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Analyzing Euglycemic Diabetic Ketoacidosis Trends Amidst the Rise of SGLT-2 Inhibitors: A Comprehensive Review

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Abstract

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Keywords: DKA, Euglycemic Diabetic Ketoacidosis (EDKA), SGLT-2 Inhibitors, Type II Diabetes, Patient Education

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Title

Analyzing Euglycemic Diabetic Ketoacidosis Trends Amidst the Rise of SGLT-2 Inhibitors: A Comprehensive Review

Abstract

This overview investigates the increasing prevalence of sodium-glucose cotransporter-2 (SGLT-2) inhibitor-associated euglycemic diabetic ketoacidosis (EDKA) in type II diabetes patients. Due to its tendency to occur with normal or somewhat high blood sugar levels, EDKA poses unique obstacles to diagnosis and treatment. Based on an extensive review of recent literature, we examine clinical motifs, hazards, and remedy approaches. Our results emphasize how crucial it is to educate patients and actively monitor their ketone levels, particularly before and after operations or sickness. Our goal is to gain a greater awareness of the intricacies of EDKA in order to guide future investigations in this field and boost therapeutic results and evaluation.

Contents

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Introduction

Diabetes mellitus (DM), which affects millions of people worldwide and has an important influence on morbidity and mortality, is still a significant threat to global health. The percentage of people worldwide who suffer from diabetes mellitus (DM) was 9.3% in 2019; by 2030, it is expected to reach 10.2% (Dagdeviren et al., 2024). The majority of reported cases of diabetes mellitus (DM) are type 2 diabetes (T2DM), which frequently results in problems involving renal failure, cardiovascular disease, and diabetic ketoacidosis (DKA). Conventionally, DKA is identified by the existence of deadly high glucose levels, high ketone body levels, and decreased pH, which are frequently brought on by insufficient insulin (Mistry & Eschler, 2021). Euglycemic diabetic ketoacidosis (EDKA), a less common but still dangerous variation, has been identified, especially in individuals receiving sodium-glucose cotransporter-2 inhibitors (SGLT2i). The identification and cure of EDKA are more challenging because, in contrast to conventional DKA, it does not exhibit marked hyperglycemia (Mistry & Eschler, 2021).

Since its launch in 2013, SGLT2i has improved glycemic control, decreased the likelihood of cardiovascular disease, and provided kidney-related defense, revolutionizing the treatment of type 2 diabetes (Juneja et al., 2023). Because of these positive aspects, SGLT2i is now widely used in clinical settings. However, the rising number of EDKA instances has also been linked to the use of these medications, a condition whose unusual presentation makes diagnosis extremely difficult (Dagdeviren et al., 2024). Normal or slightly elevated blood glucose levels associated with EDKA may mask the underlying ketoacidosis, delaying screening and therapy and possibly having dire consequences.

The emergence of SGLT2i and the growing acceptance of ketogenic diets, which not only help with glycemic management and weight loss but also encourage ketosis, have occurred at the same time (Mistry & Eschler, 2021). Since both treatments can lead to a state of ketoacidosis without ordinary hyperglycemia, the combination of SGLT2i therapy and ketogenic diets poses a special risk for EDKA. This link between dietary management and medication emphasizes the need for patients and healthcare professionals to be more aware of the risks involved in using SGLT2i.

Even though EDKA is becoming more widely recognized, there are still a lot of unanswered questions about its pathophysiology, risk factors, and best practices for management—especially when it comes to SGLT2i therapy and ketogenic diets (Juneja et al., 2023). The majority of the literature that is currently available is in the form of case reports and short series, so in order to give clinicians more precise guidance, thorough analyses that summarize these findings are required. This review aims to close this gap by carefully analyzing the body of research on EDKA that is currently available, with an emphasis on cases related to SGLT2i. With the use of this analysis, we hope to improve knowledge about EDKA, pinpoint common risk factors, and provide guidance on practical management techniques to lessen the likelihood of this dangerous consequence (Juneja et al., 2023).

Table 1

Biochemical features of DKA(Diabetic Ketoacidosis) and EDKA(Euglycemic Diabetic Ketoacidosis) (York, n.d.).

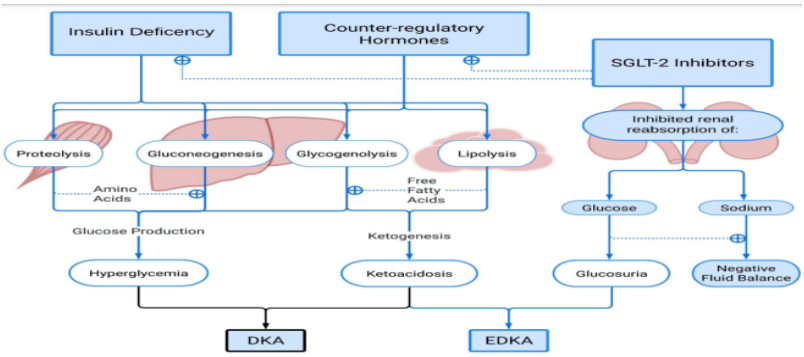
Measurement	Normal Range	DKA	EDKA
Blood Glucose	80-130 mg/dL	Above 250 mg/dL	Below 250 mg/dL
Arterial pH	7.35-7.45	Less than 7.3	Less than 7.3
Serum Bicarbonate	22-26 mEq/L	Less than 18 mEq/L	Less than 18 mEq/L
Urine Ketones	None present	Present	Present
Serum Ketones	None present	Present	Present
Anion Gap	0 mEq/L	10-12 mEq/L	10-12 mEq/L

Pathophysiology

Diabetes ketoacidosis (DKA) is a well-known condition characterized by an excess of counter-regulatory hormones, including growth hormone, catecholamines, glucagon, and corticosteroids, in conjunction with a relative or absolute lack of insulin (Chow et al., 2023). Nevertheless, the underlying mechanisms of euglycemic diabetic ketoacidosis (EDKA) are not as well understood. Early theories proposed that a combination of elevated gluconeogenesis-free fatty acid metabolism and low renal sensitivities for the elimination of glucose could cause EDKA (Chow et al., 2023; Plewa et al., 2024).

Figure 1

Pathophysiology of DKA (Diabetic Ketoacidosis) and EDKA (Euglycemic Diabetic Ketoacidosis). SGLT-2 inhibitors=Sodium Glucose Transporter 2 Inhibitors (Chow et al., 2023).



Additional information has been gleaned from recent studies, mainly concerning the function of sodium-glucose cotransporter-2 (SGLT-2) inhibitors. By preventing glucose reabsorption in the renal proximal tubules, these medications enhance the amount of glucose that is cleared by the kidneys (Vallon, 2011). This process increases glucose excretion through urine and improves gluconeogenesis when combined with lower insulin doses. Furthermore, it has been discovered that SGLT-2 inhibitors increase glucagon levels, though the precise mechanism is still unknown. Increased glucagon levels encourage ketogenesis, which aids in the emergence of EDKA (Chao, 2014; Chow et al., 2023). In addition, SGLT-2 inhibitors have the potential to cause an imbalance between sodium and fluids in the body, which would exacerbate the hypovolemic mode associated with DKA (Goldenberg et al., 2016). Dehydration causes an increase in cortisol, adrenaline, and glucagon levels, which exacerbates lipolysis, ketogenesis, and insulin resistance. Regardless of fluctuations in insulin and glucagon levels, additional research has revealed that SGLT-2 inhibitors might improve norepinephrine turnover, resulting in increased hepatic glucose production. These results demonstrate the intricate interactions among different variables which may develop EDKA, in SGLT-2 inhibitor-using patients (Chow et al., 2023).

Aim of the Study

This review's objective is to thoroughly examine the patterns, clinical manifestations, risk factors, and management approaches related to euglycemic diabetic ketoacidosis (EDKA) in light of the growing popularity of SGLT-2 inhibitors. This review aims to improve the precision of diagnosis, increase both patient and healthcare professional comprehension of EDKA, and offer perspectives on efficient preventive and treatment strategies by integrating the available evidence.

Methodology

We followed a methodological strategy to conduct this in-depth analysis by identifying and assessing pertinent literature concerning EDKA in relation to SGLT-2 inhibitors. We searched databases such as PubMed and Google Scholar to locate vetted papers, case studies, and reviews that had been published on the topic. Keywords in the search strategy that were used included "SGLT-2 inhibitors," "Type II Diabetes," "EDKA," "DKA," and "Sodium-Glucose Cotransporter 2 inhibitors." We take in concordance research findings and publications from 2014 to 2024 to give an overview of trends, risk factors, clinical characteristics, and management approaches concerning EDKA.

The selection of the articles was developed in terms of their pertinence to the subject matter; major emphasis was placed on furnishing comprehensive clinical information, case reports, and systematic reviews. Articles not in the English language and for which no full text was available were excluded. The trials that make up the final selection contribute to information about the pathophysiology of the disease, clinical monitoring, and the distribution of EDKA among patients on SGLT-2 inhibitors.

Euglycemic Diabetic Ketoacidosis in the Era of SGLT- 2 Inhibitors

Euglycemic diabetic ketoacidosis, or EDKA, is a major problem that is up more often. It's linked to glucose transporter type 2 (ST-2) inhibitors. These medications are quite useful for managing type 2 diabetes and can help improve heart health and kidney function too. Now, here's the tricky part: Unlike regular diabetic ketoacidosis (DKA), EDKA doesn't show really high blood sugar levels. So, this is harder to spot. Doctors classify EDKA into mild, moderate, & severe types based on things like serum pH and bicarbonate levels. They also look at the anion gap and ketone levels to understand the stages better. What causes EDKA? It involves not enough insulin, higher glucose production in the liver (we call that gluconeogenesis), and it's boosted by SGLT-2 inhibitors. These meds make you pee out more sugar and lift glucagon levels. Some risk factors for EDKA include being dehydrated, infections, starvation, & certain conditions—like pregnancy! The symptoms can look a lot like DKA, but usually, there's not much high blood sugar involved. To manage EDKA properly, we must keep a close eye on the anion gap & ketone levels! Giving the right insulin and fluids is super important too. Delaying the jump to subcutaneous insulin helps prevent coming back to this issue again. Plus, educating patients about how to recognize the signs of EDKA—and understanding the risks when using SGLT-2 inhibitors—is vital for quick diagnosis & better results in the long run (Chow et al., 2023).

Prolonged Acidosis is a Feature of Sglt2i-induced euglycemic Diabetic Ketoacidosis

This article talks about two cases of EDKA by SGLT2 inhibitors. Surprisingly, these cases lasted much longer than what we usually see with DKA treatments. Both patients had type 2 diabetes that wasn't well managed, plus they couldn't take metformin. After their surgeries, some

unclear symptoms were discovered, they had serious metabolic acidosis with high levels of ketones but their blood sugar was normal. In both, the acidosis took an unusually long 92 hours to go away. That's way longer than what we should expect for hyperglycemic DKA. This extended period hints that EDKA might work differently in the body. It could be related to problems with getting rid of ketones in the urine or changes in insulin & glucagon behavior. These cases remind us how important it is for doctors to recognize that EDKA can take a long time to resolve. Also, it would be wise to stop SGLT2 inhibitors before surgeries to avoid this issue. Looking ahead, more research should dive into what causes EDKA and how to spot it early so we can manage it better (Rafey et al., 2019).

Euglycemic Diabetic Ketoacidosis Associated With the Use Of A Sodium–Glucose Cotransporter-2 Inhibitor

A patient (about 70 years old), who has type 2 diabetes, came in feeling really yucky. He had nausea, vomiting, & after starting his diabetes meds again. This happened after he had heart surgery and coronary artery bypass. The doctors found out he had something called euglycemic diabetic ketoacidosis (or DKA for short). It's a fancy term that means his blood sugar was normal or almost normal, but he still got pretty sick. His mild pneumonia and the SGLT-2 inhibitor he was taking likely caused it. Now, euglycemic DKA is rare, but it's been happening more often with those SGLT-2 inhibitors. Because of that, the FDA is warning people and suggesting close checks on ketone levels when someone is sick, having surgery, or facing other issues. The good news is the man started to feel better with some intravenous fluids, insulin, & antibiotics. However, they decided not to give him the SGLT-2 inhibitor again. This situation really shows how important it is for patients to know the signs of DKA. Plus, following sick-day rules can help prevent these kinds of problems from popping up (Zhang & Tamilia, 2018).

Ketoacidosis with Euglycemia in a Patient with Type 2 Diabetes Mellitus Taking Dapagliflozin A Case Report

A 23-year-old woman, who has type 2 diabetes, had been on dapagliflozin for two days. One day, she felt terrible pain in her stomach. Doctors found that she had acute pancreatitis caused by high triglycerides. Then, something serious happened; she developed euglycemic ketoacidosis. This is a rare condition linked to medicines like dapagliflozin (SGLT2i). Even though she got conservative treatment, her situation worsened. She faced severe metabolic acidosis and even shock! Luckily, they were able to manage it through continuous renal replacement therapy (CRRT). This case really shines a light on the possible risks of SGLT2 inhibitors. They might trigger euglycemic ketoacidosis, especially for folks dealing with pancreatitis or similar issues. It's super important to act quickly & treat this rare but dangerous complication right away (Yeo et al., 2019).

A Case of Euglycemic Diabetic Ketoacidosis Following Long-term Empagliflozin Therapy

A 57-year-old man with a history of approximately ten years of type 2 diabetes presented with an unexpected complication of his disease. Following six months of therapy with empagliflozin, he was admitted with euglycemic diabetic ketoacidosis despite normal blood glucose levels. What is the likely cause? It can be related to a very low-carb diet that he was on, recently taking krill oil, and fasting before a minor outpatient procedure. When he presented, he was lightheaded and had respiratory alkalosis. Docs looked at his labs and found b-hydroxybutyrate high and there was an anion gap. Fortunately, this euDKA was relatively quickly treated with fluids, insulin, & glucose—the outcome was a very quick recovery for him. This is a wonderful lesson to be reminded of the very real risk of euDKA from medications such as SGLT2 inhibitors, one of which is empagliflozin. It is really important that patients on this class of drugs be educated about triggers and early symptoms of ketoacidosis (Farjo et al., 2016).

Managing Hospitalized Patients Taking SGLT2 Inhibitors: Reducing the Risk of Euglycemic Diabetic Ketoacidosis

With the increased indications of SGLT2 inhibitors in the management of type II diabetes, cardiac complications, and renal disorders, the possibility of euglycemic diabetic ketoacidosis-one condition in which ketoacidosis might occur with normal blood glucose levels is a growing concern in hospitalized patients. This risk is high in acute illnesses or after surgery, and hence, management is needed carefully to prevent and treat euglycemic DKA. Prevention mainly includes the assessment of the patient's risk factors before the prescription of SGLT2 inhibitors and their discontinuation during an acute illness or surgery. It also involves monitoring symptoms for DKA inappropriately hospitalized patients with normal blood glucose levels. Euglycemic DKA is treated according to the standard treatment protocols of DKA, with modifications to account for a normal glucose level. The

use of SGLT2 inhibitors after resolution can be restarted in consideration of individual patient conditions and risk factors. Healthcare providers should educate patients on recognizing DKA symptoms and take a cautious approach to the continuation or re-initiation of SGLT2 inhibitors in hospitalized patients to minimize risks (Selwyn & Pichardo-Lowden, 2023).

Euglycemic Diabetic Ketoacidosis with Persistent Diuresis Treated with Canagliflozin

An instance of EDKA in a 27-year-old type II diabetic woman who was kept on the SGLT2 inhibitor canagliflozin therapy, is described in the paper. Normal or low blood glucose levels can cause euglycemic DKA, but they can also cause increased ketones and acidosis. This patient had persistent diuresis and only mild hyperglycemia, which is unusual but still experienced DKA. Her condition was linked to canagliflozin, which promotes glucose excretion through urine. She stopped taking the medication, but her diuresis and high urine output persisted. This case puts into perspective that SGLT2 inhibitors are best administered with caution in cases of type 2 diabetic patients who have low secretion of insulin or who follow a diet of strict carbohydrate restriction. The current study emphasizes that tiredness or nausea may be symptoms of the patients who are treated with SGLT2 inhibitors could raise suspicion of euglycemic DKA. A significant measure to control persistent diuresis is proper hydration (Adachi et al., 2017).

Severe Euglycemic Diabetic Ketoacidosis Secondary to Sodium-Glucose Co-Transporter 2 Inhibitor: Case Report and Literature Review

For a decade, SGLT2i has been one of the medications for Type II diabetes, known for its reduced renal and cardiovascular risks. However, they are also associated with a very serious, sometimes fatal, disease known as euglycemic diabetic ketoacidosis (euDKA) a potentially life-threatening complication of the disease. This is a case study about a 44-year-old lady with T2DM on canagliflozin, metformin, and vildagliptin presenting with severe euDKA and lactic acidosis. The patient presented with dyspnea, diarrhea, and dyspnea; laboratory tests revealed euglycemia and severe metabolic acidosis. The diabetic ketoacidosis (DKA) protocol was followed for her care after her admission to the ICU. The benefits of SGLT2i outweigh its risks, which is why the report emphasizes the significance of pre-screening and therapy of euDKA. Patients should be informed by clinicians about the significance of stopping SGLT2i during acute illness, fasting, or surgery in order to avoid euDKA. To effectively handle this complication, timely management, and routine monitoring are essential (El Ess & ElRishi, 2023).

Ketoacidosis and SGLT2 Inhibitors: A Narrative Review

Diabetes mellitus (DM), a common and rapidly expanding worldwide health concern, is typified by hyper-blood glucose resulting from compromised insulin function. Diabetes influenced about 10.5% of adults worldwide in 2021 and by 2045, that number is expected to rise to 12.2%. To safeguard serious complexities from developing, such as diabetic ketoacidosis (DKA) and chronic problems like cardiovascular and micro-vascular diseases, managing diabetes mellitus (DM) is a complicated process that calls for both medication and lifestyle modifications. A substantial insulin shortage causes DKA, a severe complication of diabetes that may be risky due to its high ketone levels and associated symptoms. Although specific diagnoses for DKA differ among organizations, the comorbidities that typically define the condition include high ketone levels, low pH, and high blood glucose. Even in the presence of a normal range of blood glucose levels, DKA is documented to take the rarer, grave state of euglycemic DKA, or euDKA. Infection or the use of medications such as SGLT2 inhibitors may be called many times with euDKA. Although it is rare, euDKA carries risks and therefore should be treated with the knowledge of its symptoms. Studies on euDKA have underlined the need for internationally accepted diagnostic criteria and highlighted patient education and vigilance as crucial parts of SGLT2 inhibitor treatment. Research in the future should be directed at mechanisms of euDKA and also reevaluate the safety of treatments for diabetes (Morace et al., 2024).

From Sweet to Sour: SGLT-2-Inhibitor-Induced Euglycemic Diabetic Ketoacidosis

Because of their advantages in lowering heart and kidney events, SGLT-2 inhibitors, which are mainly used for type II diabetes, now have extended indications that include chronic heart problems and CKD. These medications have a low risk of hypoglycemia and are effective, but they can cause EDKA, which occurs sometimes but dangerous adverse event. Diagnosing EDKA can be difficult because it is characterized by ketoacidosis with normal or low blood glucose levels. Reduced glucose reabsorption results in lower insulin levels and higher levels of ketogenesis in the pathophysiology. Inappropriate insulin dose adjustments and dehydration are additional

contributing factors. Ketoacidosis along with an increased anionic difference must be distinguished from other metabolic disorders in order to be diagnosed. While SGLT-2 inhibitors have many advantages, EDKA can have serious consequences, so it is important to be aware of it and to monitor it (Koceva & Kravos Tramš ek, 2024).

Euglycemic Ketoacidosis as a Complication of SGLT2 Inhibitor Therapy

The risks of SGLT-2 inhibitors are examined in the paper "EDKA as a Complication of SGLT2 Inhibitor Therapy. In particular, the relation between SGLT2 inhibitors and EDKA is observed. Even when BG level is normal or only slightly elevated, SGLT2 inhibitors, which reduce BG level by inhibiting glucose reuptake in the nephron; affect its function and can cause ketoacidosis. This disorder develops as a result of these medications' effects on the kidneys' ATP turnover, which lowers bicarbonate levels and promotes metabolic acidosis. Reduced insulin dosage, elevated insulin requirements, metabolic tension, less carbohydrate consumption, and specific illnesses like autoimmune diabetes are risk factors for developing ketoacidosis. Since there isn't much hyperglycemia, diagnosis can be difficult. Managing risk factors and keeping a close eye on patients—especially those with type 1 diabetes—during stressful or sick times are key components of treatment. The article emphasizes how crucial it is to exercise cautious management and oversight in order to successfully prevent and treat this complication (Palmer & Clegg, 2021).

Results

During our review, we found a considerable amount of research demonstrating how the use of SGLT-2 inhibitors in patients with Type II Diabetes is linked to a higher danger of Euglycemic Diabetic Ketoacidosis (EDKA). The review covered 11 studies in total, including reviews, cases, observations, and clinical investigations. Despite the fact that SGLT-2 inhibitors are generally beneficial in managing diabetes and lowering the risks associated with cardiovascular disease and kidney damage, these sources have consistently shown a higher incidence of EDKA across patients receiving these treatments (Chow et al., 2023).

Incidence and Clinical Presentation

EDKA is becoming more widely acknowledged as a dangerous but underestimated side effect among patients taking SGLT-2 inhibitors to treat type 2 diabetes. Diagnosing EDKA is more difficult because, in contrast with conventional diabetic ketoacidosis (DKA), it manifests as normal or only slightly elevated blood glucose levels (Mistry & Eschler, 2021). A variety of nonspecific symptoms, such as abdominal discomfort, nausea, vomiting, and general fatigue were frequently stated in the reviewed cases; these symptoms frequently caused an unexpected delay in detection (Adachi et al., 2017; Chow et al., 2023; Juneja et al., 2023).

Risk Factors

A number of risk factors, such as dehydration, acute illness, surgery, and low on low-carbohydrate diet use, have been linked to the emergence of EDKA (Adachi et al., 2017). Individuals who were starving or under a lot of metabolic strain, as well as those with underlying diseases like pancreatitis and infections, were especially vulnerable (El Ess & ElRishi, 2023). The study also made clear that women may be more vulnerable, particularly those who are expecting or recently gave birth (Chow et al., 2023).

Pathophysiology

The intake of SGLT-2 inhibitors exacerbates the pathophysiology of EDKA, which is characterized by elevated glucagon levels, enhanced hepatic gluconeogenesis, and an insufficient supply of insulin (Morace et al., 2024). These drugs help induce ketosis and encourage glycosuria without causing noticeably elevated blood sugar levels. An extended acidosis was seen in certain cases, indicating that EDKA might last longer than hyperglycemic DKA. This could be because of changes in the patterns of insulin and glucagon or ketone clearance (Chow et al., 2023).

Management and Outcomes

In the cases under review, the treatment of EDKA generally included insulin injections, intravenous fluids, and careful monitoring of electrolyte levels, especially ketone compounds and anionic gap levels (Farjo et al., 2016; Zhang & Tamilia, 2018). Crucially, the majority of cases demonstrated the necessity of stopping SGLT-2 inhibitors prior to surgery or during an acute illness in order to lower the risk of EDKA. The majority of patients improved with proper care, but the reality that some cases were chronic emphasizes the importance of prompt detection and raised awareness (El Ess & ElRishi, 2023).

Prevention and Patient Education

The results underscore the importance of patient education in averting EDKA. When taking SGLT-2 inhibitors, patients should be made alert of the probable adverse events and trained to spot early indications of ketoacidosis, particularly if they have other health issues that could make their situation worse (Morace et al., 2024). In addition, healthcare professionals ought to think about routinely checking the concentrations of ketones in patients who are in danger and establishing precise protocols for stopping SGLT-2 inhibitors when there is metabolic stress (El Ess & ElRishi, 2023).

Discussion

It points out the probable complications of SGLT-2 inhibitors in the treatment of Type 2 Diabetes due to the growing concern of Euglycemic Diabetic Ketoacidosis. Though SGLT-2 inhibitors hold so much promise in cardiac health and sugar regulation, their association with EDKA makes diagnosis complicated as there is no evident rise in blood sugar levels. The analysis pointed out the importance of close observation and knowledge through showing acute illness, low intake of carbohydrate food, and dehydration as some common risk factors. The fact that it is often diagnosed late further points out how important patient and healthcare provider education is in terms of symptoms, signs, and triggers of EDKA. Thus, this review finally concludes with advocating proactive prophylactic steps, such as temporal cessation of SGLT-2 inhibitors in states of metabolic stress, to minimize risks of EDKA and ensure adequate patient outcomes.

Conclusion

This brief overview suggests a strong association of SGLT-2 inhibitors with an increased risk for EDKA in patients with Type II diabetes. Although SGLT-2 inhibitors have their benefits in the management of diabetes and its associated conditions, the unusual presentation of EDKA in normal or only slightly raised blood sugar levels makes this a dangerous and often unrecognized complication. These results emphasize early detection, close monitoring, and appropriate measures, including temporary SGLT-2 inhibitor withdrawal during acute illness or surgery. Aggressive risk assessment and enhanced patient education are very vital in preventing EDKA. Further research is needed to focus on enhancing diagnostic criteria and studying measures for protection against SGLT-2 inhibitor-associated risks.

Limitations

Limitations of this review include publication bias, as it is a review of previously published studies and may have failed to capture important information in unpublished literature. Moreover, results concerned with EDKA and SGLT-2 inhibitors are not as widely applicative as much as they could have been given the variation in study design and populations of patients among the reviewed studies.

Future Prospective

The outlook of this review on the possible draws attention to the fact that more investigation is needed to point out the exact mechanisms underlying SGLT-2 inhibitor-associated EDKA. In fact, to get a better understanding of risk variables, patient groups, and potential genetic vulnerabilities, there is an urgent need for longitudinal research investigations. Standardized diagnostic requirements along with management guidelines for EDKA must also be drawn out. To improve perception and early recognition, patient and healthcare provider education programs will be crucial. Ultimately, investigating the upshots of different SGLT-2 inhibitors on the prevalence and consequences of EDKA may help prescribe medications more safely.

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