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Bartosz Wilczyński[1] ⓘ, Joanna Bober[1], Justyna Putek[2], Edwin Kuźnik[2]

[1]Faculty of Medicine, Wroclaw Medical University, Wroclaw, Poland
[2]Department of Diabetology and Internal Medicine, Wroclaw Medical University, Wroclaw, Poland

Ketoacidosis in Patients with Type 1 Diabetes — Causative Factors and Influencing the Duration of Hospitalization: A Retrospective Study

Introduction

The most common acute hyperglycemic complication of type 1 diabetes (T1D) is diabetic ketoacidosis (DKA), which takes the form of an acute syndrome of disturbances involving metabolism, water-electrolyte balance and acid-base balance. It is characterized by a triad of symptoms in the form of hyperglycemia, ketosis and metabolic acidosis. Without optimal treatment, DKA has significant mortality rate, although it is largely preventable with appropriate therapy [1]. In this study, we focused on the causative factors of DKA and factors influencing the duration of hospitalization of adult patients with DKA.

Materials and methods

This is a retrospective study that analyzed 30 adult patients with T1D treated for diagnosed DKA in the Department of Angiology, Hypertension and Diabetology at the Wroclaw Medical University from 2015 to 2022. Based on medical records, we analyzed causative factors of DKA, symptoms, laboratory results and factors influencing the duration of hospitalization. The obtained results were statistically analyzed using IBM SPSS version 26 for Windows® (Statistical Package for Social Sciences) computer program. Data were analyzed using statistical tests: Shapiro-Willka, Levene, t-Student, Mann-Whitney U, and Pearson's r and Spearman's rho correlations. A p-value < 0.05 indicated statistical significance.

Results

A total of 30 patients over the age of 18 were included in the study: 14 women (46.7%) and 16 men (53.3%). Infection was responsible for the onset of DKA in 12 (40.0%) cases, inadequate insulin supply in 10 (33.3%), newly diagnosed T1D in 6 (20.0%), alcohol in 4 (13.3%), and personal insulin pump occlusion in 2 (6,7%) (Fig. 1). The causative factors could not be determined for 4 patients (13,3%). In 3 cases (10.0%), both inadequate insulin supply and excessive alcohol consumption were responsible for the onset of DKA. In another 3 cases (10.0%), inadequate insulin supply was accompanied by infection.

The mean duration of hospitalization was 12.7 ± 4.6 days, which correlated with diabetes duration (0.494, p = 0.023) and platelet count (0.388, p = 0.034). The mean HbA1c% was 11.8 ± 1.5% (min. 7,1%), which means that no patient met the criteria for metabolic control set by the Diabetes Poland guidelines.

Discussion

The percentage distribution of the prevalence of causative factors for DKA varies by geographic location, but inadequate insulin supply, infections and de novo diabetes remain the most important factors. For
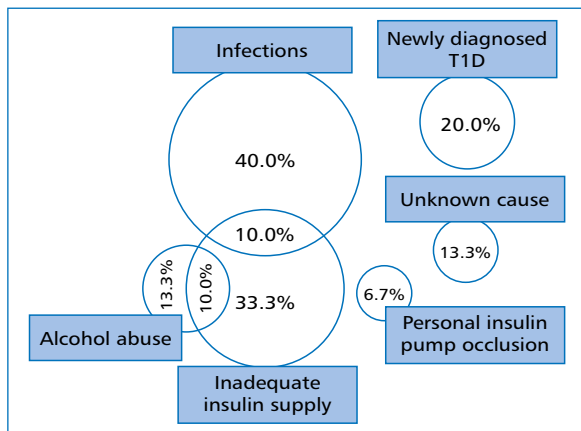
Figure 1. Percentage Distribution of Causative Factors of Diabetic Ketoacidosis

example, in the US, inadequate insulin supply is the most common causative factor for DKA (41.0–59.6%), followed by newly diagnosed diabetes (17.2–23.8%) and infections (14.0–16.0) [2, 3]. In Indonesia, on the other hand, infections are responsible for 58.3% of DKA, while insulin dose failure accounts for only 13.3% of cases [4]. A retrospective analysis of patients with DKA treated between 2008 and 2011 at a university hospital in Poznan, Poland, showed that the most common causative factors were insulin dose failure (47.6%) and infections (41.8%), which is consistent with our findings. Moreover, for one in four patients (24.3%), DKA was associated with newly diagnosed T1D [5]. Interestingly, despite widespread access to insulin in Poland, many cases were due to inadequate insulin supply (33,3% of

cases in our analysis). Moreover, patients on an alcoholic binge were not taking adequate insulin (10.0% of all cases). This underscores the importance of patient education in conducting effective therapy and the special necessity of treating alcoholic disease in patients with T1D. In our opinion, it would be interesting to further analyze the population of adult patients who do not take proper treatment for T1D for various reasons.

Article information

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Conflict of interest

The authors declare that there is no conflict of interest.

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