

## Diabetic Ketoacidosis at Diagnosis in Austrian Children: A Population-Based Analysis, 1989-2011

Maria Fritsch, MD<sup>1</sup>, Edith Schober, MD<sup>1</sup>, Birgit Rami-Merhar, MD<sup>1</sup>, Sabine Hofer, MD<sup>2</sup>, Elke Fröhlich-Reiterer, MD<sup>3</sup>, and Thomas Waldhoer, PhD<sup>4</sup>, on behalf of the Austrian Diabetes Incidence Study Group\*

**Objective** To analyze the effect of a community-based, poster-focused prevention program on the frequency of diabetic ketoacidosis (DKA) at diabetes onset in Austria.

**Study design** All newly diagnosed patients with diabetes  $\leq 15$  years of age were registered prospectively by the Austrian Diabetes Incidence Study Group. Registered data included initial blood glucose, pH, and ketonuria. DKA was defined as pH  $< 7.3$  and severe DKA as pH  $< 7.1$ . Data between 1989 and 2011 were available. In autumn, 2009, a community-based prevention program similar to the Parma Campaign, in which posters were dispensed broadly, was initiated. The frequency of DKA at the onset of diabetes in the years 2005-2009 and 2010-2011 was compared.

**Results** During the study period, 4038 children were registered. A total of 37.2% presented with DKA; 26% had a mild and 11.2% a severe form. The frequency of DKA was negatively associated with age at onset. In the years before the intervention program, 26% had mild DKA compared with 27% after the intervention (not significant). The prevalence of severe DKA in the years before the campaign was 12% compared with 9.5% thereafter (not significant). No significant change in the DKA rate at onset by the prevention program could be found when we compared age groups  $< 5$ , 5 to  $< 10$ , and 10 to  $< 15$  years, neither for mild nor for severe DKA.

**Conclusion** The frequency of DKA in children with newly diagnosed type 1 diabetes in Austria is high and did not change despite the efforts of a community-based information program. (*J Pediatr* 2013; ■: ■-■).

Diabetic ketoacidosis (DKA) is a life-threatening complication of type 1 diabetes mellitus (DMT1) present in 15%-80% of children at the time of diagnosis.<sup>1-3</sup> The prevalence of DKA at onset varies widely between studies, and an inverse correlation with the reported regional incidence rate of diabetes and the prevalence of DKA at diagnosis has been found.<sup>1-4</sup> In Austria the prevalence of DKA at diabetes onset was observed to be constant at approximately 35% during the past 2 decades.<sup>5</sup>

Some recent investigations in Northern European countries reported a spontaneous decrease of DKA at onset,<sup>6-9</sup> which could be the result of an increase of medical awareness caused by a high and still-increasing background incidence<sup>6,8,9</sup> In Austria, as in most European countries, the incidence of childhood DMT1 also is increasing.<sup>10,11</sup> Because medical awareness in health care professionals should have improved in the previous decades, one might expect a decrease of onset DKA.

The published results of an information campaign performed in the region of Parma (Northern Italy) showing a persistent reduction of the DKA rate from 78% to 12.5% were promising and stimulating.<sup>12-14</sup> The aim of our study was to introduce a nationwide diabetes prevention campaign in Austria similar to the "Parma Campaign"<sup>13</sup> and to analyze the prospectively recorded DKA rate at the onset of diabetes in children 15 years of age and younger.

### Methods

The study was approved by the ethic committee of the Medical University of Vienna. All newly diagnosed cases of DMT1 in children  $< 15$  years of age are registered prospectively by a nationwide network covering all pediatric hospitals, wards, and diabetologists since 1989 (Austrian Diabetes Incidence Study Group). The completeness of case ascertainment is  $> 93\%$ , with a uniform completeness of ascertainment over time. Since 1989 the Austrian incidence data are included in the Eurodiab ACE study, and therefore we used the same case definition for type 1 diabetes.<sup>11</sup>

From the <sup>1</sup>Department of Pediatrics, Medical University of Vienna, Vienna, Austria; <sup>2</sup>Department of Pediatrics, Medical University of Innsbruck, Innsbruck, Austria; <sup>3</sup>Department of Pediatrics, Medical University of Graz, Graz, Austria; and <sup>4</sup>Department of Epidemiology, Center of Public Health, Medical University of Vienna, Vienna, Austria

\*A list of members of the Austrian Diabetes Incidence Study Group is available at [www.jpeds.com](http://www.jpeds.com) (Appendix).

Supported by Novo Nordisk Austria and Sanofi Aventis Austria. The poster campaign was supported by Abbott Austria, Bayer Healthcare Austria, Eli Lilly Austria, Medtronic Austria, Menarini Diagnostics Austria, Novo Nordisk Austria, Roche Austria, and Sanofi Aventis Austria. The funders had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript. The authors declare no conflicts of interest.

0022-3476/\$ - see front matter. Copyright © 2013 Mosby Inc. All rights reserved. <http://dx.doi.org/10.1016/j.jpeds.2013.06.033>

|      |                          |
|------|--------------------------|
| DKA  | Diabetic ketoacidosis    |
| DMT1 | Type 1 diabetes mellitus |



**Figure 1.** Posters for **A**, adults (Translation: If your child is often thirsty or tired and starts to wet the bed again, then contact your general practitioner today. Children can have diabetes.) and **B**, children (Translation: Is this your experience? I had 12 glasses of water already today. I am so tired. I can't read from the back of the classroom. I have been to the toilet 10 times today. Speak to your doctor, it could be diabetes.) displayed at schools, kindergartens, medical offices, and pharmacies throughout Austria in autumn 2009 describing early hyperglycemic symptoms and encouraging one to contact a medical doctor.

The data set comprises date of birth, sex, date of first insulin dose, blood glucose at diagnosis, height and weight at onset, pH, ketonuria, and clinical symptoms (hyperventilation, unconsciousness) of DKA at manifestation. DKA was defined as pH < 7.3. Mild DKA was defined as pH < 7.3 to ≥ 7.1, and severe DKA as pH < 7.1 or clinical signs of severe acidosis as hyperventilation or unconsciousness. Data between January 1, 1989, and December 31, 2011, were available.

In September 2009, concurrent with the beginning of the school year a media campaign was initiated nationwide in Austria with the support of the Austrian Diabetes Society (ie, ÖDG), the Austrian Paediatric Society (ie, ÖGKJ), and the Austrian Federal Ministry for Education, the Arts and Culture (ie, bm:ukk). Posters providing information on the early signs of hyperglycemia and glucosuria were created either for adults or children who could read (Figure 1). Posters were distributed together with a letter explaining

DKA prevention to all kindergartens (n = 4175), primary and secondary schools (n = 6268), and pharmacies (n = 1200).

In addition all Austrian pediatricians and general practitioners (n = 15 700) received the posters together with an article on diabetes in childhood that pointed out the symptoms of DKA. Furthermore, medical journals (*Ärztkrone*, *Diabetesforum*) with articles on DKA in childhood were distributed to all medical offices.

The posters were mounted during the meetings of the Austrian Diabetes Society (Autumn 2009 and Spring 2010) and of the Austrian Paediatric Society (Autumn 2009).

Medical education of school medical officers twice a year (2010) included a session on early clinical signs of diabetes in childhood and information about the DKA-prevention program.

In autumn 2009, a broadcast in Austrian television (ORF 2) was dedicated to the DKA-prevention campaign. Eighteen

**Table I.** Age at diabetes manifestation in children in Austria between 1989 and 2011 and onset DKA rates (no, mild, and severe DKA)

| DKA, n, %                 | Age at manifestation, y |            |            |             | Total |
|---------------------------|-------------------------|------------|------------|-------------|-------|
|                           | 0-<2                    | 2-<5       | 5-<10      | 10-<15      |       |
| No DKA (pH ≥ 7.3)         | 85, 38.5%               | 440, 60.9% | 972, 68.6% | 1040, 61.9% | 2537  |
| Mild DKA (pH < 7.3 ≥ 7.1) | 82, 37.1%               | 208, 28.8% | 323, 22.8% | 435, 25.9%  | 1048  |
| Severe DKA (pH < 7.1)     | 54, 24.4%               | 74, 10.3%  | 121, 8.6%  | 204, 12.2%  | 453   |
| Total                     | 221                     | 722        | 1416       | 1679        | 4038  |

Download English Version:

<https://daneshyari.com/en/article/6223330>

Download Persian Version:

<https://daneshyari.com/article/6223330>

[Daneshyari.com](https://daneshyari.com)