Review Article

Nursing Perspectives in Diabetic Ketoacidosis

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Abstract

Diabetic ketoacidosis(DKA) is a serious life threatening condition and it occurs when insulin production in our body is less.Diabetic ketoacidosis is a complication of diabeties mellitus and it mostly occur in hospitalize patients . Diabetic ketoacidisis condition mostly found in both type of diabeties such as Type 1 and Type 2 diabeties patients. In between 20-30% of cases of diabetic ketacidosis condition occure in newly diagnosed patient with diabeties . Almost till 20 years the mortality rate of diabetic ketoacidosis is 100 percent and till now there is no reduction in prevalence of diabetic ketoacidosis in younger patients due to that children are continuous suffering with death .

The mortality rate in Diabetic ketoacidosis is very important because it is a very serious life threatening condition so the prevalence of diabeties is very crucial. The younger are the foundation of future health care delivery system so the evaluation of their knowledge and continue development and upgrading regarding awareness and unstanding the sign and symptoms of diabetic ketoacidosis it helps to reduce the mortality rate of Diabetic ketoacidosis.

It's an emergency condition, so the health care professional becomes a vital part of managing diabetes-related hyperglycemic emergencies, rising health care costs and changing health care systems preventing signs and symptoms of diabetic ketoacidosis remains an essential requirement.

Effective management and prevention on diabetic ketoacidosis can reduced longer stay time in hospitalize patient.

Keywords: *Nursing perspective, Knowledge, Prevention, Sign and symptoms, Diabetic ketoacidosis.*

Introduction

Diabetic ketoacidosis is also called as diabetic acidosis and it is a serious life threatening complication of diabeties mellitus which causes a serious problem. Mostly the diabetic ketoacidosis condition affects to insulin dependent diabeties patients but it also affect to Non – insulin-dependent diabetes patients .[1] Diabetic ketoacidosis is a major diabetes complication in the United States and internationally.[2] Diabetic ketoacidosis is an metabolic emergency and it occurs with insulin deficiency ,hyperglycemic ,ketonemia and acidosis patients with diabeties mellitus. [3]

Diabetic ketoacidosis occurs when insulin production is less and severe insulin resistance in the hyperglycemic state. The crises occurs when there is problems with production and release of insulin .Dysfunction of beta cells results from inadequate glucose level stimulate to secrete amount of insulin and ultimately elevation of blood glucose level occur after a digestion of meal and with this formation of new glucose is suppressed . But in a hungar state , glucagon (counter-regulatory hormones) in which stored material are properly activated and formation of glucose is elevated .[2] Diabetic ketoacidosis disease was identified by Dreschfeld in 1886 untill 1922 insulin was discovered .Since 20 years the mortality rate of diabetic ketoacidosis was 100 percent and there is no reduction in mortality rate till now .

The approximately 20 -30% cases of Diabetic ketoacidosis occur in recentaly diagnosed patients with diabeties . The mortality rate of diabetic ketoacidosis is

occur due to its complication such as one of the cerebral edema . The knowledge regarding diabetic ketoacidosis that helps to adult and youth for the adoption of good health-related practices . Youth and adults are the pillars of our future health care system and the evaluation and continuous improvement of their understanding is very necessary and understanding of signs and symptoms of Diabetic Ketoacidosis and help to reduce the high mortality rate. [3]

It is an emergency condition, and the health care provider is a critical part of handling Hyperglycemiasis Similar diabetes emergencies, with higher health care charges and prevention of signs and symptoms of diabetic ketoacidosis remains an essential requirement for a changing healthcare managing and avoiding diabetic ketoacidosis in hospitals, admissions can be reduced and stay time shortened. [4]

PREVALENCE OF DIABETIC KETOACIDOSIS

Prevalence and occurrence of diabetic ketoacidosis and its symptoms

Very few studies have examined the incidence or prevalence of diabetic ketoacidosis in patients with diabetes, the Danish National Patient Registry identified four thousand eight hundred and seven admissions in 1996–2002 and 137 deaths diagnosed with diabetic ketoacidosis in 1996–2000. The estimated annual incidence of diabetic ketoacidosis was 12.9 per 100,000, higher in males relative to females over the age of 40 years. And the prevalence of diabetic ketoacidosis over 50 years in type 2 diabetes is approximately 12 percent of all patients.

Compared to previous studies, the occurance of incidence of diabetic ketoacidosis in children is decreasing with a high mortality rate recently and younger. [5]Diabetic ketoacidosis is a type 1 diabetes metabolic syndrome typically characterized by acidosis, ketosis, and hyperglycemia. Diabetes symptoms that may cause DKA to develop include polyuria, polydipsia, polyphagia, weight loss, vomiting, abdominal pain and fatigue. [6]

PRECIPITATING FACTORS IN DIABETIC KETOACIDOSIS

Precipitating factors such as infection, insulin omission or inadequate insulin administration, acute diseases include the cardiovascular system (myocardial infarction, stroke) and gastrointestinal tract (blindness, pancreatitis), including endocrine diseases (Cushing ‘s syndrome, acromegaly) and Stress due to recent surgical procedures may develop DKA which causes dehydration and may increase insulin hormones. Medicinal products such as corticosteroids, diuretics, beta-blockers, antipsychotics, and antiepileptics that influence carbohydrate metabolism and may, therefore, precipitate DKA. Many factors may also lead to DKA, such as eating disorders, psychiatric issues, insulin pump failure and illegal use of the drug. [3]

SIGN AND SYMPTOMS OF DIABETIC KETOACIDOSIS

Diabetic ketoacidosis is buildup acid in blood it occurs when the blood sugar level rises it is life-threatening but it takes a long time to become serious so it can prevent or treat in early. It causes When the body isn’t producing enough insulin. And body cell doesn’t use sugar from the blood it uses fat as fuel energy and burn the fat and make acid called ketones.

Those who have type 1 diabetes can develop ketoacidosis and Diabetic ketoacidosis happens with type 2 diabetes also and it leads to severe dehydration. When the blood sugar level rises above 240mg /dl have symptoms like dry mouth, feeling of thirsty, so check for ketone.

When ketone is not normal in that time showing warning signs: 1. Feel the belly hurts,2. Fruity breath smell,3. Tiredness, confusion and mental status changes,4. Hard time breathing, 5. Excessive urination,6. High blood glucose level,7. Presence of ketone in the urine,8. Abdominal pain,9. Nausea and vomiting. [7]

LABORATORY INVESTIGATIONS AND DIAGNOSIS CRITERIA OF DIABETIC KETOACIDOSIS

Initial laboratory examination of patients includes Plasma glucose, blood urea nitrogen, creatinine, electrolytes, osmolality, serum and urinary ketones, and urinalysis, as well as initial blood gases and a full differential blood count. . It should also be obtained an

electrocardiogram, X-ray in the chest, and samples of urine, sputum or blood. The DKA diagnosis includes Hyperglycemia (larger than 250 mg / dL), ketosis (anion gap greater than 12 mEq / L) and acidosis (arterial pH smaller than or equal to 7.3) . The intensity of DKA is classified as mild, moderate, or extreme, depending on the magnitude of the decrease in levels of arterial pH, serum bicarbonate, and emotional, rather than hyperglycemic. Not all ketoacidosis patients do have DKA. Medical history and plasma glucose levels range from slightly elevated (rarely 200 mg / dl) to hypoglycemia, differentiate between malnutrition ketosis and alcohol ketoacidosis. [3]

TREATMENT STRATEGIES

The DKA treatment target involves the preservation of volume status, hyperglycemia and ketoacidosis, metabolic abnormalities, electrolyte abnormalities, and precipitating factors. Before beginning a physical test, diabetic ketoacidosis care should be done first. Basic parameters should be obtained, and the final diagnosis should be made.

1. Fluid therapy in DKA : Replacement of fluid with normal saline also recommended to help expand interstitial, intracellular, intravascular and perfusion of kidney . Lacking cardiac compromise: First few hour of treatment 0.9 percent NaCl ie Isotonic saline should be administered intravenously at 15–20 ml / kg/1 h or 1–1.5 liter. But in general, if 0.45 percent NaCl infused at 250–500 ml / his elevated or normal at that time, serum sodium is. If the corrected Serum sodium is low, 0.9 percent NaCl should be intravenously administered at 250-500 ml / h. To know the successful progression with fluid replacement, blood pressure monitoring, and fluid deficiency are expected to correct within 24 hours of treatment. Measurement of the input/output fluid, laboratory values, should be carried out as required. To avoid iatrogenic fluid overload in renal or heart compromised patients, monitoring should have been updated for serum osmolality, frequent renal evaluation, assessment of cardiac status, evaluation of mental status. Fluid replacement administration depends on hemodynamic status, Status of hydration, serum electrolyte levels and urinal output. If the glucose level falls below 250 mg/dl, NaCl with DNS should administer and insulin administration continued until ketonemia is controlled. [3]

2. Insulin administration Therapy

The main objective of DKA treatment is to administer insulin on regular basis (0.1 units/kg) followed by (0.1 units/kg / h) by continue administration of intravenous infusion or repeated use of subcutaneous injection. If the glucose value in the first hour does not decrease by 50-75 mg, the dose of insulin infusion should increase for each hour until normal glucose levels are achieved. [3]

3.Potassium

Between mild - to – moderate range of hyperkalemia is common in DKA patients. Acidosis correction, insulin administration therapy, volume expander helps to reduce the concentration of potassium in the serum. Replacement of Potassium should be initiated to prevent hypokalemia when the Serum rates fell below normal. Treatment purpose is to keep the serum potassium levels within the normal range of 4–5 mEq / l. In general, DKA patients can develop hypokalaemia. In these cases the treatment of potassium will start with fluid therapy replacement and insulin therapy should be put off until potassium restore concentration to > 3.3mEq / l to avoid arrhythmias and weakness in the respiratory muscle. [3]

4.Bicarbonate

The use of sodium bicarbonate at DKA is only recommended if the pH value is below 7. When the patient is pH<6.9 then inject 100mmol of sodium bicarbonate (two ampules) with 20mEq KCI in 400ml of sterile water (an isotonic solution) for 2 hours at a rate of 200ml / h until the venous pH is > 7.0. Repeat until pH reaches > 7.0 every 2 hours if pH remains < 7.0.(3)

5.Phosphate

If DKA's total body phosphate deficiency is 1.0 mmol / kg body wt on average, serum phosphate levels are often normal or increased. For patients with heart disease, anemia or breathing disorder and with concentration of serum phosphate < 1.0 mg / dl, 20–30 mEq / l. Treatment of deficiency of potassium phosphate should be used to replace fluids at a rate of 4.5 mmol / h (K2 PO4 1.5 ml / h). The average replacement rate of phosphate considered safe is 4.5 mmol / h which helps to prevent hypophosphatemia-related heart and skeletal muscle weakness and respiratory failure. [3]

Complication Associated with DKA

DKA presents the two most common complications, hypoglycemia and hypokalemia, but these complications occurred with the low-dose insulin therapy. In DKA Constant monitoring of blood glucose (every 1–2 h) is required because many patients may experience hypoglycemia during DKA treatment without sweating, nervousness, fatigue , nausea, and tachycardia manifestations. For adult patients, cerebral edema is particularly rare when being treated with DKA . Cerebral edema symptoms include headache onset, gradual awareness deterioration, seizures, looseness of sphincter muscle incontinence, pupillary changes, bradycardia, blood pressure elevation, and respiratory arrest. Other complications of DKA include Syndrome of an adult respiratory syndrome (ARDS), and hyperchloremic acidosis, non-anion gap acidosis in hyperchloremic. In DKA patient Rhabdomyolysis in the compartment that causes the syndrome can lead to acute renal failure, severe hyperkalemia, hypocalcemia and muscle swelling. Classical signs of rhabdomyolysis include myalgia, fatigue and dark urine. It is recommended that the creatine kinase concentrations be detected early every 2 to 3 hours. [3]

Preventive Strategies

Diabetic ketoacidosis in a patient who is newly diagnosed with diabetes can only be prevented if the general public and primary care physicians are aware of the symptoms and if doctors are alert to the possibility of developing diabetic ketoacidosis, particularly concerning young children. It is quick to do a urine test for glycosuria. Adequate education and support will prevent diabetic ketoacidosis in patients with proven diabetes (and for their families). Identification of children at risk for such behaviors and social and psychological support intervention can alleviate these issues.[8] Given the risks and associated symptoms and complications of in patients with Diabetic ketoacidosis, strategies to prevent infections effectively are of paramount importance. Continued patient self-management awareness and support are vital for avoiding acute complications and reducing the risk of chronic complications. Patient care is the key to learning to fight illness.

The four important points are:

1. To explain the importance of insulin therapy during illness, and to emphasize that insulin should never be interrupted.

2. Regular interaction with health-care professionals is initiated.

3. Initiating early Fever and Managing Infections.

4. Ensuring adequate intake of liquids

Preventive strategies include avoiding excessive hydration and rapid plasma osmolality reduction, decreasing serum glucose levels and maintaining serum glucose concentration from 250 to 300 mg / dl to normal serum osmolality and improving mental status. Cerebral edema care requires Mannitol injection, which should be recommended for mechanical ventilation.

Prognosis

Many studies suggest that the prognosis of properly treated diabetic ketoacidosis patients is excellent, particularly in the younger patients. The average mortality rate for DKA is 2 per cent or less. The indices of weak DKA prognosis are deep coma, hypothermia, and oliguria. The worst prognosis is typically seen in older patients with serious undercurrent diseases (e.g. myocardial infarction, sepsis, or pneumonia), particularly when these patients are treated outside an intensive care unit. [8]

Discussion

The many studies revealed that the majority of participants exhibited average levels of knowledge about diabetic ketoacidosis. On the other hand, regarding awareness, there was minimum awareness concerning the causes, signs and symptoms and complications of DKA. However, this study revealed some gaps in the awareness concerning the prevention of sign and symptoms plan of management and complications of DKA. It has been concluded from the maximum study that the minimum of the individual has a basic knowledge of DKA and its management except in certain points; the importance of the collection of blood for a metabolic profile before initiation of therapy, stopping of insulin when the patient becomes hypokalemic, fluids infusion should be continuing for 24 hours, The importance of hourly blood glucose monitoring in patients and the use of sodium bicarbonate is controversial and recommended only when PH is below 7. There was a lack of DKA

awareness among participants concerning complications associated with DKA, diagnostic criteria and to some extent the precipitating factors. The overall knowledge and awareness related to the prevention of signs and symptoms were average among diabetes patients.[2]

Conclusion

With the combination of interdisciplinary collaboration and coordinated care, DKA's mortality has decreased dramatically in recent decades. Current practitioners face problems including monitoring DKA patients at the correct level of treatment and educating patients to stop repeating DKA episodes. The potential cost savings in the medical floors associated with caring for less critical DKA patients must be balanced against staffing ratios. Prevention of DKA may require further research and cooperation among hospitalized and outpatient practitioners, as well as patient education. [2]

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