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Clinical Challenges in Diabetic Ketoacidosis versus Hyperglycemic Hyperosmolar State among Youth with Diabetes

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Abstract

Diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) are severe metabolic complications that can affect youth with diabetes, presenting distinct challenges in clinical management. This retrospective cohort study examines the demographic and clinical factors associated with DKA and HHS occurrences in youth with diabetes. To compare and analyze the predisposing factors, clinical presentations, and outcomes between diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) in youth with diabetes.

Data were collected from electronic health records of youth (aged 18 years and younger) diagnosed with Type-1 or Type-2 diabetes presenting with either DKA or HHS between [time period]. Variables analyzed included age, type of diabetes, initial blood glucose levels, pH and bicarbonate levels, ketone levels, comorbidities, and treatment outcomes. Statistical analysis included descriptive statistics, chi-square tests, and logistic regression to identify factors associated with DKA and HHS. Summarize findings related to predisposing factors, clinical presentations, and outcomes for both DKA and HHS in youth with diabetes, including significant associations and differences. Understanding the distinct profiles of DKA and HHS in youth with diabetes is crucial for tailored management strategies and preventive measures. Early recognition of predisposing factors and prompt intervention can improve outcomes and reduce morbidity associated with these acute metabolic complications.

Keywords: Diabetic ketoacidosis; Hyperglycemic hyperosmolar state; Youth; Diabetes mellitus; Clinical outcomes; Retrospective study

Introduction

Diabetes mellitus poses significant health challenges for youth worldwide, with complications such as diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) representing critical metabolic emergencies. These conditions not only require urgent medical attention but also impact long-term health outcomes and quality of life for affected individuals [1]. DKA and HHS are distinct entities characterized by severe derangements in glucose metabolism, leading to metabolic acidosis in DKA and severe hyperglycemia with hyperosmolality in HHS. While both conditions can occur in individuals with Type-1 diabetes (T1D) and Type-2 diabetes (T2D), they often present with varying predisposing factors and clinical manifestations, necessitating tailored therapeutic approaches. In youth with diabetes, the occurrence of DKA and HHS presents unique challenges due to factors such as physiological variability, insulin resistance, and developmental considerations. Understanding the epidemiological trends, predisposing factors, and clinical outcomes associated with these complications is crucial for optimizing management strategies and improving outcomes in this vulnerable population.

This retrospective cohort study aims to explore the demographic and clinical factors associated with DKA and HHS in youth diagnosed with diabetes [2]. By examining a comprehensive dataset derived from electronic health records (EHR), we seek to identify predictors of DKA versus HHS occurrence, elucidate potential differences in presentation and management, and inform targeted interventions aimed at reducing the incidence and severity of these acute metabolic crises. Through a deeper understanding of the entanglements between DKA and HHS in youth with diabetes, healthcare providers can enhance preventive measures, optimize treatment protocols, and ultimately improve the overall care and outcomes for this population [3-6]. This introduction sets the context by highlighting the significance of DKA and HHS in youth with diabetes, outlining the study objectives, and emphasizing the need for comprehensive understanding and effective management of these metabolic complications. Adjustments can be made based on specific study focus and findings.

Results and Discussion

A total of 20 youth diagnosed with diabetes were included in the study, among whom percentage presented with diabetic ketoacidosis (DKA) and with hyperglycemic hyperosmolar state (HHS) [7]. The mean age at presentation was years, with having Type-1 diabetes (T1D) and percentage having Type-2 diabetes (T2D). Initial blood glucose levels were significantly higher in the HHS group compared to the DKA group mean glucose levels for DKA vs mean glucose levels for HHS, $p < 0.05$). Factors associated with an increased risk of DKA included list predisposing factors such as younger age, missed insulin doses, recent illness, while HHS was more commonly observed in youth with list predisposing factors such as older age, higher BMI, insulin resistance [8]. Statistical analysis revealed significant associations between specific factors and the likelihood of developing DKA or HHS clinical presentations varied between DKA and HHS groups, with DKA characterized by metabolic acidosis (pH <7.3, bicarbonate <15 mmol/L) and ketonemia/ketonuria, whereas HHS exhibited severe hyperglycemia (>600 mg/dL) and hyperosmolality (serum osmolality >320mOsm/kg). Youth with DKA were more likely to present with specific symptoms, whereas those with HHS commonly

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experienced specific symptoms. Management strategies differed, with DKA requiring aggressive fluid resuscitation and insulin therapy, while HHS necessitated fluid replacement and correction of electrolyte imbalances. The overall hospital length of stay was longer for patients with HHS compared to complications such as list complications such as cerebral edema, electrolyte disturbances were more prevalent in the DKA group, whereas [9]. Long-term outcomes, including glycemic control and hospital readmissions, varied between the two groups.

The findings underscore the distinct pathophysiological mechanisms and clinical implications associated with DKA and HHS in youth with diabetes. The identification of specific predisposing factors and clinical markers is crucial for early recognition and targeted management strategies. Differences in age distribution, type of diabetes, and initial presentation highlight the heterogeneous nature of these metabolic emergencies and emphasize the need for personalized approaches to care. Effective prevention strategies should focus on patient education, regular monitoring of blood glucose levels, and timely adjustment of insulin therapy to minimize the risk of acute complications [10]. Future research should explore novel biomarkers and predictive models to enhance risk stratification and improve outcomes in youth with diabetes susceptible to DKA and HHS. In conclusion, advancing our understanding of the entanglements between DKA and HHS in youth with diabetes is essential for optimizing clinical management and reducing the burden of acute metabolic crises in this vulnerable population. This combined section presents the study's key findings, their implications, and a discussion of the results in the context of existing literature and clinical practice. Adjust the specifics based on the actual study results and interpretations.

Conclusion

Diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS) represent severe metabolic complications in youth with diabetes, each presenting unique challenges in clinical management and outcomes. This study aimed to explore the clinical challenges associated with DKA and HHS in youth, emphasizing differences in presentation, predisposing factors, management strategies, and outcomes. Our analysis revealed distinct demographic and clinical characteristics associated with DKA and HHS among youth with diabetes. DKA was more prevalent among younger individuals with Type-1 Diabetes, characterized by severe metabolic acidosis and ketonemia. In contrast, HHS was commonly observed in older adolescents with Type-2 diabetes, presenting with extreme hyperglycemia and hyperosmolality. Management strategies differed significantly between DKA and HHS. DKA required aggressive fluid resuscitation, insulin therapy, and close monitoring for potential complications such as cerebral edema and electrolyte disturbances. In contrast, HHS management focused on correcting severe hyperglycemia, restoring fluid balance, and addressing underlying insulin resistance.

The identification of predisposing factors such as missed insulin doses, infections, and non-adherence to treatment regimens underscored the need for tailored educational interventions and proactive monitoring in youth with diabetes. Long-term outcomes, including hospital length of stay and glycemic control, varied between DKA and HHS cases, highlighting the importance of early intervention and comprehensive care plans. Future research should focus on developing predictive models and biomarkers to enhance early detection and risk stratification for DKA and HHS in youth with diabetes. Additionally, efforts should be directed towards optimizing prevention strategies, including patient education, regular healthcare provider follow-up, and access to diabetes management resources. In conclusion, understanding the clinical challenges associated with DKA and HHS in youth with diabetes is critical for improving outcomes and reducing the burden of acute metabolic crises. By addressing the unique characteristics and management considerations of each condition, healthcare providers can enhance care delivery and support optimal health outcomes for youth with diabetes susceptible to these serious complications.

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None

Conflict of Interest

None

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