

CASE REPORT

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Factors associated with mortality in Type 1 Diabetes Mellitus: A Case Report

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Abstract

Background: The management of children with type 1 diabetes mellitus (T1DM) remains a major challenge in developing countries.

Case presentation: We report an adolescent male who was diagnosed with T1DM at the age of 11 years when he presented at a private hospital with diabetic ketoacidosis. He received emergency treatment there and was subsequently referred to our tertiary hospital for expert care. All through the period of management, there was poor clinic attendance, poor glucose monitoring, poor compliance with insulin therapy, and ultimately, poorly controlled diabetes. Later, he developed diabetic autonomic neuropathy which manifested as unawareness of bladder fullness with secondary enuresis and fecal incontinence. He was also severely malnourished. At his last admission, seven years after the initial diagnosis, he presented with burnt hands and feet, which were injuries sustained from putting his extremities in naked flames when he lapsed into a coma during a religious activity. He received multidisciplinary management but died a few weeks later.

Discussion and conclusion: This case is being reported to draw attention to the plight of children with T1DM from the low socioeconomic class in developing countries. In such children, poverty and ignorance may have profound negative effects on the management and outcome of T1DM.

Keywords: Health system, Ignorance, Mortality, Poverty, Type 1 diabetes mellitus.

Background

Globally, nearly half a billion people are living with diabetes mellitus and the cost of treatment is reportedly on the increase, especially in low- and middle-income countries (1, 2). Type 1 diabetes mellitus (T1DM) is characterized by immune-mediated destruction of pancreatic islet cells, resulting in absolute insulin deficiency, and is usually diagnosed in childhood (3). As a result of this, children with T1DM will require lifelong exogenous insulin therapy. The morbidity and mortality from T1DM are reportedly high in Nigeria, as most affected children are from the low socioeconomic background and usually are first diagnosed when they present with diabetic ketoacidosis, which can mimic other common childhood ailments (3, 4).

The eradication of poverty in all its forms is listed as the first among the sustainable development goals, as it has been closely linked to ignorance, disease, and sadly, deaths, especially from preventable causes (5). It has also been established that religion and

healthcare are strongly related, especially in developing countries (6). It is therefore not uncommon in the clinic setting to see patients denying the existence of illness on spiritual grounds, or sometimes leaning more towards spiritual healing for their ailments, despite the availability of effective medical treatment.

T1DM is burdensome as it affects every aspect of day-to-day life and requires multidisciplinary care (7). The burden is reportedly huge in developing countries due to poor diagnostic facilities and challenges with achieving glycaemic control (3). Several complications have been reported in children with T1DM, mostly due to poor glycaemic control (8). The declaration by the International Diabetes Federation (IDF) that no child should die of diabetes mellitus relies heavily on the availability of adequate care and support for families (9). This case report is aimed at creating awareness about the challenges of managing T1DM, particularly in resource-limited areas, drawing attention to the plight of children with diabetes, as well as advocating for

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increased awareness and support for families caring for children with T1DM.

Case presentation

We report an adolescent male, the third of four children in a monogamous, non-consanguineous marriage, and from a low socioeconomic background who was diagnosed with T1DM at age 11 years when he presented at a private hospital with diabetic ketoacidosis. He received emergency treatment there and was subsequently referred to our tertiary hospital for expert care. Adequate counseling and continuous education on diabetes and its management were given at each clinic visit. He was placed on subcutaneous insulin (Mixtard 30:70) which was not regularly purchased. Most of the required investigations, including glycosylated hemoglobin, could also not be done as a result of severe financial constraints and he had no health insurance coverage. The managing team provided a personal glucometer for him with some glucose test strips for blood glucose monitoring as well as occasional monetary incentives. He had multidisciplinary care which involved the pediatric endocrinology team and dietician as well as ophthalmologic review. He had poor clinic attendance and later defaulted, only to re-present four years later with marked weight loss, unawareness of bladder fullness with secondary enuresis, and fecal incontinence with the passage of recently ingested meals within 10 minutes of feeding, which were in keeping with diabetic autonomic

neuropathy. He also had a chronic left thigh ulcer. His meals were composed mainly of carbohydrates. At the clinic, he had an episode of fecal incontinence and walk-in diabetic ketoacidosis. The few blood glucose values from his diary were mostly high; as high as 589 mg/dl (32.7 mmol/l). The blood pressure was normal and he was in puberty. His height (1.51 m) and body mass index (15.4 kg/m²) were between -2 and -3SD (WHO charts), while the weight was 35 kg. Thereafter, he defaulted for another two years.

Four weeks before his final presentation, he attended an overnight religious program with his mother but lapsed into unconsciousness during the program. In an attempt to revive him, fellow attendees at the meeting put his hands and feet in the fire. He suffered severe burn injuries with the inability to use both hands and feet (Figures 1 and 2). Due to severe financial constraints, he did not present at the hospital until four weeks after the incident. At presentation, he had signs of sepsis, poor glycaemic control, and was also in depression. His multi-disciplinary management was initially affected by the lack of funds. The managing team raised some funds to support his care. He attended the follow-up clinic only six times and had a phone conversation for care a couple of times.

Amputation of the unsalvageable parts of the limbs was recommended by the Orthopaedic surgeons but the patient and his parents declined. Sadly, he died from overwhelming sepsis, seven years after the onset of T1DM.

Figure 1: Extensive burn injuries of both hands with exposure of deep tissues. (Picture was taken with mother and patient's permission).



Figure 2: Burn injuries to the right foot. (Picture was taken with mother and patient's permission).



Discussion and conclusion

The turbulent course and eventual mortality in this patient who had T1DM were very saddening and could have been prevented. This is the first mortality of this nature among children with T1DM in our facility. All through the management, the devastating effects of poverty, ignorance, and poor health-seeking behavior were evident in the described case. It had been previously reported that most of the children receiving care for T1DM in Sagamu, Nigeria, were from the low socio-economic class, similar to the index patient (10). The implication of this is that without adequate support, these children are more likely to have preventable complications, and may eventually die from diabetes. Also, their families may further be impoverished in the course of providing care.

Presently, the retail cost of insulin and test strips for twice-daily blood glucose monitoring, excluding the cost of a glucometer, over one month in Nigeria is about 40-50 USD. This is unaffordable for most children and families attending the diabetes clinic; thus, resulting in prolonged periods of insulin lack and rationing, with accompanying debilitating consequences, as observed in this case. In Nigeria, the National Health Insurance Scheme (NHIS), especially the community-based health insurance, which the index patient could have benefitted from, is grossly under-subscribed. Out-of-pocket payment constitutes up to 70% of healthcare funding in the country (11). If the health system and indeed, the NHIS is

improved, this will positively impact the lives of children with T1DM and their families.

The pieces of evidence of gastrointestinal and genitourinary diabetic autonomic neuropathy observed in the patient were the first reported among diabetic children in Sagamu, and have been linked to long-standing poor glycaemic control (8). Unfortunately, the symptoms developed within four years of diagnosis in the index case, which is a relatively short period. This greatly emphasizes the need for adequate metabolic control in diabetic patients.

Hypoglycaemic or hyperglycaemic coma can occur anywhere and at any time in diabetic patients. It is therefore important that diabetes education and appropriate emergency interventions be made available in places like schools, worship centers, and other places that children are likely to visit. It is also important that harmful cultural practices be discouraged as such measures carried out during diabetic emergencies or coma may predispose a child to irreversible consequences and even death as occurred in our patient. Of note is the need to adopt a patient-centered approach by involving stakeholders like religious leaders, when necessary, in the care of patients with T1DM to dispel myths about diabetes mellitus, improve care and prevent complications (12).

There is an urgent need for massive and continuing education of the populace on the management of diabetes, particularly diabetic emergencies, and departure from harmful practices, while strengthening collaborative efforts. The involvement of government, non-

governmental organizations, and philanthropic individuals will go a long way in ameliorating the challenges faced by children with T1DM.

In conclusion, without adequate, continuous care and support for children with T1DM in Nigeria, the course and outcome may be devastating and highly unfavorable.

List of abbreviations

IDF: International Diabetes Federation
NHIS: National Health Insurance Scheme
T1DM: Type 1 Diabetes Mellitus
WHO: World Health Organisation

Declarations

Ethics approval and consent to participate

Consent was obtained from the parents.

Consent for publication

The authors hereby transfer all copyright ownership exclusively to the journal, if this work is published by the journal.

Availability of data and materials

Not applicable

Competing interests

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Authors' contributions

AOA and FMB developed the concept, design and the drafting of the manuscript while IAO and AOO contributed to the design and critically reviewed the manuscript. The final draft was read and approved by all the authors.

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