

# Incidence and Predictors of Diabetic Ketoacidosis among Children with Diabetes

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## Abstract

Diabetic ketoacidosis remains a relevant problem in children with diabetes. Its incidence is wide ranging across the world due to quality of health care services and socioeconomic circumstances; in recent study in Ethiopia high incidence was observed. The interacting factors for diabetic ketoacidosis development are absolute or relative insulin deficiency. In established diabetes diabetic ketoacidosis develops when treatment fails to adequately control blood glucose concentration. Treatment failure can be due to medication non adherence and relative ineffectiveness of insulin when insulin action is antagonized by physiological stress such as infection and inappropriate storage of insulin at home. Diabetic ketoacidosis and its associated complications can be prevented with proper diabetic education and treatment.

**Keywords:** Incidence; Diabetic ketoacidosis; Children; Known diabetes

## Description

Diabetic Ketoacidosis (DKA) remains an acute emergency in children with diabetes, which results due to an absolute or relative insulin deficiency. It has a significant morbidity (neurologic sequel) and the leading cause of death. Its related complication includes cerebral edema, hypoglycemia, hypokalemia, pulmonary edema, acute renal failure, shock and vascular thrombosis [1].

The incidence of DKA in established diabetes children is wide ranging across the world due to the difference in the access and quality of health care services and socioeconomic circumstances. International society of pediatrics and adolescent diabetes estimates, the risk of DKA in known diabetes was 1%-10% per patient per year in children [2]. The incidence of DKA in established diabetes in Africa is unknown. However, recently published study in Ethiopia revealed the incidence of DKA in known diabetes was 27.24 cases per 100 child-years [3]. This observation was higher than previous studies done in developed countries in US 8 per 100 person-years [4], in Sweden 3.2-3.6/100 patient-years [5] and Austria 8.4 to 18.4 per 100,000 per year [6]. The high incidence of DKA may be due to Lack of appropriate diabetic education and

insufficient resources concerning the home self-management in developing countries including Ethiopia [7]. Furthermore, poor access to health care facilities and poor health care seeking behaviours of the society during illness, result in a delay in care that further complicating the disease process [8].

The interacting factors for DKA development are absolute or relative insulin deficiency as the initial primary event in progressive cell failure. In established diabetes DKA develops when treatment fails to adequately control blood glucose concentration. Treatment failure can be due to omission of insulin. Many studies agree that medication non adherence was significantly associated with DKA [9]. On the top of this recent study in Ethiopia revealed inappropriate storage of insulin at home was significantly associated with DKA [3]. Moreover, DKA can also exist due to the relative ineffectiveness of insulin when insulin action is antagonized by physiological stress such as infection that leading to excessive counter-regulatory hormones. Together, these hormonal changes augment glycogenolysis and gluconeogenesis while limiting glucose utilization, resulting in hyperglycemia and DKA [9]. This more pronounced in Africa, due to children's are prone to infections such as pneumonia, upper

respiratory tract infection, gastroenteritis, which exacerbates the occurrence of DKA and leading to more severe dehydration and acidosis [1]. In a recent study in Ethiopia, the majority of children with diabetes have an upper respiratory tract infection followed by skin fungal infection, pneumonia, gastroenteritis, urinary tract infection, otitis media and other infections. Also, most children with diabetes in Africa encountered malnourished and hypoglycemic episode [3,10].

## Discussion and Conclusion

DKA and its associated complications can be prevented with proper diabetic education and treatment. Awareness of proper diabetic education concerning (nutritional management, insulin injection techniques, exercise, self-monitoring of blood glucose, storage of insulin at home, awareness of sign and symptoms, health seeking behaviour during illness) on the patients with diabetic mellitus, health care providers and on the part of the general public can help to minimize the development of DKA. Late diagnosis, delayed treatment and lack of appropriate monitoring are usually associated with more morbidity and mortality as well as increased hospital costs.

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## Author's Contribution

Conceptualization and methodology by BA and HZ original draft preparation by BA, writing review and editing by BA and HZ

## Ethics Approval and Consent to Participate

Ethical review was done by Pharma Health college Department of Public Health Permission letters were obtained from Sidama Regional Health Bureau. The purpose of the study was explained to study participants. Identification codes were given to ensure confidentiality of individual client information.

Written informed consent was obtained from all participants.

## Competing Interests

The authors declare that they have no competing interests.

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