

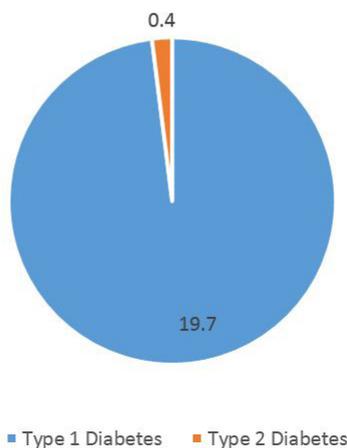
Onset of Type 1 Diabetes Mellitus Presenting With Diabetic Ketoacidosis Requiring Hospitalization in a 20-Year-Old Male: A Case Report

Kristin Tivener, MET, AT, Allan Liggett, EdD, AT, and Darryl Mitchell, ATS • Missouri State University

Type 1 (insulin-dependent) diabetes mellitus (DM) accounts for 5–10% of all cases of DM worldwide.^{1,2} During 2002–2005 in the United States, 15,600 children and adolescents were newly diagnosed with type 1 diabetes annually.³ Among individuals younger than 10 years of age, the rate of new cases of type 1 diabetes diagnosis was 19.7 per 100,000 each year, and from 10–19 years of age, the rate of new cases was 18.6 per 100,000³ (see Figure 1). Commonly referred to by the term juvenile-onset diabetes because onset is common

in childhood and early adulthood, type 1 DM is a chronic autoimmune metabolic disease characterized by progressive destruction of the pancreatic β -cells, usually leading to absolute insulin deficiency.^{2,4} Type 1 DM can be classified into two forms: type 1A (immune-mediated diabetes), which results from cellular-mediated autoimmune destruction of the β -cells of the pancreas;^{1,2} and, far less frequently, type 1B (idiopathic diabetes), where patients have permanent insulinopenia and are prone to sporadic episodes of ketoacidosis, but have no known etiology or evidence of autoimmunity.^{2,4,5}

New Cases of Diabetes in US per 100,000 of Youth Ages Younger than 10



New Cases of Diabetes in US per 100,000 of Youth Ages 10 Years or Older

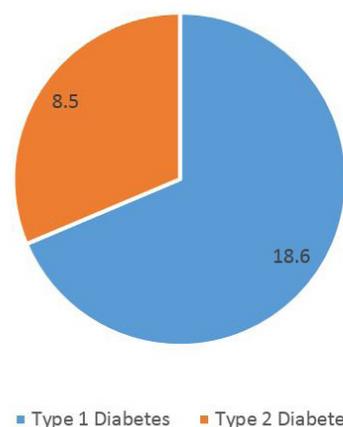


Figure 1 Prevalence of new cases of type 1 and type 2 diabetes among youths in the United States 2002–2005 (information from National Institute of Diabetes³).

A wide variation in the duration of symptoms preceding clinical diagnosis from 1 to 180 days has been found in some studies;⁶ however, in most cases type 1 DM in children and adolescents has an abrupt clinical onset over a 2–3 week period.^{6–8} Recent data suggests 50–60% of those with type 1 DM are younger than 16–18 years at presentation of the disease.^{4,6} The rate and presentation of β -cell destruction is quite variable, being rapid in some individuals and slow in others, while others may show rapid change in the presence of infection (bacterial or viral) or other stress.^{1,9} A variety of presenting symptoms have been described, the most common being the classic triad of polyuria (excessive urination), polydipsia (excessive thirst), and weight loss.^{1,6,10} These classic triad symptoms have been reported in 73–95% of children and 81–96% of young adults with the onset of type 1 DM.^{2,6} Ethnicity and family history of diabetes play a large role in risk factors for diabetes. In the United States, diabetes is prevalent in 7.1% of Whites, 8.4% of Asian-Americans, 11.8% of Hispanics, and 12.6% of African Americans.³ Multiple genetic predispositions for type 1 DM provides both susceptibility toward, and protection from, the disease and is largely dependent on the immune response and regulator genes that are inherited.¹¹

If diagnosis and clinical management of DM is delayed, the patient is at a higher risk of suffering a serious acute complication such as diabetic ketoacidosis (DKA).¹² Life-threatening DKA, which is characterized by the triad of hyperglycemia, acidosis, and ketosis, has manifested in 15–30% of initial cases of diabetes.^{12,15} Further, DKA is the leading cause of morbidity and mortality in children with type 1 DM, with mortality rates ranging from .15% (USA)¹⁴ to 1% (worldwide).¹⁵

The purpose of this report is to present a case of a 20-year-old male with an onset of type 1 DM who presented with DKA requiring hospitalization. We present this report to describe the patient's common onset of symptoms that went unrecognized as diabetes until the disease progressed to life-threatening DKA in order to identify the factors athletic trainers (ATs) should monitor athletic populations for to identify risk factors, provide early clinical recognition and diagnosis, and prevent life-threatening conditions associated with DM.

This case study presents a patient-athlete who had an undiagnosed DM condition. However, it is important to note relevant discussion regarding athletic participation for patients with diabetes and the role of the AT or sports health care provider in the management

of this disease. The American Academy of Pediatrics¹⁶ provides recommendations and suggested restrictions on sport participation for athletes with various medical conditions based on the identified risk of injury or likelihood of adversely affecting the medical condition. Patient-athletes diagnosed with DM are not restricted in sport participation, however, it is recommended that proper attention is given for diet, blood glucose concentration, hydration, and insulin therapy.¹⁶ Further, the American Association of Diabetes Educators (AADE) supports regular physical activity, including sport participation, as contributing to improvements in glycemic control, weight management, and quality of life.¹⁷

The certified athletic trainer or sports health care provider plays an important role in the interprofessional diabetes management team and often has more contact with the athlete than other members of the team.¹⁸ The National Athletic Trainers' Association (NATA) recommends guidelines for the management of the athlete with type 1 DM in the categories of: "diabetes care plan; supplies for athletic training kits; preparticipation physical examination (PPE); recognition, treatment, and prevention of hypoglycemia; recognition, treatment, and prevention of hyperglycemia; insulin administration; travel recommendations; and athletic injury and glycemic control" (p. 536).¹⁸ This NATA position statement¹⁸ is intended to provide the AT specific knowledge and description of skills necessary to properly assist the athlete in effective maintenance of the disease during the demands of sport participation. The primary goal of diabetes management is to maintain normal, or near-normal, blood glucose levels. Insulin replacement therapy, delivered through insulin pumps or multiple daily injections, is the primary method to maintain blood glucose levels. It is important to note, aside from the physiological disturbances to blood glucose levels in physical activity, the AT must also be watchful of damage to the insulin pump through physical contact and reduction of adhesives in the infusion site of the insulin pump due to heavy sweating or contact with water. Complete review of the roles and responsibilities as part of the diabetes management team is recommended for ATs who work with patients with diabetes.

Case Report

A 20-year-old African American male intramural basketball player, who was also an athletic training student,