrospectively from the medical records of patients of both sexes aged 5–20 years with a diagnosis of T1DM according to the International Society for Pediatric and Adolescent Diabetes criteria (ISPAD, 1995).

The patients had been using MDI for at least 6 months, and later CIIT, using both brands available in Brazil, also for at least 6 months. The duration of diabetes was required to be more than 2 years.

All patients were trained to count carbohydrates, to modify insulin dosage and to measure capillary glucose levels 7–9 times daily. They all have a telephone number to make contact if they need, and the consultations were made every 3 months by a multi professional team.

The following data were obtained: sex, age, time of MDI use, time of CIIT use, mean glycosylated hemoglobin levels (mHbA1c), number of severe hypoglycemic events requiring help for recovery, and number of DKA episodes. HbA1c levels were measured by HPLC and it was the same method during all the study.

The research protocol was approved by the Research Ethics Committee with waiver of informed consent.

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